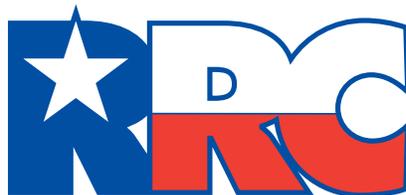


TEXAS LP-GAS EXAMINATION STUDY GUIDE

Mobile Fuel
Employee Level



RAILROAD COMMISSION OF TEXAS

September 2012

NOTICE

This publication is intended for use in its entirety as a guide for persons preparing to take Railroad Commission LP-gas qualifying examinations. 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because changes in technology are likely to occur that might make portions of this publication inaccurate and out-of-date.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.

Exam administration

Taking an examination in Austin

You may take any LP-gas qualifying examination in Austin without pre-registering (“walk-in”) on any business day, excluding holidays, from 8:00 a.m. to 12:00 noon at the AFRED Training Center. The Training Center is located at 6506 Bolm Road, at the intersection of U.S. Highway 183.

Tuesdays and Thursdays are the preferred days for walk-in examinations.

(See map to Training Center on page 16.)

Taking an examination outside of Austin

You may also take any Railroad Commission qualifying examination at more than two dozen other locations statewide. Exam dates, times and locations are listed three months in advance on the Commission’s web site. To view a complete schedule, go to www.rrc.state.tx.us. From the drop-down menu under “Education and Training,” choose “Training Classes & Qualifying Exams” and click on “Class/Exam Schedule.” The online schedule has links to maps showing each class and exam location.

You must register at least two business days in advance to take an examination outside of Austin. To register online, go to www.rrc.state.tx.us. From the drop-down menu under “Education and Training,” choose “Training Classes & Qualifying Exams” and click on “Register Now.” The web site allows you to register up to four people for an examination, a training class, or both.

When you register online, you will receive a return e-mail confirming the registration and the dates and locations of the exams. You will also receive advance notification of any changes in the examination date, time or location.

Payment for exams; LPG Form 16; ID required

The fee is \$40.00 for each employee-level exam and \$70.00 for each management-level exam. Fees are non-refundable by state law, and cash cannot be accepted.

You may pay the required examination fee at any exam location by check or money order payable to the Railroad Commission of Texas. LPG Form 16, “Application for Examination,” may also be completed at the examination site. Examinees must also present an official state-issued driver’s license or photo ID at the exam site.

You may also pay your examination fee by credit card in advance online. To pay by credit card, go to www.rrc.state.tx.us. From the drop-down menu under “Education and Training,” choose “Training Classes & Qualifying Exams” and click on “Pay Online.” Be sure to print out the confirmation page in Step 6. Make a copy of the confirmation page for your records and bring a copy with you to the examination site.

Open-book examinations

All Railroad Commission LP-gas employee-level qualifying examinations are open book.

Examinees may use a copy of NFPA 58, 2008 edition and the Railroad Commission’s *LP-Gas Safety Rules* to take their employee-level mobile fuel examination. This study guide may not be used during any employee-level examinations.

The questions on the employee-level mobile fuel examination are not organized by topic as they are in this study guide.

Examination time limit

The employee-level mobile fuel examination must be completed within two hours after the examination is given to you, including any breaks you elect to take. The examination proctor is the official timekeeper. You must submit your examination and your answer sheet to the proctor within the two-hour limit.

Grades, reports and retakes

The minimum passing grade is 75 percent on all LP-gas examinations.

All examinations administered at the Training Center in Austin are graded on-site, and examinees are immediately informed of the results. If you fail an examination that you took in Austin, you may retake that same examination only one additional time during a business day. Any subsequent examination must be taken on another business day, unless approved by the Commission.

Exams taken at a remote site are graded as soon as possible, and the results of the examination are reported within 10 working days.

If you pass an examination, the Railroad Commission will issue you a blue certification card within 10 working days. You will be notified by letter if you fail an examination.

Contacts

Alternative Fuels Research and Education (AFRED)

Rayfield Hearne, Certification Manager	(512) 463-6845	rayfield.hearne@rrc.state.tx.us
Amber Flaherty, Examination Coordinator	(512) 463-6933	amber.flaherty@rrc.state.tx.us
Carol Goodman, Training Coordinator	(512) 463-2682	carol.goodman@rrc.state.tx.us

LP-Gas Operations

April Dawn Richardson, LP-Gas Safety	(512) 463-6935	april.richardson@rrc.state.tx.us
--------------------------------------	----------------	--

LP-GAS EXAMINATION STUDY GUIDE EMPLOYEE-LEVEL MOBILE FUEL

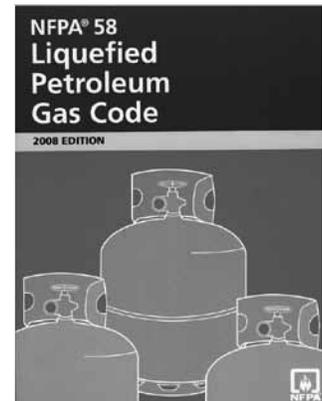
Who should use this guide?

You should use this guide if you plan to take the Railroad Commission's employee-level qualifying examination to perform LP-gas mobile fuel activities. The mobile fuel examination qualifies you to install LP-gas mobile fuel containers, cylinders, and LP-gas mobile fuel systems, and replace container valves on mobile LP-gas equipment such as trailers, catering trucks, mobile kitchens, tar kettles, hot oil units, and portable auxiliary engines.

The mobile fuel examination does not authorize you to fill LP-gas mobile fuel containers or cylinders.

What book do I need?

This examination tests your knowledge of the laws and standards that apply to mobile fuel operations in Texas. These laws and standards are found in NFPA 58, *Liquefied Petroleum Gas Code* (National Fire Protection Association, 2008).



Where do I get this book?

Printed copies of NFPA 58 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 on pp. 6-7 of this study guide and the contents of the following sections of the codes and standards.

The actual examination may not include questions on all of the listed sections and topics. Exam questions are not organized by topic as they are in this study guide.

NOTE: Section (§)9.402(c) of the LP-Gas Safety Rules states, “Container capacity, piping system, and appliance exceptions. 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, or to any LP-gas piping system or appliance attached or connected to such a container.”

NFPA 58 (2008)

- 5.20 Appliances

- 6.23 LP-Gas Systems on Vehicles (Other Than Engine Fuel Systems)

Terms and definitions

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

As a mobile fuel technician, you need to know the terms, definitions, facts, rules and procedures relating propane’s physical characteristics and the operation of mobile LP-gas equipment.

NFPA 58 (2008)

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

Container. Any vessel, including cylinders, tanks, portable tanks, and cargo tanks, used for the transporting or storage of LP-gases.

NFPA 58, §3.3.13

Container Appurtenances. Devices installed in container openings for safety, control, or operating purposes.

NFPA 58, §3.3.14

DOT. U.S. Department of Transportation.

NFPA 58, §3.3.21

Fixed Liquid Level Gauge. A liquid level indicator that uses a positive shutoff vent valve to indicate that the liquid level in a container being filled has reached the point at which the indicator communicates with the liquid level in the container.

NFPA 58, §3.3.29.1

Fixed Maximum Liquid Level Gauge [“outage gauge,” “spitter valve,” “spew 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, §3.3.29.2

Flexible Connector. A short [not more than 60 in. overall length] piping system component that is fabricated from a flexible material and equipped with connections at both ends.

NFPA 58, §3.3.25

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

NFPA 58, §3.3.36

Pressure Relief Device [“popoff valve”]. A device designed to open to prevent a rise of internal pressure in excess of a specified value due to emergency or abnormal conditions.

NFPA 58, §3.3.58

Sources of Ignition. Devices or equipment that, because of their modes of use or operation, are capable of providing sufficient thermal energy to ignite flammable LP-gas vapor-air mixtures when introduced into such a mixture or when such a mixture comes into contact with them, and that will permit propagation of flame away from them.

NFPA 58, §3.3.67

Water Capacity. The amount of water at 60°F required to fill a container.

NFPA 58, §3.3.79

Mobile container. A container that is permanently mounted on a vehicle and connected for uses other than supplying fuel to the vehicle’s engine.

NFPA 58, §3.3.41

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

NFPA 58, §3.3.73

Key topics

NOTE: The list below is not exhaustive. You are responsible for knowing all the rules or standards 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. Then, when you take the examination, read each question very carefully.

1. Container Installation Requirements

Containers must comply with the following:

(A) ASME mobile containers must have a maximum allowable working pressure of 250 psig if constructed prior to April 1, 2001, or 312 psig if constructed on or after April 1, 2001.

(B) Cylinders installed on recreational vehicles or on other vehicles must be constructed for at least a 240 psig service pressure.

(C) ASME mobile containers installed on recreational vehicles or on other vehicles must be constructed for at least a 312 psig maximum allowable working pressure.

(D) LP-gas fuel containers used on passenger-carrying vehicles must not exceed 200 gallons total water capacity.

(E) The capacity of individual LP-gas containers on highway vehicles must be in accordance with Table 6.23.3.1(E).

(F) Containers designed for stationary service only and not in compliance with the container appurtenance protection requirements of 5.2.6 must not be used.

NFPA 58, §6.23.3.1

The maximum capacity of an individual LP-gas container installed on a highway, non-passenger vehicle is 300 gallons water capacity.

NFPA 58, §Table 6.23.3.1(E)

ASME containers and cylinders must not be installed, transported, or stored (even temporarily) inside any vehicle, except for ASME containers installed in accordance with 6.23.3.4(I), Chapter 9, or DOT regulations.

NFPA 58, §6.23.3.2

The LP-gas supply system, including the containers, must 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 feet horizontally away from any opening into the vehicle below the level of the vents.

NFPA 58, §6.23.3.3

Containers must be mounted securely on the vehicle or within the enclosing recess or cabinet.

- (A) Containers must be installed with road clearance in accordance with 11.7.3.
- (B) Fuel containers must be mounted to prevent jarring loose and slipping or rotating, and the fastenings must be designed and constructed to withstand, without permanent visible deformation, static loading in any direction equal to four times the weight of the container filled with fuel.
- (C) Where containers are mounted within a vehicle housing, the securing of the housing to the vehicle must comply with this code. Any removable portions of the housing or cabinet must be secured while in transit.
- (D) Field welding on containers must be limited to attachments to non-pressure parts such as saddle plates, wear plates, or brackets applied by the container manufacturer.
- (E) All container valves, appurtenances, and connections must be protected to prevent damage from accidental contacts with stationary objects, from loose objects, stones, mud, or ice thrown up from the ground or floor, and from damage due to overturn or similar vehicular accident.
- (F) Permanently mounted ASME containers must be located on the vehicle to provide this protection.
- (G) Cylinders must have permanent protection for cylinder valves and connections.
- (H) Where cylinders are located on the outside of a vehicle, weather protection must be provided.
- (I) Containers mounted on the interior of passenger-carrying vehicles must be installed in compliance with Section 11.8. Pressure relief valve installations for such containers must comply with 11.7.5.

NFPA 58, §6.23.3.4

Cylinders installed on portable tar kettles alongside the kettle, on the vehicle frame, or on road-surface heating equipment must be protected from radiant or convected heat from open flame or other burners by the use of a heat shield or by the location of the cylinder(s) on the vehicle. In addition:

- (1) Cylinder valves must be closed when burners are not in use.
- (2) Cylinders must not be refilled while burners are in use as provided in 7.2.3.2(B).

NFPA 58, §6.23.3.5

SAMPLE QUESTION

ASME mobile containers installed on recreational vehicles or on other vehicles must be constructed for at least a 275 psig maximum allowable working pressure.

- A. True
- B. False

Answer: B

2. Installation of Container Appurtenances (Valves and Fittings)

Container appurtenances must be installed in accordance with the following:

- (1) Pressure relief valves installed on ASME containers that are installed in the interior of vehicles complying with §11.8 must comply with §11.7.5.
- (2) Pressure relief valve installations on ASME containers installed on the outside of vehicles must comply with §11.7.5 and §6.23.3.3.
- (3) Main shutoff valves on containers for liquid and vapor must be readily accessible.
- (4) Cylinders must be designed to be filled in either the vertical or horizontal position. Universal-type cylinders may be filled in either position.
- (5) All container inlets, outlets, or valves that are installed in container inlets or outlets, except pressure relief devices and gauging devices, must be labeled to designate whether they communicate with the vapor or liquid space of the container.
- (6) Containers from which only vapor is to be withdrawn must be installed and equipped with connections to minimize the possibility of the accidental withdrawal of liquid.

NFPA 58, §6.23.4.1

Regulators must be installed in accordance with §6.7.2 and §§6.23.4.2(A) through 6.23.4.2(E).

- (A) Regulators must 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 must 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 must be installed in a compartment that provides protection against the weather and wheel spray.

(D) Regulator compartments must comply with the following:

- (1) The compartment must be of sufficient size to allow tool operation for connection to and replacement of the regulators(s).
- (2) The compartment must be vapor-tight to the interior of the vehicle.
- (3) The compartment must have a 1 square inch minimum vent opening to the exterior located within 1 inch of the bottom of the compartment.
- (4) The compartment must not contain flame or spark producing equipment.

(E) A regulator vent outlet must be at least 2 inches above the compartment vent opening.

NFPA 58, §6.23.4.2

SAMPLE QUESTION

If a vehicle-mounted regulator is installed _____, it must be installed in a compartment that provides protection against the weather and wheel spray.

- A. Below floor level
- B. At floor level
- C. At or below floor level
- D. None of the above

Answer: C

3. Piping

Piping must be installed in accordance with §6.9.3 and §§6.23.5.1(A) through 6.23.5.1(M).

- (A) Steel tubing must have a minimum wall thickness of 0.049 in.
- (B) A flexible connector must be installed between the regulator outlet and the piping system to protect against expansion, contraction, jarring, and vibration strains.
- (C) Flexibility must be provided in the piping between a cylinder and the gas piping system or regulator.
- (D) Flexible connectors must be installed in accordance with §6.9.6.
- (E) Flexible connectors longer than the length allowed in the code, or fuel lines that incorporate hose, must be used only where approved.

(F) The piping system must 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 must be installed in a protected location.

(H) Where piping is installed outside the vehicle, it must be installed as follows:

(1) Piping must be under the vehicle and below any insulation or false bottom.

(2) Fastening or other protection must 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 must be installed to prevent chafing.

(I) Gas piping must 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 must be located in the main gas line under the floor and outside the vehicle.

(K) Exposed parts of the piping system either must be of corrosion-resistant material or must be coated or protected to minimize exterior corrosion.

(L) Hydrostatic relief valves must be installed in isolated sections of liquid piping as provided in §6.13.

(M) Piping systems, including hose, must be pressure tested and proven free of leaks in accordance with §6.14.
NFPA 58, §6.23.5.1

There must be no fuel connection between a tractor and trailer or other vehicle units.
NFPA 58, §6.23.5.2

SAMPLE QUESTION

Piping systems, including hose, must be pressure tested and proven free of leaks.

- A. True
- B. False

Answer: A

4. Equipment Installation

Installation must be made in accordance with the manufacturer's recommendations and, in the case of approved equipment, as provided in the approval.

NFPA 58, §6.23.6.1

Equipment installed on vehicles must be protected against vehicular damage as provided for container appurtenances and connections in §6.23.3.4(C).

NFPA 58, §6.23.6.2

5. Appliance Installation on Vehicles

All appliances installed on vehicles must be approved.

NFPA 58, §6.23.7.2

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

NFPA 58, §6.23.7.3

Gas-fired heating appliances and water heaters must be equipped with automatic devices designed to shut off the flow of gas to the main burner and the pilot in the event the pilot flame is extinguished.

NFPA 58, §5.20.7(A)

All gas-fired heating appliances must be equipped with safety shutoffs in accordance with §5.20.7(A) except those covered in §6.19.2.8(2).

NFPA 58, §6.23.7.4

Gas-fired heating appliances, other than ranges and illuminating appliances installed on vehicles intended for human occupancy, must be designed or installed to provide for a complete separation of the combustion system from the atmosphere inside the vehicle.

NFPA 58, §6.23.7.5

Where unvented-type heaters that are designed to protect cargo are used on vehicles not intended for human occupancy, provisions must be made to provide air from the outside for combustion and dispose of the products of combustion to the outside.

NFPA 58, §6.23.7.6

Appliances installed in the cargo space of a vehicle must be readily accessible whether the vehicle is loaded or empty.

NFPA 58, §6.23.7.7

Appliances must be constructed or otherwise protected to minimize possible damage or impaired operation due to cargo shifting or handling.

NFPA 58, §6.23.7.8

Appliances must be located so that a fire at any appliance will not block persons from exiting the vehicle.

NFPA 58, §6.23.7.9

A permanent caution plate must be provided, affixed to either the appliance or the vehicle outside of any enclosure and adjacent to the container(s), and must include the following items:

CAUTION:

- (1) Be sure all appliance valves are closed before opening container valve.
- (2) Connections at the appliances, regulators, and containers must 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 must be closed when equipment is not in use.

NFPA 58, §6.23.7.10

SAMPLE QUESTION

Which of the following statements is not required to be included on the caution plate affixed to either the appliance or to the vehicle outside of any enclosure and adjacent to the container(s)?

- A. Be sure all appliance valves are closed before opening container valve.
- B. Never use a match or flame to check for leaks.
- C. Container valves shall be closed when equipment is not in use.
- D. Leak-check appliances, regulators and containers every three years.

Answer: D

6. General Precautions

Mobile units containing hot plates and other cooking equipment, including mobile kitchens and catering vehicles, must have at least one approved portable fire extinguisher rated at not less than 10-B:C in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*.

NFPA 58, §6.23.8

7. Parking, Servicing, and Repair

Vehicles with LP-Gas fuel systems mounted on them for purposes other than propulsion must be permitted to be parked, serviced, or repaired inside buildings in accordance with the following:

- (1) The fuel system must be leak-free, and the container(s) must not be filled beyond the limits specified in Chapter 7.
- (2) The container shutoff valve must be closed, except that the container shutoff valve must not be required to be closed when fuel is required for test or repair.
- (3) The vehicle must not be parked near sources of heat, open flames, or similar sources of ignition, or near unventilated pits.

NFPA 58, §6.23.9.1

Vehicles having containers with water capacities larger than 300 gallon must comply with the requirements of §9.7.

NFPA 58, §6.23.9.2

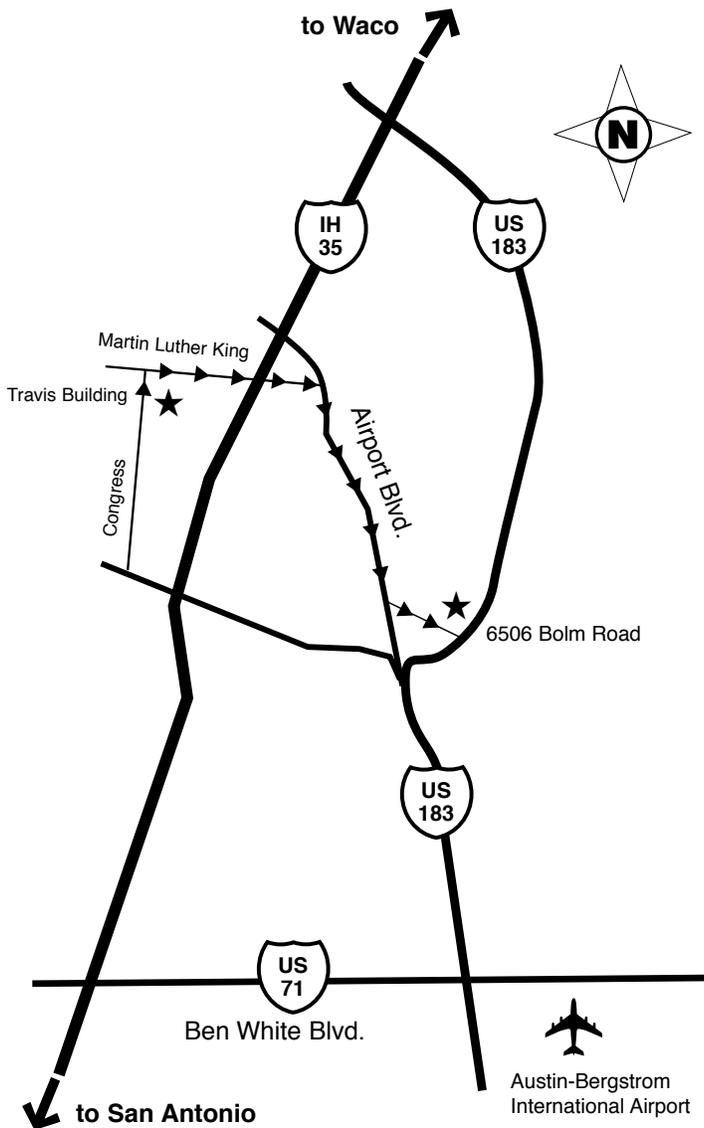
- (2) The container shutoff valve must be closed, except that the container shutoff valve must not be required to be closed when fuel is required for test or repair.
- (3) The vehicle must not be parked near sources of heat, open flames, or similar sources of ignition, or near unventilated pits.

NFPA 58, §6.23.9.1

Vehicles having containers with water capacities larger than 300 gallon must comply with the requirements of §9.7.

NFPA 58, §6.23.9.2

RRC/AFRED TRAINING CENTER 6506 BOLM RD., AUSTIN



DIRECTIONS TO RRC ALTERNATIVE FUELS TRAINING CENTER, AUSTIN

From the Travis Building:

Go one block north to Martin Luther King, Jr. Blvd. Turn right on MLK and go about 2 miles to Airport Blvd. Turn right (south) on Airport and go about 1 1/2 miles. The fifth traffic light, just over the railroad bridge, is Bolm Road. Turn left (east) onto Bolm Road and go about 1 mile. 6506 is the last building on the left before U.S. 183.

Entering Austin on I-35 going south:

Take exit 239/240 for Hwy 183 South/ Austin-Bergstrom International Airport. Stay on 183 past Cameron Road, U.S. 290, Manor Road, Loyola Lane, and Techni-Center Drive. Proceed down the hill on 183 and take the Bolm Road exit. At the light, turn right onto Bolm Road. The Training Center is on the northwest corner of 183 and Bolm Road. Enter through the double glass doors on the south side of the building.

Entering Austin on I-35 going north:

Take exit 230 for Texas Hwy. 71/Ben White Blvd. Turn right toward Bastrop. Stay on 71 for approximately 4.3 miles. Exit onto U.S. 183 North. Stay on 183 past the Colorado River bridge. Stay in the right lane and take the Bolm Road exit. Turn left at the light onto Bolm Road and go under the overpass. The Training Center is on the northwest corner of 183 and Bolm Road. Enter through the double glass doors on the south side of the building.