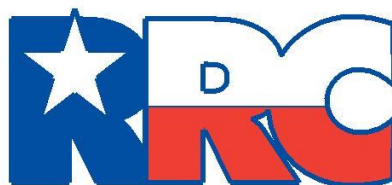


TEXAS LP-GAS EXAMINATION STUDY GUIDE

Recreational Vehicle
Technician
Employee 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 LP-gas 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' LP-Gas Safety Rules 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because changes in technology are likely to occur that might make portions of this publication inaccurate and out-of-date.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 of 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.

LP-GAS EXAMINATION STUDY GUIDE

EMPLOYEE-LEVEL

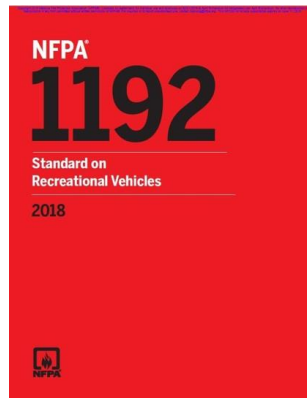
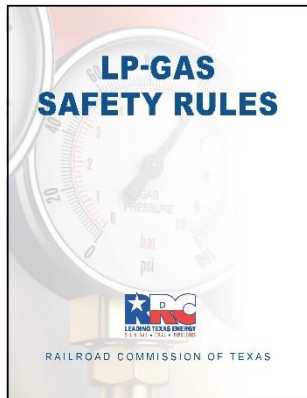
Recreational Vehicle Technician

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 recreational vehicle installation and repair activities. The recreational vehicle examination qualifies you to install LP-gas motor or mobile fuel containers, including cylinders, and to install and repair LP-gas systems on recreational vehicles.

The recreational vehicle examination does not authorize you to fill LP-gas 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 three books:

LP-Gas Safety Rules (Texas Railroad Commission)

NFPA 1192 Standard on Recreational Vehicles (National Fire Protection Association, 2018)

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.state.tx.us. 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.

Printed copies of NFPA 1192 are available for purchase from the Texas Propane Gas Association by calling (800) 392-0023. 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.”

NFPA 1192 (2018)

§5.2	Propane Systems
§5.3	Propane Piping Systems
§5.4	Fuel-Burning Appliances
§5.5	Venting, Ventilation and Combustion Air
§5.6	Marking Appliances (Installation and Operational Features)
§6.4	Other Considerations

Terms and Definitions

NOTE: The list below is not exhaustive. You are responsible for knowing all the terms and definitions that apply to the LP-gas activities you will perform, as well as the rules and standards highlighted in this guide.

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)

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)

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 1192 (2018)

Accessible. Having access to, but which first may require the removal of, a panel, door or similar covering of the item described.

NFPA 1192, §3.3.1

Axle Height. The distance to the lower connection of the axle spindle assembly and the outboard end of the lower control arm (lever ball joint or kingpin), excluding shock mounting, grease fitting, or similar component.

NFPA 1192, §3.3.4

Compartment. An enclosed volumetric space designed to provide for a separate area.

NFPA 1192, §3.3.12

Cylinder. A portable container constructed in accordance with U.S. Department of Transportation *Specifications for LP-Gas Containers* (49 CFR).

NFPA 1192, §3.3.47.1

Frame. Chassis rail and any addition thereto of equal or greater strength.

NFPA 1192, §3.3.26

Fuel System. Any arrangement of pipe, tubing, fittings, connectors, tanks, controls, valves and devices designed and intended to supply or control the flow of fuel.

NFPA 1192, §3.3.29

Heating Appliance. An appliance for comfort heating for a recreational vehicle or for water heating.

NFPA 1192, §3.3.3.1

Heat-Producing Appliance. An appliance that produces heat by utilizing electric energy or by burning fuel.

NFPA 1192, §3.3.3.2

Propane [Liquefied Petroleum Gas, LP-Gas, LPG]. Any material having a vapor pressure not exceeding that allowed from commercial propane composed predominantly of the following hydrocarbons, either by themselves or as mixtures: propane, propylene, butane (normal butane or isobutane), and butylene.

NFPA 1192, §3.3.46

Propane Supply Connector. Tubing or pipe connections the recreational vehicle to the propane supply source.

NFPA 1192, §3.3.49

Readily Accessible. Able to be located, reached, serviced or removed without removing other components or parts of the apparatus and without the need to use special tools to open enclosures.

NFPA 1192, §3.3.51

Recreational vehicle [RV]. A vehicular-type unit primarily designed as temporary living quarters for recreational, camping, travel, or seasonal use that either has its own motive power or is mounted on or towed by another vehicle.

NFPA 1192, §3.3.50

Pressure Relief Valve [“popoff valve”]. A type of pressure relief device designed to both open and closed to maintain internal fluid pressure.

NFPA 1192, §3.3.45

Tank. A container constructed in accordance with the Section VIII, “Rules for the Construction of Unfired Pressure Vessels” of the Boiler and Pressure Vessel Code.

NFPA 1192, §3.3.45.2

Containers: Capacity, Construction, Location and Installation

Where propane utilization equipment is installed by the recreational vehicle manufacturer, the recreational vehicle shall be provided with one of the following:

- (1) One but not more than three cylinders having individual water capacities of 105 lb. maximum [approximately 45 lb. propane capacity]
- (2) One or more tanks having a maximum aggregate water capacity of 200 gallons.

NFPA 1192, §5.2.1

Cylinders shall be constructed and marked in accordance with the specifications for propane cylinders of the U.S. Department of Transportation (DOT).

NFPA 1192, §5.2.2.1

Tanks utilizing vapor withdrawal must be constructed and marked in accordance with the Rules for Construction of Pressure Vessels, Section VIII, Division I, ASME *Boiler and Pressure Vessel Code*, and shall have design gauge pressure of at least 312 psi.

NFPA 1192, §5.2.2.2

Under no circumstances may an LP-gas container be installed in front of the front axle of a recreational vehicle.

NFPA 1192, §5.2.3.3 (3)

Containers shall not be mounted on the exterior of the rear wall or the rear bumper of a recreational vehicle.

NFPA 1192, §5.2.3.4

Tanks mounted behind the rear axle of a travel trailer or fifth wheel trailer must be installed so that the bottom of the tank and any connection thereto is not lower than either the rear axle(s) height or the lowest section of the frame to the rear of the tank, whichever is higher.

NFPA 1192, §5.2.3.3 (4)(a)

When the recreational vehicle is supplied with cylinders not secured in place, the recreational vehicle manufacturer shall provide mounting instructions and required materials with the vehicle.

NFPA 1192, §5.2.4.2

Propane containers located less than 18 inches 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 1192, §5.2.5.1

Containers shall be equipped with a listed overfilling prevention device.

NFPA 1192, §5.2.13.1

Cylinders shall be equipped with an overfilling prevention device that complies with ANSI/UL 2227, *Standard for Overfilling Prevention Devices*.

NFPA 1192, §5.2.13.2

LP-gas containers shall be located so that the discharge from the pressure relief valve is not less than 3 feet measured horizontally along the surface of vehicle from any opening into the recreational vehicle, fuel-burning appliance intake and exhaust vents, and all internal combustion engine exhaust terminations located below the level of the discharge.

NFPA 1192, §5.2.19.1

Sample Question

An LP-gas regulator must be installed with the pressure relief vent opening pointing downward within 50 degrees of vertical to vertical to allow for drainage of any moisture collected on the diaphragm of the regulator.

- A. True
- B. False

Propane Systems

Compartments shall be ventilated at or near the top and at the extreme bottom to facilitate diffusion of vapors.
NFPA 1192, §5.2.6.1

Hoods or housings covering cylinder valves shall not be equipped with locks or require special tools to open.
NFPA 1192, §5.2.7.2

Propane containers shall not be installed in compartments or under hoods or housing that contain flame-or spark-producing equipment.
NFPA 1192, §5.2.9

Where a remotely controlled shutoff valve is not used as permitted in 5.2.11.1, the manual control of the tank shutoff valve, the propane fill connection, and the fixed maximum liquid level gauge shall be located not more than 18 inches from the vehicle's outside wall when the vehicle is in the travel mode.
NFPA 1192, §5.2.10.2

The regulator(s) shall have a capacity of not less than the total input of all propane appliances installed in the recreational vehicle.
NFPA 1192, §5.2.15.3

The regulator(s) shall be installed with the pressure relief vent opening pointing downward within 45 degrees of vertical to vertical to allow for drainage of any moisture collected on the diaphragm of the regulator.
NFPA 1192, §5.2.15.4

A regulator installed below floor level shall be installed in a compartment that provides protection against the weather and wheel spray.
NFPA 1192, §5.2.15.5

Cylinders shall require a manual shutoff valve for vapor service that does not allow propane to flow until a positive seal is achieved between that valve and its mating connection.
NFPA 1192, §5.2.16.2

In multiple-cylinder systems, a backflow check valve shall be provided anywhere from the cylinder outlet to the automatic changeover regulator inlet.
NFPA 1192, §5.2.16.3

The pipeaway (piping) system connections shall be mechanically fastened and must not depend on adhesives or sealing compounds.
NFPA 1192, §5.2.19.3.12

Vapor, at a pressure not over 14 inches water column, shall be delivered from the system into the propane appliance supply connection.

NFPA 1192, §5.2.21.1

The appliance must be listed for recreational vehicle use at the specified operating pressure.

NFPA 1192, §5.2.21.2 (4)

Sample Question

Vapor, at a pressure not over _____ inches water column, must be delivered from the system into the propane appliance supply connection.

- A. 10
- B. 12
- C. 13
- D. 14

Propane Piping Systems

Materials for the installation, extension, alteration, or repair of LP-gas piping system in a recreational vehicle shall be new and free from defects or internal obstructions.

NFPA 1192, §5.3.2.1

Brass flare nuts shall be stress relieved or of the forged type.

NFPA 1192, §5.3.2.5 (6)

Where tubing passes through walls, floors, partitions or roofs, or similar installations, such tubing shall be protected by the use of weather-resistant grommets that fit snugly both the tubing and the hole through which the tubing passes.

NFPA 1192, §5.3.8.2

Propane piping systems shall be sized so that the pressure drop to any appliance inlet connection from the LP-gas supply connection or connections, when all appliances are in operation at maximum capacity, is not more than 0.5 inches water column.

NFPA 1192, §5.3.4.1

Threaded joints shall be made up tight with approved pipe joint material that is insoluble in propane.

NFPA 1192, §5.3.7.1

Threaded pipe joint material shall be applied to only male threads.

NFPA 1192, §5.3.7.2

Pipe or tubing joints shall not be located in any floor, wall, partition, or concealed construction space.

NFPA 1192, §5.3.9.1

All propane piping shall be secured and supported at intervals of not more than 4 feet.

NFPA 1192, §5.3.18.1

After appliances are connected to the piping system, the entire piping system shall be proven by test to be leak-free by maintaining an air pressure of not less than 8 inches water column or more than 14 inches water column.

NFPA 1192, §5.3.20.1

If during the 3-minute period, a drop in pressure occurs, the system shall be deemed to have failed the test.

NFPA 1192, §5.3.20.6 (4)

Before the test is begun, the temperature of both the air and piping must be approximately the same, and a uniform temperature shall be maintained throughout the test period.

NFPA 1192, §5.3.20.2

Sample Question

All recreational vehicle LP-gas piping must be supported at intervals of not more than _____ feet, except where adequate support and protection is provided by structural members.

- A. 3
 - B. 4
 - C. 5
 - D. 6
-

Fuel-Burning Appliances

Propane appliances shall be listed for use with propane only or for use with both natural gas and propane where convertible from natural gas to propane and vice versa.

NFPA 1192, §5.4.3

All fuel-burning appliances, except ranges and ovens, shall be designed and installed to provide for complete separation of the combustion system from a recreational vehicle's interior atmosphere.

NFPA 1192, §5.4.6.1

Fuel burning appliances must not be converted from one fuel to another unless in accordance with the terms of its listing and the appliance manufacturer's instructions.

NFPA 1192, §5.4.4

The installation of each fuel burning appliance shall conform to the terms of its listing and the appliance manufacturer's instructions.

NFPA 1192, §5.4.5.1

Floor-mounted fuel burning appliances shall not be installed on carpeting unless the appliance is listed for such installation.

NFPA 1192, §5.4.5.2

Every appliance shall be mounted in place to avoid displacement.

NFPA 1192, §5.4.5.3

Sample Question

All fuel-burning appliances, except _____, must be designed and installed to provide for complete separation of the combustion system from a recreational vehicle's interior atmosphere.

- A. Floor-mounted appliances
- B. Ranges
- C. Ovens
- D. Both B and C

Venting, Ventilation and Combustion

In a recreational vehicle, venting and combustion air systems shall be installed in accordance with the following:

- (1) Components shall be assembled and properly aligned using the methods shown in the appliance manufacturer's instructions.
- (2) Vent connectors shall be firmly attached to the flue collars by sheet metal screws, their equivalent, or as specified in the manufacturer's instructions.
- (3) Every joint of a vent, vent connector, exhaust duct and combustion air intake shall be secured and in alignment.

NFPA 1192, §5.5.1

Flue gas outlets from fuel-burning heating appliances shall not be less than 3 feet from any motor-driven air intake discharging into habitable areas of a recreational vehicle.

NFPA 1192, §5.5.2.1

Flue gas outlets must not terminate under a recreational vehicle.

NFPA 1192, §5.5.2.2

Any portion of a combustion air inlet or flue gas outlet of a fuel-burning heating appliance shall be located at least 3 feet from any gasoline filler spout on the vehicle if the inlet or outlet is located above or at the same level.

NFPA 1192, §5.5.3.1

The space where any fuel-burning cooking appliance is located shall be ventilated by a gravity or mechanical vent extending through the roof to the outside.

NFPA 1192, §5.5.4.1

Sample Question

In a recreational vehicle, venting and combustion air systems must be installed in accordance with which of the following?

- A. Components must be assembled and properly aligned as shown in the manufacturer's instructions.
- B. Vent connectors must be firmly attached to the flue collars by sheet metal screws or as specified in the manufacturer's instructions.
- C. Every joint of a vent, vent connector, exhaust duct and combustion air intake must be secured and in alignment.
- D. All of the above

Marking Appliances (Installation and Operational Features)

Information on clearance, input rating, lighting, and shutdown shall be attached to the appliance.

NFPA 1192, §5.6.1.1

Each fuel burning appliance shall bear the appliance manufacturer's permanent marking designating the type(s) of fuel for which it is listed.

NFPA 1192, §5.6.2.1

Every appliance must be accessible for inspection, service, repair and replacement.

NFPA 1192, §5.6.3.1

All propane clothes dryers shall be exhausted to the outside by a moisture-lint exhaust duct and termination fitting.

NFPA 1192, §5.6.7.1

Fuel-burning clothes dryers shall receive their combustion air and drying air from outside the vehicle and shall exhaust the combustion products and drying air from inside the vehicle.

NFPA 1192, §5.6.7.4

Each recreational vehicle must be provided with an owner's manual that must contain as a minimum the information contained in 5.9.1.2(A) through 5.9.1.2(G).

NFPA 1192, §5.8.1.2

Sample Question

Information on clearance, input rating, lighting, and shutdown of appliances must be attached to the driver's side dash panel on any recreational vehicle. NFPA 1192, §5.6.1.1

- A. True
- B. False

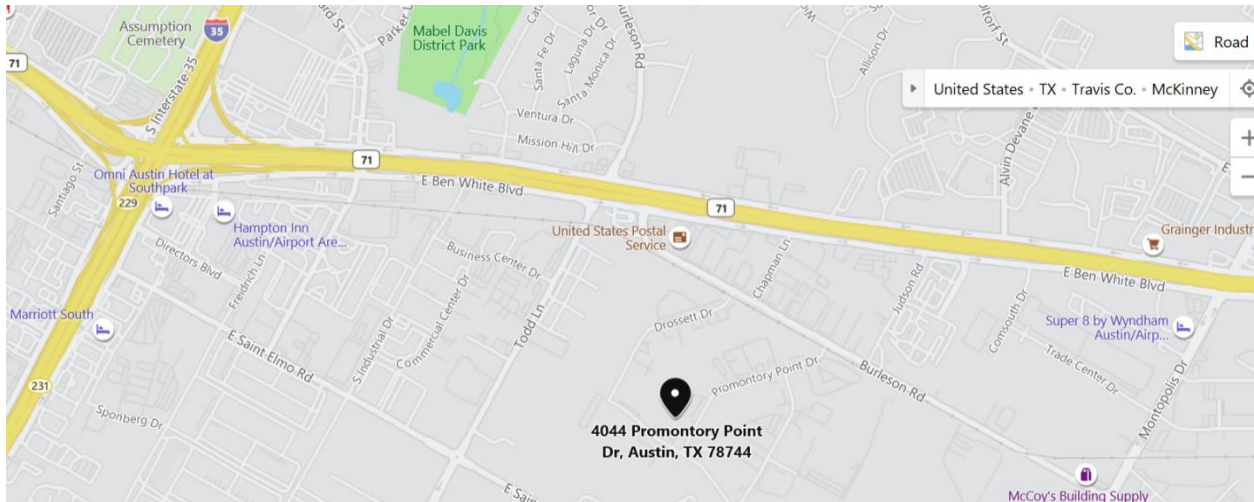
Fire and Life Safety Provisions

All recreational vehicles equipped with a propane appliance and electrical system must be equipped with a listed propane detector listed as suitable for use in recreational vehicles under the requirements of UL 1484 and installed according to the terms of its listing.

NFPA 1192, §6.3.3.1

ALTERNATIVE FUELS TRAINING CENTER

4044 Promontory Point Austin Texas 78744



Sample Question Answers

1. B
2. D
3. B
4. D
5. D
6. B