

TEXAS LP-GAS EXAMINATION STUDY GUIDE

On-Road Motor Fuel
Employee Level



RAILROAD COMMISSION OF TEXAS

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LP-GAS EXAMINATION STUDY GUIDE

Employee-LEVEL

Who should use this guide?

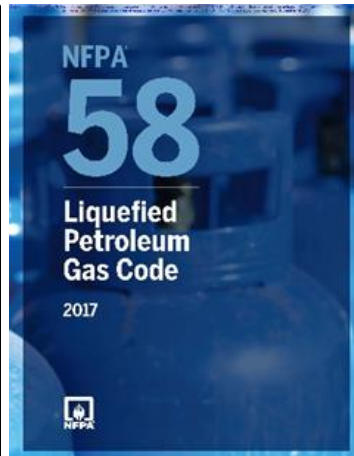
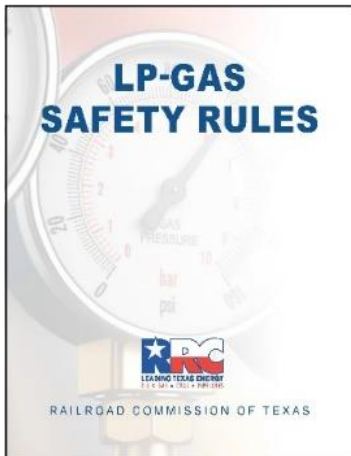
You should use this guide if you plan to take the Railroad Commission's employee-level qualifying examination to:

Perform LP-gas on-road motor-fuel activities.

The on-road motor fuel examination qualifies you to install LP-gas motor-fuel containers, cylinders, and LP-gas motor fuel systems and to replace container valves on motorized vehicles licensed to operate on public roadways.

The on-road motor-fuel examination does NOT authorize you to fill LP-gas motor or mobile fuel containers.

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

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

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

Container Repairs and Alterations

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

Container Installation Requirements

ASME mobile containers shall meet the following conditions:

- (1) An MAWP of 312 psig or higher where installed in enclosed spaces of vehicles
- (2) An MAWP of 312 psig where installed outside of passenger vehicles
- (3) An MAWP of 250 psig where installed outside of nonpassenger vehicles.

NFPA 58, §11.3.2.2

Main shutoff valves on a container for liquid and vapor shall be readily accessible without the use of tools, or other equipment shall be provided to shut off the container valves.

NFPA 58, §11.8.4.3

Fuel containers shall be installed and fitted so that no gas from fueling and gauging operations can be released inside of the passenger or luggage compartments by permanently installing a remote filling device (single or double backflow check filler valve) and a fixed maximum liquid level gauging device to the outside of the vehicle.

NFPA 58, §11.9.1.4

Container Connections

The container openings shall be labeled on the container or valves connected to the container opening to designate whether they communicate with the vapor or with the liquid space.

NFPA 58, §11.3.6.3

Labels are not required on openings for pressure relief valves and gauging devices.

NFPA 58, §11.3.6.4

Engine fuel containers constructed of steel must be painted or powder coated to minimize corrosion. Stainless steel cylinders are not required to be painted or powder coated.

NFPA 58, §11.3.7

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

Container Appurtenances

Permanently mounted ASME containers shall be equipped with a valve or combination of valves in the liquid outlet connection that has manual shutoff, excess-flow, and automatic closure features.

(A) The valve assembly shall prevent the flow of fuel when the engine is not in an operating mode even if the ignition switch is in the “on” position.

(B) This requirement shall not apply to industrial and forklift trucks.

NFPA 58, §11.4.1.8

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

Protection of Containers and Appurtenances

Container valves, appurtenances, and connections shall be protected to prevent damage due to accidental contact with stationary objects, or from stones, mud, or ice, and from damage due to an overturn or similar vehicular accident.
NFPA 58, §11.8.2.1

Protection of container valves, appurtenances, and connections shall be provided by one of the following:

- (1) By locating the container so that parts of the vehicle furnish the necessary protection
- (2) By the use of a fitting guard furnished by the manufacturer of the container
- (3) By other means to provide equivalent protection

NFPA 58, §11.8.2.2

The gas regulator and the automatic shutoff valve shall be installed as follows:

- (1) An approved automatic shutoff valve in compliance with 11.6.3 shall be installed in the fuel system.
- (2) Approved automatic pressure-reducing equipment shall be installed between the fuel supply container and the carburetor or final fuel delivery system.

NFPA 58, §11.11.1.2

Container Clearances

Containers shall not be mounted directly on roofs or ahead of the front axle or beyond the rear bumper of the vehicles.

NFPA 58, §11.8.3.1

Containers installed behind the rear axle and extending below the frame shall comply with 11.8.3.7 or shall not be lower than the lowest of the following points and surfaces with the vehicle suspension under full-rated load compression:

(1) Containers shall not be lower than the lowest point of a structural component of the body, engine, and transmission (including clutch housing or torque converter housing, as applicable) forward of the container.

(2) Containers shall not be lower than lines extending rearward from each wheel at the point where the wheels contact the ground directly below the center of the axle to the lowest and most rearward structural interference, as illustrated in Part 2 of Figure 11.8.3.4.

NFPA 58, §11.8.3.6

Where an LP-Gas container is substituted for the fuel container installed by the original manufacturer of the vehicle, the LP-Gas container either shall fit within the space in which the original fuel container was installed or shall comply with 11.8.3.5 or 11.8.3.6.

NFPA 58, §11.8.3.7

Pressure Relief Discharge

The pressure relief valve discharge from fuel containers on vehicles other than industrial (and forklift) trucks shall be in accordance with the following:

(1) It shall be directed upward or downward within 45 degrees of vertical.

(2) It shall not directly impinge on the vehicle fuel container(s), the exhaust system, or any other part of the vehicle.

(3) It shall not be directed into the interior of the vehicle.

NFPA 58, §11.8.5.1

Where the pressure relief valve discharge must be piped away, the pipeaway system shall have a breakaway adapter.

- (A) The breakaway adapter shall have a melting point of not less than 1500°F.
 - (B) The adapter either shall be an integral part of the pressure relief valve or shall be a separate adapter attached directly to the pressure relief valve.
 - (C) The pipeaway system shall have a length of nonmetallic hose.
 - (D) The nonmetallic hose shall be as short as practical and shall be able to withstand the downstream pressure from the relief valve in the full open position, and the hose shall be fabricated of materials resistant to the action of LP-Gas.
 - (E) Where hose is used to pipe away the relief valve discharge on containers installed on the outside of the vehicle, the breakaway adapter and any attached fitting shall deflect the relief valve discharge upward or downward within 45 degrees of vertical and shall meet the other requirements of 11.8.5.1 without the hose attached. If an additional fitting is necessary to meet this requirement, it shall have a melting point not less than 1500°F.
 - (F) The pipeaway system shall have a protective cover to minimize the possibility of the entrance of water or dirt into either the relief valve or its discharge system.
 - (G) No portion of the system shall have an internal diameter less than the internal diameter of the recommended breakaway adapter.
 - (H) The breakaway adapter either shall be threaded for direct connection to the relief valve and shall not interfere with the operation of the relief valve or shall be an integral part of the pressure relief valve. It shall break away without impairing the function of the relief valve.
 - (I) The pipeaway system connections shall be mechanically secured and shall not depend on adhesives or sealing compounds and shall not be routed between a bumper system and the vehicle body.
 - (J) Where a pipeaway system is not required, the pressure relief valve shall have a protective cover.
- NFPA 58, §11.8.5.2*

Container: Design, capacity, construction, repair, and name plate

The maximum capacity of individual LP-Gas containers installed on highway vehicles shall be in accordance with Table 6.24.3.1(C).

NFPA 58, §11.3.5.1

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

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

Installation in Interior of Vehicles

The container and its appurtenances shall be installed in an enclosure that is securely mounted to the vehicle.

(A) The enclosure shall be gastight with respect to driver or passenger compartments and to any space containing radio transmitters or other spark-producing equipment.

(B) The enclosure shall be vented to the outside of the vehicle.

NFPA 58, §11.9.1.2

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

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

Garaging of Vehicles

Where vehicles with LP-Gas engine fuel systems mounted on them, and general-purpose vehicles propelled by LP-Gas engines, are stored or serviced inside garages, the following conditions shall apply:

- (1) The fuel system shall be leak-free.
- (2) The container shall not be filled beyond the limits specified in Chapter 7.
- (3) The container shutoff valve shall be closed when the vehicle or the engine is being repaired, except when the engine is required to operate. Containers equipped with an automatic shutoff valve as specified in 11.4.1.8 satisfy this requirement.
- (4) The vehicle shall not be parked near sources of heat, open flames, or similar sources of ignition or near inadequately ventilated pits.

NFPA 58, §11.16

Commissioning Vehicles

All LP-Gas–fueled motor vehicles shall be identified by a weather-resistant diamond-shaped label affixed to its exterior vertical, or near vertical, lower right rear surface, but not attached to its bumper.

NFPA 58, §12.3.4

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

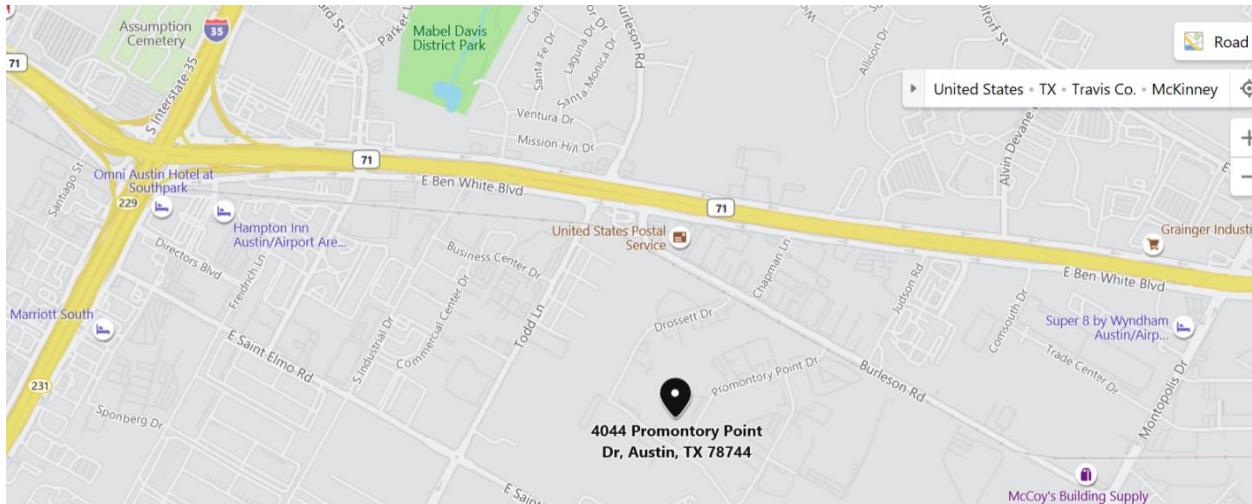
Which of the following pipe materials may be used in LP-gas engine fuel system installations?

- 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