TEXAS LP-GAS EXAMINATION STUDY GUIDE

Non-Road Motor Fuel Employee Level

RAILROAD COMMISSION OF TEXAS

Rev 1.0

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LP-GAS EXAMINATION STUDY GUIDE
Employee-LEVEL

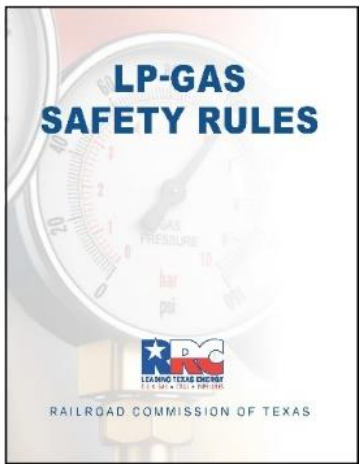
Who should use this guide?

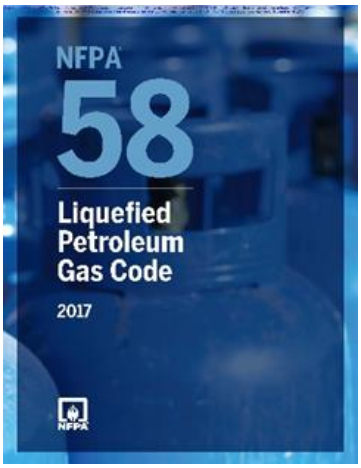
You should use this guide if you plan to take the Railroad Commission's employee-level qualifying examination to:

Perform LP-gas activities on vehicles such as industrial forklift trucks and commercial mowers. These activities include installing LP-gas motor-fuel tanks, cylinders and fuel systems, and replacing container valves on non-road vehicles.

The non-road motor fuel examination does not authorize you to fill LP-gas motor-fuel tanks or cylinders.

What books do I need?





This examination tests your knowledge of the laws and standards that apply to LP-gas general installation and service activities in Texas. These laws and standards are found in two books:

LP-Gas Safety Rules (Texas Railroad Commission, 2020)

NFPA 58 Liquefied Petroleum Gas Code (National Fire Protection Association, 2017)

Where do I get these books?

You may download the current edition of the Railroad Commission's *LP-Gas Safety Rules* 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 of the listed sections and topics.

NOTE: Section (§) 9.402(c) of the *LP-Gas Safety Rules* states, "The Commission does not adopt language in any NFPA rule, chart, figure, or table pertaining to any LP-gas container having a water capacity of one gallon (4.2 pounds LP-gas capacity) or less."

Terms and Definitions

NOTE: Informal terms that are sometimes used in the propane industry instead of formal technical terms are given in brackets.

Railroad Commission *LP-Gas Safety Rules*

Alternative Fuel Safety (AFS). The RRC department responsible for LP-Gas training and inspection.
LP-Gas Safety Rules, §9.2(1)

Company Representative. The individual designated to the Commission by a license applicant or a licensee as the principal individual in authority.
LP-Gas Safety Rules, §9.2(12)

LP Gas Safety Rules. The rules adopted by the Railroad Commission in the Texas Administrative Code, Title 16, Part 1, Chapter 9, including any NFPA or other documents adopted by reference. The official text of the Commission's rules is that which is on file with the Secretary of State's office and available at www.sos.state.tx.us or through the Commission's web site
LP-Gas Safety Rules, §9.2(22)

Mobile Fuel Container. An LP-gas container mounted on a vehicle to store LP-gas as the fuel supply to an auxiliary engine other than the engine to propel the vehicle or for other uses on the vehicle.
LP-Gas Safety Rules, §9.2(25)

Operations Supervisor. The individual who is certified by the Commission to actively supervise a licensee's LP-gas operations and is authorized by the licensee to implement operational changes.
LP-Gas Safety Rules, §9.2(31)

Outlet. A site operated by an LP-gas licensee from which any regulated LP-gas activity is performed.
LP-Gas Safety Rules, §9.2(32)

Rules Examination. The Commission's written examination that measures an examinee's working knowledge of Chapter 113 of the Texas Natural Resources Code and/or the current LP-Gas Safety Rules.
LP-Gas Safety Rules, §9.2(41)

NFPA 58 (2017)

Container. Any vessel, including cylinders, tanks, portable tanks, and cargo tanks, used for the transporting or storing of LP-Gases.
NFPA 58, §3.3.14

Container Appurtenances. Devices installed in container openings for safety, control, or operating purposes.
NFPA 58, §3.3.15

DOT. U.S. Department of Transportation.
NFPA 58, §3.3.24

Fixed Maximum Liquid Level Gauge. A fixed liquid level gauge that indicates the liquid level at which the container is filled to its maximum permitted filling limit.
NFPA 58, §3.3.34.2

Flexible Connector. A short [not exceeding 60 in. (1.52 m) overall length] fixed piping system component that is fabricated from a flexible material and equipped with connections at both ends.
NFPA 58, §3.3.28

Liquefied Petroleum Gas (LP-Gas). Any material having a vapor pressure not exceeding that allowed for commercial propane that is composed predominantly of the following hydrocarbons, either by themselves (except propylene) or as mixtures: propane, propylene, butane (normal butane or isobutane), and butylenes.
NFPA 58, §3.3.43

Mobile Container. A container that is permanently mounted on a vehicle and connected for uses other than supplying engine fuel.
NFPA 58, §3.3.48

Point of Transfer. The location where connections and disconnections are made or where LP-Gas is vented to the atmosphere in the course of transfer operations.
NFPA 58, §3.3.60

Universal Cylinder. A cylinder that can be connected for service in either the vertical or horizontal position so that the fixed maximum liquid level gauge, pressure relief device, and filling and withdrawal appurtenances function properly in either position.
NFPA 58, §3.3.17.1

Water Capacity. The amount of water at 60°F required to fill a container.
NFPA 58, §3.3.90

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 LP-gas activities you will perform, as well as the rules and standards highlighted in this guide.

As you study the applicable codes and standards, pay special attention to the facts, rules and procedures related to the following key topics.
When you take the examination, read each question very carefully.

Application for a New Certificate

An applicant for a new certificate shall:
(1) file with AFS a properly completed LPG Form 16 and the applicable nonrefundable rules examination fee specified in §9.10 of this title (relating to Rules Examination); pass the applicable rules examination with a score of at least 75%.
(2) pass the applicable rules examination with a score of at least 75%; and
(3) complete any required training and/or AFT in §9.51 and §9.52 of this title.
LP-Gas Safety Rules, §9.8(c)

Certificate Renewal

Certificate holders shall remit the nonrefundable $35 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.
(1) Failure to pay the nonrefundable annual renewal fee by the deadline shall result in a lapsed certificate
(A) To renew a lapsed certification, the individual must pay the nonrefundable $35 annual renewal fee plus a nonrefundable $20 late-filing fee.
(B) If an individual's certificate lapses or expires, that individual shall immediately cease performance of any LP-gas activities authorized by the certificate.
(C) 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 in §9.8 of this title (relating to Requirements and Application for a New Certificate) or §9.13 of this title.
LP-Gas Safety Rules, §9.9

Continuing education. A certificate holder shall complete at least eight hours of continuing education every four years as specified in this subsection.
(1) Upon fulfillment of this requirement, the certificate holder's next continuing education deadline shall be four years after the May 31 following the date of the most recent class the certificate holder has completed, unless the course was completed on May 31, in which case the deadline shall be four years from that date.
LP-Gas Safety Rules, §9.52(b)

Rules Examination

Failure of any exam shall immediately disqualify the individual from performing any LP-gas related activities covered by the exam which is failed, except for activities covered by a separate exam which the individual has passed.
LP-Gas Safety Rules, §9.10(f)

Individuals who pass an employee level rules examination between March 1 and May 31 of any year shall have until May 31 of the next year to complete any required training. Individuals who pass an employee level rules examination at other times shall have until the next May 31 to complete any required training.
LP-Gas Safety Rules, §9.52(a)(3)

Trainees

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.
(1) 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.
LP-Gas Safety Rules, §9.12

No person shall perform work, directly supervise LP-gas activities, or be employed in any capacity requiring contact with LP-gas unless:
(1) that individual is a certificate holder
(2) that individual is a trainee
LP-Gas Safety Rules, §9.8(a)

Sample Question 1

A licensee or ultimate consumer may employ an individual as a trainee for a period not to exceed ____ calendar days without that individual having successfully completed the rules examination

A. 20
B. 31
C. 45
D. 75

Answer on last page

Pressure Relief Valves

All cylinders used in industrial truck service (including forklift truck cylinders) shall have the cylinder's pressure relief valve replaced by a new or unused valve within 12 years of the date of manufacture of the cylinder and every 10 years thereafter.
NFPA 58, §5.9.2.14

Containers

Containers shall be designed, fabricated, tested, and marked (or stamped) in accordance with the regulations of the U.S. Department of Transportation (DOT); the ASME *Boiler and Pressure Vessel Code*, Section VIII, "Rules for the Construction of Unfired Pressure Vessels"; or the API-ASME *Code for Unfired Pressure Vessels for Petroleum Liquids and Gases*, except for UG-125 through UG-136.
NFPA 58, §11.3.1.1

Containers that have been involved in a fire and show no distortion shall be requalified in accordance with CGA C-6, *Standard for the Visual Inspection of Steel Compressed Gas Cylinders*, or CGA C-6.3, *Guidelines for Visual Inspection and Requalification of Low Pressure Aluminum Compressed Gas Cylinders*, for continued service before being used or reinstalled.
(A) Cylinders shall be requalified by a manufacturer of the type of cylinder or by a repair facility approved by DOT.
(B) ASME or API-ASME containers shall be retested using the hydrostatic test procedure applicable at the time of the original fabrication.
(C) All container appurtenances shall be replaced.
(D) DOT 4E specification (aluminum) cylinders or composite cylinders involved in a fire shall be permanently removed from service.
NFPA 58, §11.3.1.4

Cylinders shall be designed and constructed for at least a 240 psig service pressure.
NFPA 58, §11.3.1.6

Container Repairs and Alterations

Containers that show excessive denting, bulging, gouging, or corrosion shall be removed from service.
NFPA 58, §11.3.3.1

Repairs or alteration of a container shall comply with the regulations, rules, or code under which the container was fabricated.
NFPA 58, §11.3.3.2

Repairs or alterations to ASME containers shall be in accordance with the NBBI NB23, *National Board Inspection Code*.
NFPA 58, §11.3.3.3

Field welding shall be permitted only on saddle plates, lugs, pads, or brackets that are attached to the container by the container manufacturer.
NFPA 58, §11.3.3.4

Location of Containers

Containers shall be located to minimize the possibility of damage to the container and its fittings.
NFPA 58, §11.8.1.1

Where containers are located in the rear of the vehicle, they shall be protected.
NFPA 58, §11.8.1.2

Containers located less than 18 in. from the exhaust system, the transmission, or a heat-producing component of the internal combustion engine shall be shielded by a vehicle frame member or by a noncombustible baffle with an air space on both sides of the frame member or baffle.
NFPA 58, §11.8.1.3

After a container is permanently installed on a vehicle, container markings shall be readable either directly or with a portable lamp and mirror.
NFPA 58, §11.8.1.4

Sample Question 2

Engine fuel containers constructed of steel shall be _____ to minimize corrosion.

A. Nickel coated
B. Painted or powder coated
C. Anodized
D. Fiberglass coated
E. Any of the above

Answer on last page

Carburation Equipment

Carburetion equipment subject to a pressure of 125 psig or greater shall be designed for a pressure rating of 250 psig or for the MAWP of the container where the MAWP of the container is greater than 250 psig.
***NFPA 58, §*11.6.1**

Vaporizers

Vaporizers shall be fabricated of materials resistant to corrosion by LP-Gas under service conditions.
***NFPA 58, §*11.6.2.1**

Vaporizers shall be designed for engine fuel service.
***NFPA 58, §*11.6.2.2**

Vaporizers subjected to pressures up to the MAWP of the supply container shall have a pressure rating of 250 psig or the MAWP of the container where the MAWP of the container is greater than 250 psig.
***NFPA 58, §*11.6.2.3**

Vaporizers shall be marked with the design pressure of the fuel-containing portion in psig, and the marking shall be visible when the vaporizer is installed.
***NFPA 58, §*11.6.2.4**

The vaporizer shall not be equipped with a fusible plug.
***NFPA 58, §*11.6.2.5**

Each vaporizer shall be capable of having the water or heating fluid drained from the engine cooling system drain or water hose or shall have a valve or plug located at or near the lowest portion of the section occupied by the water or other heating fluid to allow drainage of the water or heating fluid.
***NFPA 58, §*11.6.2.6**

Where engine exhaust gases are used as a direct source of heat to vaporize the fuel, the materials of construction of those parts of the vaporizer in contact with the exhaust gases shall be resistant to corrosion by these gases, and the vaporizer system shall be designed to prevent a pressure in excess of 200 psig.
***NFPA 58, §*11.6.2.7**

Devices that supply heat directly to the fuel container shall be equipped with an automatic device to cut off the supply of heat before the pressure in the container reaches 200 psig.
***NFPA 58, §*11.6.2.8**

Fuel Shutoff Valve

An automatic shutoff valve shall be provided in the fuel system as close as practical to the inlet of the gas regulator.
NFPA 58, §11.6.3.1

The valve shall prevent flow of fuel to the carburetor when the engine is not running even if the ignition switch is in the "on" position.
NFPA 58, §11.6.3.2

Atmospheric-type regulators (zero governors) shall not be considered as automatic shutoff valves for the purpose of the requirements of 11.6.3.
NFPA 58, §11.6.3.3

Pipe and Tubing

Pipe shall be wrought-iron or steel (black or galvanized), brass, or copper and shall comply with the following:
(1) Wrought-iron: ASME B36.10M, *Welded and Seamless Wrought Steel Pipe*
(2) Steel pipe: ASTM A53, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*
(3) Steel pipe: ASTM A106, *Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service*
(4) Brass pipe: ASTM B43, *Standard Specification for Seamless Red Brass Pipe, Standard Sizes*
(5) Copper pipe: ASTM B42, *Standard Specification for Seamless Copper Pipe, Standard Sizes*
NFPA 58, §11.7.1.1

Tubing shall be steel, stainless steel, brass, or copper and shall comply with the following:
(1) Brass tubing: ASTM B135, *Standard Specification for Seamless Brass Tube*
(2) Copper tubing:
(a) Type K or L: ASTM B88, *Standard Specification for Seamless Copper Water Tube*
(b) ASTM B280, *Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service*
(3) Stainless Steel shall be one of the 300 series as follows:
(a) ASTM A213, *Standard for Seamless Ferritic and Austenitic Alloy Steel Superheater Boiler Tube Heat Exchanger Tubes*
(b) ASTM A249, *Standard Specification for Welded Austenitic Steel Boiler, Superheater, Heat Exchanger and Condenser Tubes*
(c) ASTM A269, *Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service*
(4) Steel Tubing: SAE J356, *Welded Flash-Controlled Low-Carbon Steel Tubing Normalized for Bending, Double Flaring, and Beading*
NFPA 58, §11.7.1.2

Fittings for Metallic Pipe and Tubing

Fittings shall be steel, brass, copper, malleable iron, or ductile (nodular) iron.
NFPA 58, §11.7.2.1

Pipe fittings shall have a minimum pressure rating as specified in Table 11.7.2.2 and shall comply with the following:
(1) Cast-iron pipe fittings shall not be used.
(2) Brazing filler material shall have a melting point that exceeds 1000°F.
NFPA 58, §11.7.2.2

Metal tube fittings shall have a minimum pressure rating as specified in Table 11.7.2.2.
NFPA 58, §11.7.2.3

Pipe and Hose Installation

The piping system shall be designed, installed, supported, and secured in such a manner as to minimize damage due to expansion, contraction, vibration, strains, abrasion, UV deterioration, and wear.
NFPA 58, §11.10.1.1

Piping (including hose) shall be installed in a protected location.
NFPA 58, §11.10.1.2

If piping is installed outside the vehicle, it shall be under the vehicle and below any insulation or false bottom.
NFPA 58, §11.10.1.3

Fastening or other protection shall be installed to prevent damage due to vibration or abrasion.
NFPA 58, §11.10.1.4

At each point where piping passes through sheet metal or a structural member, a rubber grommet or equivalent protection shall be installed to prevent chafing.
NFPA 58, §11.10.1.5

Fuel line piping that must pass through the floor of a vehicle shall be installed to enter the vehicle through the floor directly beneath or adjacent to the container.
NFPA 58, §11.10.1.6

If a branch fuel line is required, the tee connection shall be in the main fuel line under the floor and outside the vehicle.
NFPA 58, §11.10.1.7

Where liquid service lines of two or more individual containers are connected together, a spring-loaded backflow check valve or equivalent shall be installed in each of the liquid lines prior to the point where the liquid lines tee together to prevent the transfer of LP-Gas from one container to another.
NFPA 58, §11.10.1.8

Exposed parts of the piping system shall be of corrosion-resistant material or shall be protected to minimize exterior corrosion.
NFPA 58, §11.10.1.9

Piping systems, including hose, shall be tested and proven free of leaks at not less than normal operating pressure.
NFPA 58, §11.10.1.10

There shall be no fuel connection between a tractor and trailer or other vehicle units.
NFPA 58, §11.10.1.11

Hydrostatic Relief Valves

A hydrostatic relief valve or device providing pressure-relieving protection shall be installed in each section of piping (including hose) in which liquid LP-Gas can be isolated between shutoff valves, so as to relieve to the atmosphere.
NFPA 58, §11.10.2.1

Hydrostatic relief valves shall have a pressure setting of not less than 400 psig or more than 500 psig.
NFPA 58, §11.10.2.2

Hydrostatic relief valve Installation

A hydrostatic relief valve or a device providing pressure-relieving protection shall be installed in each section of piping and hose in which liquid LP-Gas can be isolated between shutoff valves, so as to relieve the pressure that could develop from the trapped liquid to a safe atmosphere or product-retaining section.
NFPA 58, §6.15

Industrial Truck Cylinders

Cylinders shall be designed, constructed, or fitted for installation and filling in either the vertical or horizontal position or, if the cylinder is a universal cylinder, in either position.
NFPA 58, §11.13.2.1

Universal cylinders intended for use in the horizontal position shall be installed with the positioning slot correctly positioned prior to use or filling.
NFPA 58, §11.13.2.2

The fixed maximum liquid level gauge shall indicate the maximum permitted filling level in either position.
NFPA 58, §11.13.2.3

The cylinder vapor or liquid withdrawal valves shall function in either position.
NFPA 58, 11.13.2.5

The cylinder pressure relief valve discharge shall be directed upward within 45 degrees of vertical and otherwise shall not impinge on the cylinder, the exhaust system, or any other part of the industrial truck.
NFPA 58, §11.13.2.6

The discharge opening shall be provided with a protective cover to minimize the possibility of the entry of water or any extraneous matter.
NFPA 58, §11.13.2.7

Hose 60 inches in length or less shall not be required to be of stainless steel wire braid construction.
NFPA 58, §11.13.3

Industrial trucks shall be refueled outdoors.
NFPA 58, §11.13.4.1

Where cylinders are exchanged indoors, the fuel piping system shall be equipped to minimize the release of fuel when cylinders are exchanged, in accordance with either of the following:
(1) Using an approved quick-closing coupling in the fuel line
(2) Closing the shutoff valve at the fuel cylinder and allowing the engine to run until the fuel in the line is exhausted.
NFPA 58, §11.13.4.2

Where LP-Gas–fueled industrial trucks are used in buildings or structures, the following shall apply:
(1) The number of fuel cylinders on such a truck shall not exceed two.
(2) The use of industrial trucks in buildings frequented by the public, including those times when such buildings are occupied by the public, shall require the approval of the authority having jurisdiction.
(3) The total water capacity of the fuel cylinders on an individual truck shall not exceed 105 lb [nominal 45 lb propane capacity].
(4) Trucks shall not be parked and left unattended in areas occupied by or frequented by the public without the approval of the authority having jurisdiction. If left unattended with approval, the cylinder shutoff valve shall be closed.
(5) In no case shall trucks be parked and left unattended in areas of excessive heat or near sources of ignition.
NFPA 58, §11.13.4.3

All cylinders used in industrial truck service (including forklift truck cylinders) shall have the cylinder pressure relief valve replaced in accordance with 5.9.2.14.
NFPA 58, §11.13.4.4

General Requirements

Industrial trucks (including forklift trucks) and other engines on vehicles operating in buildings other than those used exclusively to house engines shall have an approved automatic shutoff valve installed in the fuel system.
NFPA 58, §11.14.2.1

The source of air for combustion shall be isolated from the driver and passenger compartment, ventilating system, or air-conditioning system on the vehicle.
NFPA 58, §11.14.2.2

Non–self-propelled floor maintenance machinery (floor polishers, scrubbers, buffers) and other similar portable equipment shall be listed.
(A) A label shall be affixed to the machinery or equipment, with the label facing the operator, with the text denoting that the cylinder or portion of the machinery or equipment containing the cylinder shall be stored in accordance with Chapter 8.
(B) The use of floor maintenance machines in buildings frequented by the public, including the times when such buildings are occupied by the public, shall require the approval of the authority having jurisdiction.
NFPA 58, §11.14.2.3

Portable Engines

The use of portable engines in buildings shall be limited to emergencies.
NFPA 58, §11.15.1.1

Air for combustion and cooling shall be supplied.
NFPA 58, §11.15.1.2

Exhaust gases shall be discharged to a point outside the building or to an area in which they will not constitute a hazard.
NFPA 58, §11.15.1.3

Where atmospheric-type regulators (zero governors) are used on engines operated only outdoors, a separate automatic shutoff valve shall not be required.
NFPA 58, §11.15.1.4

Installation of Container Appurtenances

The LP-Gas supply system, including the containers, shall be installed either on the outside of the vehicle or in a recess or cabinet vapor-tight to the inside of the vehicle but accessible from and vented to the outside, with the vents located near the top and bottom of the enclosure and 3 ft horizontally away from any opening into the vehicle below the level of the vents.
NFPA 58, §6.26.3.3

Container appurtenances shall be installed in accordance with the following:
(1) Pressure relief valve installation on ASME containers installed in the interior of vehicles complying with Section 11.9 shall comply with 11.8.5.
(2) Pressure relief valve installations on ASME containers installed on the outside of vehicles shall comply with 11.8.5 and 6.26.3.3.
(3) Main shutoff valves on containers for liquid and vapor shall be readily accessible.
(4) Cylinders shall be designed to be filled in either the vertical or horizontal position, or if they are the universal type, they are permitted to be filled in either position.
(5) All container inlets, outlets, or valves installed in container inlets or outlets, except pressure relief devices and gauging devices, shall be labeled to designate whether they communicate with the vapor or liquid space.
(6) Containers from which only vapor is to be withdrawn shall be installed and equipped with connections to minimize the possibility of the accidental withdrawal of liquid.
NFPA 58, §6.26.4.1

Sample Question 3

Container appurtenances subject to pressures in excess of _____ psig shall be rated for a pressure of at least _____ psig.

A. 125 / 250
B. 125 / 312
C. 250 / 312
D. 250 / 500

Answer on last page

Regulators shall be installed in accordance with 6.10.2 and 6.26.4.2(A) through 6.26.4.2(E).
(A) Regulators shall be installed with the pressure relief vent opening pointing vertically downward to allow for drainage of moisture collected on the diaphragm of the regulator.
(B) Regulators not installed in compartments shall be equipped with a durable cover designed to protect the regulator vent opening from sleet, snow, freezing rain, ice, mud, and wheel spray.
(C) If vehicle-mounted regulators are installed at or below the floor level, they shall be installed in a compartment that provides protection against the weather and wheel spray.
(D) Regulator compartments shall comply with the following:
(1) The compartment shall be of sufficient size to allow tool operation for connection to and replacement of the regulator(s).
(2) The compartment shall be vapor-tight to the interior of the vehicle.
(3) The compartment shall have a 1 in.2 (650 mm2) minimum vent opening to the exterior located within 1 in. of the bottom of the compartment.
(4) The compartment shall not contain flame or spark producing equipment.
(E) A regulator vent outlet shall be at least 2 in. above the compartment vent opening.
NFPA 58, §6.26.4.2

Piping Requirements

Piping shall be installed in accordance with 6.11.3 and 6.26.5.1(A) through 6.26.5.1(M).
(A) Steel tubing shall have a minimum wall thickness of 0.049 in. (1.2 mm).
(B) A flexible connector shall be installed between the regulator outlet and the fixed piping system to protect against expansion, contraction, jarring, and vibration strains.
(C) Flexibility shall be provided in the piping between a cylinder and the gas piping system or regulator.
(D) Flexible connectors shall be installed in accordance with 6.11.6.
(E) Flexible connectors longer than the length allowed in the code, or fuel lines that incorporate hose, shall be used only where approved.
(F) The fixed piping system shall be designed, installed, supported, and secured to minimize the possibility of damage due to vibration, strains, or wear and to preclude any loosening while in transit.
(G) Piping shall be installed in a protected location.
(H) Where piping is installed outside the vehicle, it shall be installed as follows:
(1) Piping shall be under the vehicle and below any insulation or false bottom.
(2) Fastening or other protection shall be installed to prevent damage due to vibration or abrasion.
(3) At each point where piping passes through sheet metal or a structural member, a rubber grommet or equivalent protection shall be installed to prevent chafing.
(I) Gas piping shall be installed to enter the vehicle through the floor directly beneath or adjacent to the appliance served.
(J) If a branch line is installed, the tee connection shall be located in the main gas line under the floor and outside the vehicle.
(K) Exposed parts of the fixed piping system either shall be of corrosion-resistant material or shall be coated or protected to minimize exterior corrosion.
(L) Hydrostatic relief valves shall be installed in isolated sections of liquid piping as provided in Section 6.15.
(M) Piping systems, including hose, shall be proven free of leaks in accordance with Section 6.16.
NFPA 58, §6.26.5.1

Appliance Installation on Vehicles

All appliances covered by 6.26.7 installed on vehicles shall be approved.
NFPA 58, §6.26.7.2

Where the device or appliance, such as a cargo heater or cooler, is designed to be in operation while the vehicle is in transit, means, such as an excess-flow valve, to stop the flow of gas in the event of a line break shall be installed.
NFPA 58, §6.26.7.3

A permanent caution plate shall be affixed to either the appliance or the vehicle outside of any enclosure, shall be adjacent to the container(s), and shall include the following instructions:
CAUTION:
(1) Be sure all appliance valves are closed before opening container valve.
(2) Connections at the appliances, regulators, and containers shall be checked periodically for leaks with soapy water or its equivalent.
(3) Never use a match or flame to check for leaks.
(4) Container valves shall be closed when equipment is not in use.
NFPA 58, §6.26.7.10

ASME Containers

ASME containers used for any LP-Gas application shall comply with the applicable requirements in 11.13.1.
NFPA 58, §12.4.2.1

ASME containers manufactured after April 1, 2001, and for use on vehicles within the scope of this chapter, shall have a design pressure of not less than 312 psig.
NFPA 58, §12.4.2.2

The capacity of individual containers shall comply with 6.26.3.1(C).
NFPA 58, §12.4.2.3

The number of ASME containers mounted on an LPGas vehicle shall be limited to three separate ASME containers with a maximum aggregate capacity of 300 gal water capacity.
NFPA 58, §12.4.2.4

Sample Question 4

Which of the following pipe materials may be used in LP-gas engine fuel system installations?

A. Wrought iron
B. Steel
C. Brass or copper
D. All of the above
E. A or C only

Answer on last page

ALTERNATIVE FUELS TRAINING CENTER

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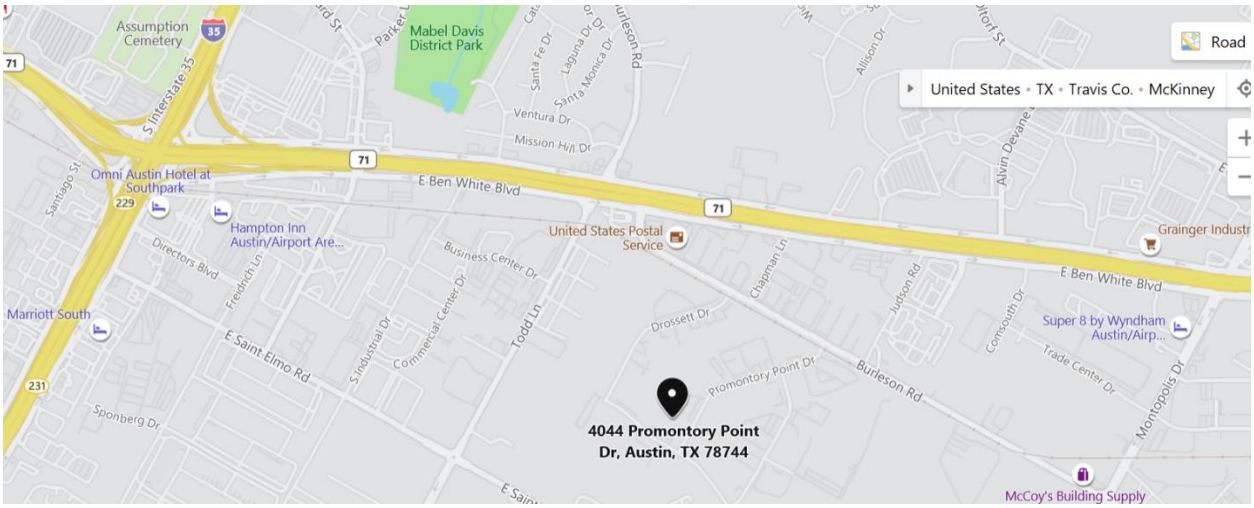

Sample Question Answers

1. C
2. C
3. B
4. A