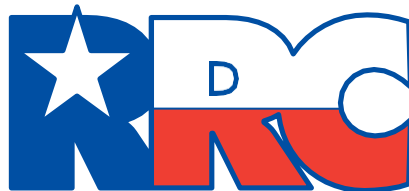


TEXAS CNG EXAMINATION STUDY GUIDE

Category 1
ASME and DOT
Container Manufacturer
Management Level



Railroad Commission of Texas

Notice

This publication is intended for use in its entirety as a guide for persons preparing to take a Railroad Commission CNG qualifying examination. Any other use or distribution of this publication or use or distribution of any portion of this publication for any purpose whatsoever is considered by the Railroad Commission of Texas to be misuse of this publication.

This publication is not intended to be an exhaustive treatment of the subjects covered and should not be interpreted as precluding the use of other safety programs or procedures that comply with (1) applicable federal, state, and/or local code provisions, statutes, ordinances, and/or other regulations, including, but not limited to, the Railroad Commission of Texas' *Regulations for Compressed Natural Gas and Liquefied Natural Gas* (16 Texas Administrative Code, Chapter 13) and codes adopted by the Railroad Commission of Texas, and/or (2) other industry standards and/or practices.

Every effort was made to ensure that this publication was accurate and up to date as of the date of publication. The reader is cautioned, however, about reliance on this publication or any portion thereof at any time thereafter, particularly because changes in technology are likely to occur that might make portions of this publication inaccurate and out-of-date. The Railroad Commission of Texas assumes no liability, under any circumstances, for any actions taken or omissions made in reliance on the contents of this publication, from whatever source, or any other consequences of any such reliance.

All rights reserved. No part of this publication may be reproduced or transmitted in any form without written permission from the Railroad Commission of Texas.

CNG EXAMINATION STUDY GUIDE Management-LEVEL

ASME and DOT Container Manufacturer Management Level

Who should use this guide?

You should use this guide if you plan to take the Railroad Commission’s management-level qualifying examination to perform CNG ASME and DOT Container Manufacturer activities.

A **Category 1** examination qualifies an individual to assemble, repair, test, sell, install, and subframe ASME and DOT containers.

What books do I need?



This examination tests your knowledge of the laws and standards that apply to ASME and DOT Container Management Level operations in Texas.

These laws and standards are found in:

Regulations for Compressed Natural Gas and Liquefied Natural Gas (Texas Railroad Commission)

NFPA 52, Vehicular Natural Gas Fuel Systems Code (2013 Edition)

NFPA 55, Compressed Gases and Cryogenic Fluids Code (2013 Edition)

Where do I get these books?

You may download the current edition of the Railroad Commission's *Regulations for Compressed Natural Gas And Liquefied Natural Gas* in PDF format free online at www.rrc.texas.gov. If you need printed copies, they may be purchased for \$10.00, tax included, by calling the Railroad Commission's publications office at (512) 463-7309.

You may also order NFPA manuals online at www.nfpa.org; click on "Codes and Standards."

Sections and Topics

Before you take this examination, you should know the definitions found in this study guide and the contents of the sections of the codes and standards listed below. The actual examination questions may not cover all the listed sections and topics.

Terms and Definitions

NOTE: The list below is **not** exhaustive.

You are responsible for knowing all the terms and definitions that apply to the CNG activities you will perform, as well as the rules and standards highlighted in this guide.

Regulations for Compressed Natural Gas and Liquefied Natural Gas (2023)

ASME--American Society of Mechanical Engineers.
Regulations for CNG, §13.3(2)

Cascade storage system--Storage in multiple cylinders.
Regulations for CNG, §13.3(6)

CNG cylinder--A cylinder or other container designed for use or used as part of a CNG system.
Regulations for CNG, §13.3(11)

CNG system--A system of safety devices, cylinders, piping, fittings, valves, compressors, regulators, dryers, gauges, relief devices, vents, installation fixtures, and other CNG equipment intended for use or used in any building or public place by the general public, or used in conjunction with a motor vehicle or mobile fuel system fueled by CNG, and any system or facilities designed to be used or used in the compression, sale, storage, transportation for delivery, or distribution of CNG in portable CNG cylinders, but does not include natural gas facilities, equipment, or pipelines located upstream of the outlet of the natural gas meter.
Regulations for CNG, §13.3(12)

Commercial installation--Any CNG installation located on premises other than a single-family dwelling used as a residence, or a private agricultural installation, including but not limited to a retail business establishment, school, convalescent home, hospital, retail CNG cylinder filling/exchange operation, service station, forklift refueling facility, or private motor/mobile fuel cylinder filling operation.
Regulations for CNG, §13.3(13)

Company representative--The individual designated to the Commission by a license applicant or a licensee as the principal individual in authority and actively supervising the conduct of the licensee's CNG activities.
Regulations for CNG, §13.3(15)

Compressed natural gas is a mixture of hydrocarbons in gases and vapors consisting principally of methane.
Regulations for CNG, §13.3(16)

Dispensing installation--A CNG installation that dispenses CNG from any source by any means into fuel supply cylinders installed on vehicles or into portable cylinders.

Regulations for CNG, §13.3(20)

Licensed--Authorized by the Commission to perform CNG activities through the issuance of a valid license.

Regulations for CNG, §13.3(25)

Licensee--A person which has applied for and been granted a CNG license by the Commission.

Regulations for CNG, §13.3(26)

Mobile fuel container--A CNG container mounted on a vehicle to store CNG as the fuel supply for uses other than the engine to propel the vehicle, including use in an auxiliary engine.

Regulations for CNG, §13.3(29)

Mobile fuel system--A CNG system which supplies natural gas fuel to an auxiliary engine other than the engine used to propel the vehicle or for other uses on the vehicle.

Regulations for CNG, §13.3(30)

Motor fuel container--A CNG container mounted on a vehicle to store CNG as the fuel supply to an engine used to propel the vehicle.

Regulations for CNG, §13.3(31)

Motor fuel system--A CNG system to supply natural gas as a fuel for an engine used to propel the vehicle.

Regulations for CNG, §13.3(32)

Operations supervisor--The individual who is certified by the Commission to actively supervise a licensee's CNG activities and is authorized by the licensee to implement operational changes.

Regulations for CNG, §13.3(34)

Outlet--A site operated by a CNG licensee from which any regulated CNG activity is performed.

Regulations for CNG, §13.3(35)

Pressure relief device--A device designed to provide a means of venting excess pressure to prevent rupture of a normally charged cylinder.

Regulations for CNG, §13.3(38)

Pullaway--The accidental separation of a hose from a cylinder, container, transfer equipment, or dispensing equipment, which could occur on a cylinder, container, transfer equipment, or dispensing equipment whether or not they are protected by a pullaway or breakaway device.

Regulations for CNG, §13.3(40)

Residential fueling facility--An assembly and its associated equipment and piping at a residence used for the compression and delivery of natural gas into vehicles.

Regulations for CNG, §13.3(42)

Trainee--An individual who has not yet taken and passed an employee-level rules examination.
Regulations for CNG, §13.3(47)

Transfer system--All piping, fittings, valves, pumps, compressors, meters, hoses, and equipment used in transferring CNG between containers.
Regulations for CNG, §13.3(48)

Transport--Any vehicle or combination of vehicles and CNG cylinders designed or adapted for use or used principally as a means of moving or delivering CNG from one place to another, including but not limited to any truck, trailer, semitrailer, cargo tank, or other vehicle used in the distribution of CNG.
Regulations for CNG, §13.3(49)

Ultimate consumer--The person controlling CNG immediately prior to its ignition.
Regulations for CNG, §13.3(50)

NFPA 52 (2013)

ASME Code. The American Society of Mechanical Engineers' *Boiler and Pressure Vessel Code*.
NFPA 52, §3.3.3

Container. A pressure vessel, cylinder, or cylinder(s) permanently manifolded together used to store CNG or LNG.
NFPA 52, §3.3.9

Cargo Transport Container. A mobile unit designed to transport LNG or CNG.
NFPA 52, §3.3.9.1

Composite Container. A container consisting of an inner metal or plastic gas-containing component, reinforced with a filament and resin outer layer.
NFPA 52, §3.3.9.2

Fuel Supply Container. A container mounted on a vehicle to store LNG or CNG as the fuel supply to the vehicle.
NFPA 52, §3.3.9.3

Fueling Facility Container. Primary storage for vehicular fueling.
NFPA 52, §3.3.9.4

Dispensing Station. A natural gas installation that dispenses CNG or LNG from storage containers or a distribution pipeline into vehicular fuel supply containers or into portable cylinders by means of a compressor, reformer, vaporizer, or pressure booster.
NFPA 52, §3.3.18

DOT. U.S. Department of Transportation.
NFPA 52, §3.3.19

Piping. A means of transporting natural gas. This term applies to refueling facilities.
NFPA 52, §3.3.42

Point of Transfer. The location where connections and disconnections are made.
NFPA 52, §3.3.43

Pressure.

Compression Discharge Pressure. The varying pressure at the point of discharge from the compressor.
NFPA 52, §3.3.44.1

Maximum Allowable Working Pressure (MAWP). The maximum pressure to which any component or portion of the pressure system can be subjected over the entire range of design temperatures. This value is $1.1 \times 1.25 \times$ the service pressure.
NFPA 52, §3.3.44.2

Operating Pressure. The varying pressure in a fuel supply container during normal container use.
NFPA 52, §3.3.44.3

Maximum Operating Pressure. The steady-state gauge pressure at which a part or system normally operates. This value is $1.25 \times$ the pressure.
NFPA 52, §3.3.44.3.1

Set Pressure. The start-to-discharge pressure for which a relief valve is set and marked.
NFPA 52, §3.3.44.5

Settled Pressure. The pressure in a container after the temperature of the gas reaches equilibrium.
NFPA 52, §3.3.44.6

Storage Pressure. The varying pressure in the storage containers.
NFPA 52, §3.3.44.7

Pressure Regulator. A device, either adjustable or nonadjustable, for controlling and maintaining, within acceptable limits, a uniform outlet pressure.
NFPA 52, §3.3.45

Pressure Vessel. A container or other component designed in accordance with the ASME Boiler and Pressure Vessel Code or CSA B51, Boiler, Pressure Vessel and Pressure Piping Code.
NFPA 52, §3.3.47

Vaporizer. A device other than a container that receives LNG in liquid form and adds sufficient heat to convert the liquid to a gaseous state, or a device used to add heat to LNG for the purpose of saturating LNG.
NFPA 52, §3.3.59

Water Capacity. The amount of water at 60°F required to fill a container.
NFPA 52, §3.3.63

NFPA 55 (2013)

CFR. The Code of Federal Regulations of the United States Government. [1, 2012]
NFPA 55, §3.3.18

Compressor. A mechanical device used to increase the pressure and the resultant density of a gas through the act of compression.
NFPA 55, §3.3.22

Cylinder. A pressure vessel designed for absolute pressures higher than 40 psi and having a circular cross section. It does not include a portable tank, multiunit tank car tank, cargo tank, or tank car.
NFPA 55, §3.3.29

Emergency Shutoff Valve. A designated valve designed to shut off the flow of gases or liquids.
NFPA 55, §3.3.37

Automatic Emergency Shutoff Valve. A designated fail-safe automatic closing valve designed to shut off the flow of gases or liquids that is initiated by a control system where the control system is activated by either manual or automatic means.
NFPA 55, §3.3.37.1

Manual Emergency Shutoff Valve. A designated valve designed to shut off the flow of gases or liquids that is manually operated.
NFPA 55, §3.3.37.2

Qualified Individual. An individual knowledgeable in the hazards of compressed gases and cryogenic fluids through training and work experience.
NFPA 55, §3.3.82

Tank.

Portable Tank. Any packaging over 60 U.S. gal capacity designed primarily to be loaded into or on, or temporarily attached to, a transport vehicle or ship and equipped with skids, mountings, or accessories to facilitate handling of the tank by mechanical means.
NFPA 55, §3.3.94.1

Stationary Tank. A packaging designed primarily for stationary installations not intended for loading, unloading, or attachment to a transport vehicle as part of its normal operation in the process of use.
NFPA 55, §3.3.94.2

Sample Question 1

Pressure Vessel is defined as a container or other component designed in accordance with the _____ Code.

- A. Railroad Commission
- B. DOT
- C. ASME
- D. Federal

Answer on last page.

Key Topics

NOTE: The list below is **not** exhaustive.

You are responsible for knowing all the facts, rules, standards and procedures that apply to the Natural Gas activities you will perform, as well as the rules and standards highlighted in this guide.

When you take the examination, read each question very carefully.

ADMINISTRATIVE RULES - GENERAL REQUIREMENTS

Company License

A Category 1 license for container assembly and repair authorizes the assembly, repair, testing, sale, installation, and subframing of ASME or DOT CNG containers. A Category 1 license includes all activities covered by both the Category 1A and 1B licenses. The original license fee is \$1,000; the renewal fee is \$600.

Regulations for CNG, §13.61(b)(1)

In addition to NFPA 55 §7.1.12, no person may engage in CNG activities until that person has obtained a license from the Commission authorizing that activity, except as follows:

(1) A state agency or institution, county, municipality, school district or other governmental subdivision is exempt from licensing requirements as provided in Texas Natural Resources Code, §116.031(d), if the entity is performing CNG activities on its own behalf, but is required to obtain a license to perform CNG activities for or on behalf of a second party.

(2) An ultimate consumer is not subject to the licensing requirements of this chapter in order to perform those CNG activities dealing only with the ultimate consumer; however, a license is required to register a transport or cylinder delivery unit. An ultimate consumer's license does not require a fee or a company representative.

(3) An original manufacturer of a new motor vehicle powered by CNG or a subcontractor of a manufacturer who produces a new CNG powered motor vehicle for the manufacturer is not subject to the licensing requirements of this chapter, but shall comply with all other rules in this chapter.

Regulations for CNG, §13.61(e)

Licensees, registered manufacturers, company representatives, and operations supervisors at each outlet shall have copies of all current licenses and/or manufacturer registration certificates and certification cards for employees at that location available for inspection during regular business hours.

Regulations for CNG, §13.61(h)

Licenses or manufacturer registrations issued under this chapter expire one year after issuance at midnight on the last day of the month previous to the month in which they are issued.

Regulations for CNG, §13.61(i)

A properly completed CNG Form 1001 listing all names under which CNG related activities requiring licensing are to be conducted and the applicant's properly qualified company representative, and the following forms or documents as applicable:

(A) CNG Form 1001A if the applicant will operate any outlets pursuant to subsection (1) of this section;

(B) CNG Form 1007, 1007A, or 1007T and any information requested in §13.69 of this title if the applicant intends to register any CNG cargo tanks or container delivery units;

(C) CNG Form 1019 if the applicant will be transferring the operation of one or more existing retail service stations.

Regulations for CNG, §13.61(k)(1)

A person who is otherwise eligible to renew a license or registration may renew an unexpired license or registration by paying the required renewal fee to the commission before the expiration date of the license or registration. A person whose license or registration has expired may not engage in activities that require a license or registration until the license or registration has been renewed.

Texas Natural Resources Code, §116.033(b)

Application for a New Certificate

(1) In addition to NFPA 52 §§ 1.4.3 and 4.2, and NFPA 55 §4.7, no person shall perform work, directly supervise CNG activities, or be employed in any capacity requiring contact with CNG unless that individual is employed by a licensee and:

(A) is a certificate holder who is in compliance with renewal requirements in subsection (h) of this section;

(B) is a trainee who complies with subsection (f) of this section; or

(C) holds a current examination exemption pursuant to subsection (g) of this section.

(2) Any person transporting CNG on a public roadway must be properly certified, even if the unit is operated by an ultimate consumer.

Regulations for CNG, §13.70(a)

An individual who passes the applicable rules examination with a score of at least 75% will become a certificate holder. AFS will send a certificate to the licensee listed on the CNG Form 1016.

If a licensee is not listed on the form, AFS will send the certificate to the individual's personal address.

(A) Successful completion of any required examination shall be credited to and accrue to the individual.

(B) An individual who has been issued a certificate shall make it readily available and shall present the certificate to any Commission employee or agent who requests proof of certification.

Regulations for CNG, §13.70(b)(1)

An individual who files CNG Form 1016 and pays the applicable nonrefundable examination fee may take the rules examination.

(A) Dates and locations of available Commission CNG examinations may be obtained on the Commission's web site. Examinations may be administered:

- (i) at the Commission's AFS Training Center in Austin;
- (ii) at other designated times and locations around the state; and
- (iii) through an online testing or proctoring service.

(B) Individuals or companies may request in writing that examinations be given in their area. AFS shall schedule examinations at its discretion.

(C) Exam fees.

(i) The nonrefundable management-level rules examination fee is \$70.

(ii) The nonrefundable employee-level rules examination fee is \$40.

(iii) The nonrefundable examination fees shall be paid each time an individual takes an examination.

(iv) A military service member, military veteran, or military spouse shall be exempt from the examination fee pursuant to the requirements in § 13.76 of this title (relating to Military Fee Exemption). An individual who receives a military fee exemption is not exempt from renewal fees specified in subsection (h) of this section.

(v) Beginning February 7, 2023, individuals who register for an examination to be administered by a testing or proctoring service shall pay any fee required by the testing or proctoring service in addition to paying the examination fee to the Commission.

(D) Time limits.

(i) An applicant shall complete the examination within two hours.

(ii) The examination proctor shall be the official timekeeper.

(iii) An examinee shall submit the examination and the answer sheet to the examination proctor before or at the end of the established time limit for an examination.

(iv) The examination proctor shall mark any answer sheet that was not completed within the time limit.

(E) Each individual who performs CNG activities as an employee of an ultimate consumer or a state agency, county, municipality, school district, or other governmental subdivision shall be properly supervised by his or her employer. Any such individual who is not certified by AFS to perform such CNG activities shall be properly trained by a competent person in the safe performance of such CNG activities.

Regulations for CNG, §13.70(b)(3)

Failure of any examination shall immediately disqualify the individual from performing any CNG related activities covered by the examination which is failed, except for activities covered by a separate examination which the individual has passed.

Any individual who fails an examination administered by the Commission at the Austin location may retake the same examination one additional time during a business day.

Any subsequent examinations shall be taken on another business day, unless approved by the AFS director.

An individual who fails an examination may request an analysis of the individual's performance on the examination.

Regulations for CNG, §13.70(e)

Trainees.

(1) A licensee or ultimate consumer may employ an individual as a trainee for a period not to exceed 45 calendar days without that individual having successfully completed the rules examination, as specified in subsection (b) of this section or registered as specified in subsection (g) of this section, subject to the following conditions:

(A) In addition to NFPA 52 §4.2, the trainee shall be directly and individually supervised at all times by an individual who has successfully completed the Commission's rules examination for the areas of work being performed by the trainee.

(B) A trainee who has been in training for a total period of 45 calendar days, in any combination and with any number of employers, shall cease to perform any CNG activities for which the trainee is not certified until the trainee successfully completes the rules examination.

(2) A trainee who fails the rules examination shall immediately cease to perform any CNG related activities covered by the examination failed.

Regulations for CNG, §13.70(f)

Requirements for certificate holder renewal.

(1) In order to maintain active status, certificate holders shall renew their certificate or exemption annually as specified in this subsection.

(2) AFS shall notify licensees of any of their employees' pending renewal deadlines and shall notify the individual if not employed by a licensee, in writing, at the address on file with AFS no later than March 15 of a year for the May 31 renewal date of that year.

(3) Certificate holders shall pay the nonrefundable \$25 annual certificate renewal fee to AFS on or before May 31 of each year. Individuals who hold more than one certificate shall pay only one annual renewal fee.

(A) Failure to pay the nonrefundable annual renewal fee by the deadline shall result in a lapsed certificate.

(i) To renew a lapsed certificate, the individual shall pay the nonrefundable \$25 annual renewal fee plus a nonrefundable \$20 late-filing fee. Failure to do so shall result in the expiration of the certificate.

(ii) If an individual's certificate lapses or expires, that individual shall immediately cease performance of any CNG activities authorized by the certificate.

(iii) If an individual's certificate has been expired for more than two years from May 31 of the year in which the certificate lapsed, that individual shall comply with the requirements of subsection (a) of this section.

(B) Upon receipt of the annual renewal fee and late filing fee, AFS shall verify that all applicable requirements have been met. After verification, AFS shall renew the certificate and send a copy of the certificate, and the individual may continue or resume CNG activities authorized by that certificate.

Regulations for CNG, §13.70(h)

Report of CNG Incident/Accident

(a) At the earliest practical moment or within two hours following discovery, a licensee owning, operating, or servicing equipment or an installation shall notify AFS by telephone of any incident or accident involving CNG which:

- (1) caused a death or personal injury requiring hospitalization;
- (2) required taking an operating facility out of service;
- (3) resulted in unintentional gas ignition requiring emergency response;
- (4) meets the requirements of subsection (c) of this section;
- (5) caused an estimated damage to the property of the operator, others or both totaling \$50,000 or more, including gas loss;
- (6) involves a single release of CNG during or following CNG transfer or during container transportation. Any loss of CNG which is less than 1.0% of the gross amount delivered, stored, or withdrawn need not be reported. However, any loss occurring as a result of a pullaway shall be reported;
- (7) could reasonably be judged as significant because of rerouting of traffic, evacuation of buildings, or media interest, even though it does not meet paragraphs (1) - (6) of this subsection; or
- (8) is required to be reported to any other state or federal agency (such as the Texas Department of Public Safety or the United States Department of Transportation).

(b) The telephonic notice required by this section shall be made to the Railroad Commission's 24-hour emergency line at (512) 463-6788 or (844) 773-0305 and shall include the following:

- (1) date and time of the incident;
- (2) name of reporting operator;
- (3) phone number of operator;
- (4) location of leak or incident;
- (5) personal injuries and/or fatalities;
- (6) whether fire, explosion, or gas leak has occurred;
- (7) status of gas leak or other immediate hazards;
- (8) other significant facts relevant to the incident; and
- (9) whether immediate assistance from AFS is requested.

(c) Any transport unit required to be registered with AFS in accordance with §13.69 of this title (relating to Registration and Transfer of CNG Cargo Tanks and Delivery Units) which is involved in an accident where there is damage to the tank, piping or appurtenances, or any release of CNG resulting from an accident shall be reported to AFS in accordance with this section regardless of the accident location. Any CNG powered motor vehicle used for school transportation or mass transit including any state owned vehicle which is involved in an accident resulting in a substantial release of CNG or damage to the CNG conversion equipment shall be reported to AFS in accordance with this section regardless of accident location.

(d) Following the initial telephone report, the licensee who made the telephonic report shall submit CNG Form 1020 to AFS. The form shall be postmarked within 14 calendar days of the date of initial notification to AFS, or within five business days of receipt of the fire department report, whichever occurs first, unless AFS grants authorization for a longer period of time when additional investigation or information is necessary.

(e) Within five business days of receipt, AFS shall review CNG Form 1020 and notify in writing the person submitting CNG Form 1020 if the report is incomplete and specify in detail what information is lacking or needed. Incomplete reports may delay the resumption of CNG activities at the involved location.

Regulations for CNG, §13.36

General Rules for Stationary CNG Installations

Cylinders, Containers, and Tanks

Design and Construction. Cylinders, containers, and tanks shall be designed, fabricated, tested, and marked (stamped) in accordance with regulations of DOT, Transport Canada (TC) Transportation of Dangerous Goods Regulations, or the ASME Boiler and Pressure Vessel Code, “Rules for the Construction of Unfired Pressure Vessels,” Section VIII. ***NFPA 55, §7.1.6.1***

Compressed gas cylinders, containers, and tanks containing residual product shall be treated as full except when being examined, serviced, or refilled by a gas manufacturer, authorized cylinder requalifier, or distributor. ***NFPA 55, §7.1.6.4***

Containers shall be fabricated of steel, aluminum, or composite materials. ***NFPA 52, §5.4.1***

The container shall be designed for CNG service. ***NFPA 52, §5.4.2***

The container shall be permanently marked “CNG” by the manufacturer. ***NFPA 52, §5.4.2.1***

Compressed gas cylinders, containers, and tanks containing residual product shall be treated as full except when being examined, serviced, or refilled by a gas manufacturer, authorized cylinder requalifier, or distributor. Cylinders shall be manufactured, inspected, marked, tested, retested, equipped, and used in accordance with the following:

- (1) U.S. Department of Transportation (DOT) or Transport Canada (TC) regulations, exemptions, or special permits
- (2) ANSI NGV2, *Compressed Natural Gas Vehicle (NGV) Fuel Containers*, specifically for CNG service
- (3) CSA B51, *Boiler, Pressure Vessel and Pressure Piping Code*
- (4) U.S. Federal Motor Vehicle Safety Standard, 49 CFR 571.304, *Compressed Natural Gas Fuel Container Integrity*.

NFPA 52, §5.4.4

Pressure vessels shall be manufactured, inspected, marked, and tested in accordance with ASME *Boiler and Pressure Vessel Code*, Section VIII or Section X. ***NFPA 52, §5.4.5.1***

The + (plus) and * (star) markings on DOT and TC cylinders shall not apply in accordance with DOT and TC regulations for cylinders for flammable compressed gases. ***NFPA 52, §5.4.6***

The repair or alteration of an ASME pressure vessel shall comply with the requirements of the NB-23, *National Board Inspection Code*. ***NFPA 52, §5.4.7***

The repair or alteration of an ASME pressure vessel shall comply with the requirements of the NB-23, *National Board Inspection Code*. ***NFPA 52, §5.4.7.1***

A pressure gauge, if provided, shall be capable of reading at least 1.2 times the system design pressure. ***NFPA 52, §5.6***

Leakage shall not occur at less than 1 1/2 times the rated service pressure. ***NFPA 52, §5.9.1.2***

Pipe, Hose, Tubing, Fittings & Connections

Pipe, tubing, fittings, and other components shall be designed with a minimum safety factor of 3.
NFPA 52, §5.8.2

The following components shall not be used for CNG service:

- (1) Fittings, street elbows, and other piping components of cast irons other than those complying with ASTM A 47, Standard Specification for Ferritic Malleable Iron Castings (Grade 35018); ASTM A 395, Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; and ASTM A 536, Standard Specification for Ductile Iron Castings (Grade 60-40-18)
- (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.

NFPA 52, §5.8.4

Aluminum pipe, tubing, and fittings shall be permitted to be used downstream of the first-stage pressure regulator in an engine fuel system.

NFPA 52, §5.8.4.2

Piping components such as strainers, snubbers, and expansion joints shall be permanently marked by the manufacturer to indicate the service ratings.

NFPA 52, §5.8.5

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 service pressure.

NFPA 52, §5.10.2

Prior to use, hose assemblies shall be tested by the OEM or its designated representative at a pressure at least twice the service pressure.

NFPA 52, §5.10.3

Pressure Relief Devices

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.

NFPA 52, §5.5.1.1

PRDs shall be located so that the temperature to which they are subjected is representative of the temperature to which the fuel supply container is subjected.

NFPA 52, §5.5.1.2

The minimum rate of discharge of PRDs on containers shall be in accordance with CGA S-1.1, *Pressure Relief Device Standards* — Part 1 — *Cylinders for Compressed Gases*, or the *ASME Boiler and Pressure Vessel Code*, whichever is applicable.

NFPA 52, §5.5.2.1

Pressure relief valves (PRVs) for CNG service shall not be fitted with lifting devices.

NFPA 52, §5.5.2.2

The adjustment, if external, shall be provided with a means for sealing the adjustment to prevent tampering.
NFPA 52, §5.5.2.2.1

Container valves incorporating integral PRDs complying with 5.5.1 shall not require additional marking.
NFPA 52, §5.9.4.1

When required by 7.1.6.5.2, pressure relief devices shall be provided to protect containers and systems containing compressed gases from rupture in the event of overpressure from thermal exposure.
NFPA 55, §7.1.6.5.1

Pressure relief devices to protect containers shall be designed and provided in accordance with CGA S-1.1, *Pressure Relief Device Standards – Part 1 – Cylinders for Compressed Gases*, for cylinders; CGA S-1.2, *Pressure Relief Device Standards – Part 2 – Cargo and Portable Tanks for Compressed Gases*, for portable tanks; and CGA S-1.3, *Pressure Relief Device Standards – Part 3 – Stationary Storage Containers for Compressed Gases*, for stationary tanks or in accordance with applicable equivalent requirements in the country of use.
NFPA 55, §7.1.6.5.2

Pressure relief devices shall be sized in accordance with the specifications to which the container was fabricated.
NFPA 55, §7.1.6.5.3

The pressure relief device shall have the capacity to prevent the maximum design pressure of the container or system from being exceeded.
NFPA 55, §7.1.6.5.4

Pressure Regulators

A pressure regulator inlet and each chamber shall be designed for its service pressure with a pressure safety factor of at least 4.
NFPA 52, §5.7.1

Low-pressure chambers shall provide for overpressure relief or be able to withstand the service pressure of the upstream pressure chamber.
NFPA 52, §5.7.2

Valves

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.
NFPA 52, §5.9.1

Shutoff valves shall have a rated service pressure not less than the rated service pressure of the entire system and shall be capable of withstanding a hydrostatic test of at least four times the rated service pressure without rupture.
NFPA 52, §5.9.1.1

Valves of cast irons other than those complying with ASTM A 47, *Standard Specification for Ferritic Malleable Iron Castings* (Grade 35018); ASTM A 395, *Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures*; and ASTM A 536, *Standard Specification for Ductile Iron Castings (Grade 60-40-18)*, shall not be used as primary stop valves.
NFPA 52, §5.9.2

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.

NFPA 52, §5.9.3

The manufacturer shall stamp or otherwise permanently mark the valve body to indicate the service ratings.

NFPA 52, §5.9.4

Integrity. Piping, tubing, pressure regulators, valves, and other apparatus shall be kept gastight to prevent leakage.

NFPA 55, §7.3.1.3.1

Removal from CNG Service

In addition to NFPA 55 §§7.1.14 and 7.1.15 and for any installations subject to NFPA 52 requirements, if AFS determines that any CNG cylinder or installation constitutes an immediate danger to the public health, safety, and welfare, AFS shall require the immediate removal of all CNG and/or the immediate disconnection by a properly licensed company to the extent necessary to eliminate the danger. This may include equipment or any part of the system including the service container. A warning tag shall be attached by AFS until the unsafe condition is remedied. Once the unsafe condition is remedied, the tag may be removed by an AFS inspector or by the licensee if authorized by AFS.

Regulations for CNG, §13.38(a)

A licensee or the licensee's employees shall not introduce CNG into any container if the licensee or employee has knowledge or reason to believe that such container, cylinder, piping, or system is unsafe or is not installed in accordance with Texas Natural Resources Code, Chapter 116, or the rules in this chapter.

Regulations for CNG, §13.39

Manufacturer's Nameplates and Markings on ASME Containers

(a) In addition to NFPA 52 §5.4.5.1 and NFPA 55 §7.1.6.1:

(1) Compressed natural gas (CNG) shall not be introduced into any ASME container unless the container is equipped with an original nameplate or at least one of the following nameplates permanently attached to the container or has the required information stamped directly on the vessel.

(A) A duplicate nameplate is an additional ASME container nameplate issued by the original manufacturer with duplicate information as the original nameplate and clearly marked as a duplicate nameplate but installed in a remote location.

(B) A modification (or alteration) nameplate is a nameplate issued and affixed by an ASME Code facility including only partial information applicable to a modification or alteration performed on that container.

(C) A replacement nameplate is a nameplate including the identical information as the original nameplate and identified as a replacement nameplate, but issued and affixed by the original manufacturer or its successor company or companies when the original nameplate is lost or illegible.

(2) Nameplates on ASME containers manufactured on or after November 1, 1994, shall be stainless steel.

(3) If the nameplate is attached, it shall be attached in a manner that will minimize corrosion of the nameplate or its attachments or that will not contribute to the corrosion of the container.

(b) If the nameplate is attached directly to the container, the nameplate thickness shall be sufficient to resist distortion due to the application of markings and fusion welding.

(c) Container nameplates shall be stamped or etched with the following information in legible characters:

- (1) the mark or symbol approved by ASME indicating compliance with the provisions of the ASME Pressure Vessel Code;
- (2) the name and address of the manufacturer;
- (3) the capacity of the container in standard cubic feet;
- (4) the maximum allowable working pressure of the container in pounds per square inch (psi);
- (5) the thickness of the material used in both the shell and heads;
- (6) the overall length of the container, the outside diameter of the container, and the dish radius of the heads;
- (7) the serial number of the container; and
- (8) the date of manufacture.

(d) Nameplates attached to or markings on the container shall remain visible after installation of the containers.

(e) Containers manufactured prior to November 1, 1994, which may have corroded or rusted nameplates shall have the following minimum information readable on the manufacturer's nameplate:

- (1) name of the container manufacturer;
- (2) manufacturer's serial number;
- (3) working pressure; and
- (4) capacity.

(f) AFS may remove a container from CNG service or require ASME acceptance of a container at any time if AFS determines that the nameplate or stamped information, in any form defined in subsection (a) of this section, is loose, unreadable, or detached, or if it appears to be tampered with or damaged in any way and does not contain at a minimum the items defined in subsection (c) or (e) of this section as applicable.

Regulations for CNG, §13.40

Sample Question 2

Shutoff valves shall have a rated service pressure _____ than the rated service pressure of the entire system and shall be capable of withstanding a hydrostatic test of at least _____ times the rated service pressure without rupture.

- A. Three times greater / four
- B. Two times greater / five
- C. Not less / four
- D. Three times greater / five

Answer on last page.

Installation of Valves

Every cylinder shall be equipped with either of the following:

- (1) A manual valve
- (2) A normally closed, remotely actuated shutoff valve connected directly to the cylinder and equipped to bleed the cylinder manually.

NFPA 52, §6.6.1

Testing Containers

When all registration or transfer requirements have been met, AFS shall issue CNG Form 1004 which shall be properly affixed in accordance with the placement instructions on the form. CNG Form 1004 shall authorize the licensee or ultimate consumer to whom it has been issued and no other person to operate such unit in the transportation of CNG and to fill the transport containers.

- (1) A person shall not operate a CNG transport or cylinder delivery unit in Texas unless the CNG Form 1004 has been properly affixed or unless its operation has been specifically approved by AFS.
- (2) A person shall not introduce CNG into a transport container unless that unit bears a CNG Form 1004 or unless specifically approved by AFS.
- (3) CNG Form 1004 shall not be transferable by the person to whom it has been issued, but shall be registered by any subsequent licensee or ultimate consumer prior to the unit being placed into CNG service.
- (4) This subsection shall not apply to:
 - (A) a container manufacturer/fabricator who introduces a reasonable amount of CNG into a newly constructed container in order to properly test the vessel, piping system, and appurtenances prior to the initial sale of the container. The CNG shall be removed from the transport container prior to the transport leaving the manufacturer's or fabricator's premises; or
 - (B) a person who introduces a maximum of 500 cubic feet of CNG into a newly constructed transport container when such container will provide the motor fuel to the chassis engine for the purpose of allowing the unit to reach its destination.
- (5) AFS shall not issue a CNG Form 1004 if AFS or a Category 1 or 4 licensee determines that the transport is unsafe for CNG service.
- (6) If a CNG Form 1004 decal on a unit currently registered with AFS is destroyed, lost, or damaged, the operator of that vehicle shall obtain a replacement by filing CNG Form 1018B and a \$50 replacement fee with AFS.

Regulations for CNG, §13.69(b)

Natural Resources Code

Chapter 116 – Compressed Natural Gas

Entry on Property; Inspection and Investigation

(a) An employee, agent, or inspector of the commission may enter the premises of a licensee under this chapter or any building or other premises open to the public or inspect any CNG or LNG system or motor vehicle equipped with CNG or LNG equipment at any reasonable time for the purpose of determining and verifying compliance with this chapter and rules of the commission adopted under this chapter.

(b) Any authorized representative of the LPG division may enter any building or premises where an accident has occurred in which CNG or LNG was a probable cause for purposes of investigating the cause, origin, and circumstances of such accident. The LPG division may request that any state or local authority having jurisdiction take appropriate action as may be necessary for preservation of property and premises.

Texas Natural Resources Code, §116.015

Insurance Requirements

All licensees must acquire and maintain appropriate workers' compensation or coverage for its employees under policies of work-related accident, disability, and health insurance, including coverage for death benefits, from an insurance carrier authorized to provide coverage in this state and other insurance coverage required by the commission in the amounts required by the commission.

Texas Natural Resources Code, §116.036(a)

Disciplinary Action

If the commission or division determines that the probable violation or noncompliance constitutes an immediate danger to the public health, safety, and welfare, it shall require the immediate cessation of the probable violation or noncompliance and proceed with a hearing.

Texas Natural Resources Code, §116.037(e)

Registration

Each motor vehicle that is equipped with a CNG or LNG cargo tank and each motor vehicle used principally to transport CNG or LNG in portable cylinders or containers must be registered with the commission as provided by commission rules.

Texas Natural Resources Code, §116.072(a)

Warning Tags

(a) An employee, agent, or inspector of the commission may declare unsafe or dangerous for service any motor vehicle required to be registered under this chapter or any CNG or LNG equipment or system that is defective or that does not otherwise conform to the safety requirements of this chapter and the rules adopted under this chapter and shall attach a warning tag to the motor vehicle, equipment, or system in a conspicuous location.

(b) A person may not sell, furnish, deliver, or supply compressed natural gas and liquefied natural gas for use or consumption by or through a motor vehicle or system in a public place or operate a motor vehicle having CNG or LNG equipment to which a warning tag is attached.

(c) A warning tag may be removed on approval of the commission or by a person designated by the commission to remove the tag. A warning tag may not be removed by any person who is not authorized to remove the tag by the commission.

Texas Natural Resources Code, §116.103

Injunctive Relief

On request of the commission, the attorney general shall bring suit in the name of the state to enjoin a person from violating this chapter or a rule adopted under this chapter.

Texas Natural Resources Code, §116.141(a)

Administrative Penalty

(a) If a person violates this chapter, a rule of the commission adopted under this chapter, or a term, condition, or provision of a license or registration issued by the commission under this chapter and the violation results in pollution of the air or water of this state or poses a threat to the public safety, the person may be assessed a civil penalty by the commission.

(b) The penalty may not exceed \$10,000 a day for each violation. Each day a violation continues may be considered a separate violation for purposes of penalty assessments.

(c) In determining the amount of the penalty, the commission shall consider the person's history of previous violations of this chapter, the seriousness of the violation, any hazard to the health or safety of the public, and the demonstrated good faith of the person charged.

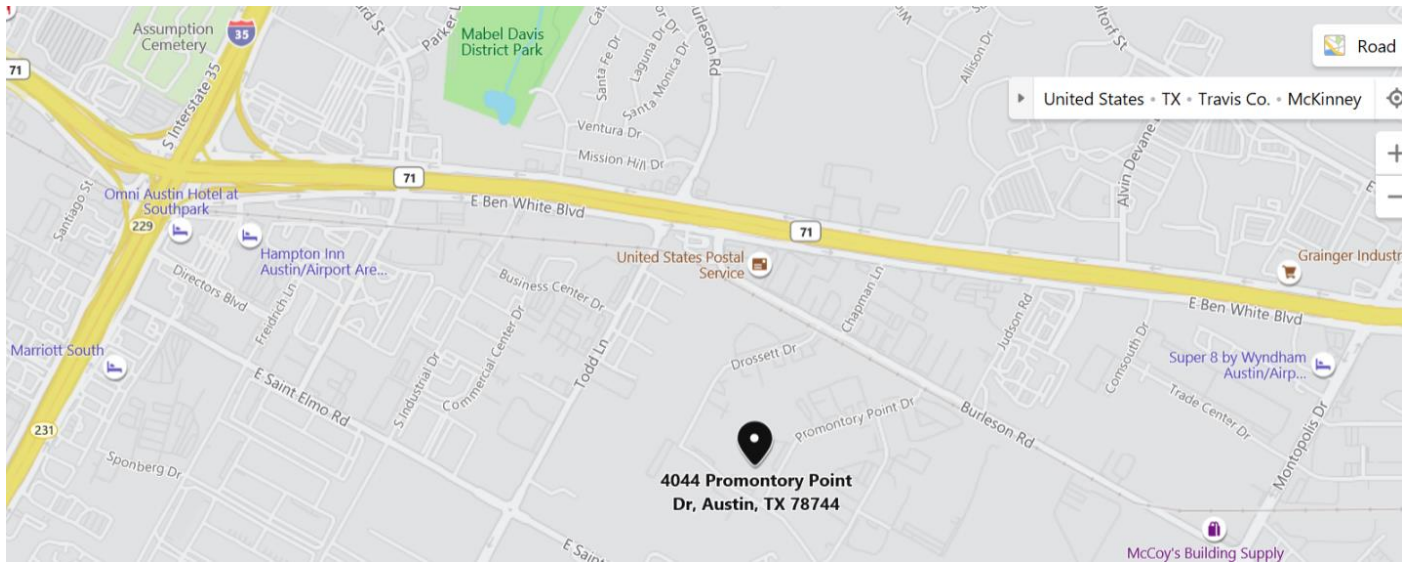
Texas Natural Resources Code, §116.143

Penalty Assessment Procedure

A civil penalty under Section 116.145 of this code may be assessed only after the person charged with the violation has been given an opportunity for a public hearing.

Texas Natural Resources Code, §116.144(a)

Alternative Fuels Training Center 4044 Promontory Point Austin, Texas 78744



Sample Question Answers

1. C
2. C