A Guide to Successful Installation of LP Gas Appliances & Systems
(Previously known as the "Red Book")

Provided by the:
Oklahoma LP Gas Administration
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GENERAL INFORMATION

No person, firm, corporation, association or other entity shall engage in the manufacturing, assembling, fabrication, installing or selling of any system, container, or apparatus to be used in this State in or for the transportation, storing, dispensing, or utilization of LPG, nor shall any transporter, distributor, or retailer of LPG store, dispense and/or transport over the highways of this State any LPG for use in this State in any system, container, apparatus or appliance without having first obtained a permit to do so.

CLASS IV – INSTALLER PERMIT

(A) The Class IV Installer Permit permits the holder to install and service LP Gas systems, appliances, and other LP Gas equipment. The applicant is required to have immediate supervision for two (2) weeks with a Class IV, IV-D, Class X, or a person licensed by Oklahoma Construction Industries Board with a Mechanical License, and then shall be required to pass a written examination for each separate endorsement. The endorsements will be as follows:
(i) LP, Low Pressure systems covered by **NFPA 54**;
(ii) HP, High Pressure systems covered by **NFPA 58**;
(iii) RV, Recreational Vehicle systems covered by **NFPA 1192**;
(iv) MC, Meter Calibration systems covered by **NIST Handbook 44**;
(v) TI, Truck Inspections and Piping covered by **NFPA 58** and **CFR 49**;
(vi) DO, Dispenser Operator for Class IV permit holders that also dispense propane.

(B) Exception from two (2) week training period would be anyone already licensed by Oklahoma Construction Industries Board with a Mechanical License. If the supervising person determines that the new applicant is properly trained, proper documentation of the training is on file, and a Class IV application has been forwarded to the LP Gas Administration, the applicant at that time may begin performing the duties of a Class IV permit holder until such time as the test is administered and the permit issued. This time shall not exceed thirty (30) days, or the applicant shall cease to perform these duties. Upon renewal, endorsements will be based on services provided as authorized by the Administrator.

(C) Class IV permit does not permit the holder to install or service LP-Gas carburetion systems.

(D) Any installer not under the personal and direct supervision of a Class X holder at the immediate time and location of installation shall be required to have a Class IV or IV-D permit.

The annual fee for a Class IV permit with one (1) endorsement is Seventy Dollars ($70.00). Each additional endorsement is Ten Dollars ($10.00).

INSURANCE

(A) General liability, Bodily Injury, Property Damage, including products and completed operations liability coverage shall be obtained as follows: $500,000 per occurrence; $500,000 aggregate. (B) Workers' compensation insurance shall be obtained as required by Oklahoma State statutes.

EXAM

Before the permit is issued the first time, the applicant must pass an examination, showing proficiency in the type of work in which he will engage.

The applicant may schedule a time to come to the LP Gas Administrations office to take the exam, or they can take it near their hometown or nearby vicinity, providing it may be given at a time and date the Safety Code Enforcement

Officer is in that area. There is a $10.00 fee for the examination and a onetime $10.00 filing fee. The examination will cover matters pertaining to SAFETY.

GENERAL PRECAUTIONS

NOTIFICATION OF INTERRUPTED SERVICE:
It shall be the duty of the permit holder, when the gas supply is to be turned off, to notify all affected consumers.

BEFORE TURNING OFF GAS:
Before turning off the gas to premises for the purpose of installation, repair, or maintenance of gas piping or appliances, all equipment shutoff valves shall be turned off.

TURN OFF GAS:
All piping or gas appliance installation shall be performed with the gas turned off to eliminate hazards from leakage of gas.

WORKING ALONE:
An individual should not work alone in any situation where accepted working practice dictates that two or more persons are necessary to perform the work SAFELY.

WHEEL STOPS:
Each cargo tank vehicle shall carry and use chock blocks to prevent rolling of the vehicle whenever it is being loaded, unloaded, or is parked. **NFPA 58, 9.4.8**

INTERRUPTIONS IN WORK:
When interruptions in work occur while repairs or alterations are being made to an existing piping system, the system shall be left in a safe condition. **NFPA 54, §4.2.2.**

NO SMOKING:
When working on piping or containers which contain or has contained gas, open flames, lanterns, welding, smoking, or other sources of ignition, shall not be permitted.

WELDING ON CONTAINER:
Welding to the shell, head, or any other part of the container subject to internal pressure, is prohibited unless done in compliance with the code under which the tank was fabricated and by a manufacturer or other agency qualified to do this type of work.

CHECKING FOR GAS LEAKS:
Leak detection solution, combustible gas indicator, or other material acceptable for the purpose, shall be used in locating gas leakage. *MATCHES, CANDLES, FLAME, OR OTHER SOURCES OF IGNITION SHALL NOT BE USED FOR THIS PURPOSE.*

PERSONAL PROTECTIVE EQUIPMENT
OHSA'S 29 CFR § 1910.132 requires that when hazards cannot be eliminated through engineering and/or administrative controls, PPE must be used to protect the eyes, face, head, feet, hands, arms, body, ears, and lungs.

WHAT IS PPE?
Equipment that workers wear to protect themselves from hazards in their work environment.

EXAMPLES:

Hearing Protection	Safety Goggles	Respirators	Safety Glasses
Hard Hats	Gloves	Safety Shoes	

STUDENT/ EMPLOYEE RESPONSIBILITIES:
- Properly wearing, cleaning, maintaining, and inspecting all assigned PPE, according to the manufacturer's instructions, and following the PPE program requirements.
- Returning all damaged PPE to Instructor/ Employer to receive a replacement
- Defective or damaged equipment or PPE shall not be used.

WHEN IS PPE NECESSARY?

- Impact hazards
    - A hard hat is necessary when there is a danger of falling or flying objects or bumping head against a fixed object. Also required when delivering to industrial/ construction sites.
- Mechanical or Environmental Hazards
    - Hand protection is required when working with objects, tools, or machinery that may cause punctures, cuts, or abrasions. Factors such as extreme temperatures also require proper PPE Gloves should be worn when transferring propane.
    - For hand protection, there is no **ANSI** standard for gloves, but **OSHA** recommends that selection be based upon the tasks to be performed and the performance and construction characteristics of the glove material.
- Eye Hazards
    - Safety glasses or face shields may be worn if hazards are present such as:
        - Injurious gases, vapors, & liquids
        - Flying particles, dust, or objects
- Regular eyeglasses or contact lenses ***do not*** provide adequate protection.

COMPANY POLICY

You must adhere to the PPE policies and procedures of your organization. Know where to get your PPE, when and how to use it, and what the consequences are for noncompliance.

PURGING

The process of purging gas piping that contains fuel gas or charging a gas pipe that is full of air with fuel gas requires that a significant amount of combustible mixture not be developed within the pipeline or released within a confined space. **NFPA 54, §A.8.3.**

When piping full of air is placed in operation, the air in the piping shall be displaced with fuel gas, except where such piping is required by Table 8.3.1 to be purged with an inert gas prior to introduction of fuel gas.

The air can be safely displaced with fuel gas, provided that a moderately rapid and continuous flow of fuel gas is introduced at one end of the line and air is vented out at the other end. The fuel gas flow shall be continued without interruption until the vented gas is free of air. The point of discharge shall not be left unattended during purging. After purging, the vent shall then be closed. **NFPA 54, §8.3.2.1.**

The open end of piping systems being purged shall not discharge into confined spaces or areas where there are sources of ignition unless precautions are taken to perform this operation in a safe manner by ventilation of the space, control of purging rate, and elimination of all hazardous conditions. **NFPA 54, §8.3.3.**

THE SMELL OF PROPANE

Propane is required to be odorized, and the odor shall be documented each time a transport load is brought into a storage facility and again before being delivered to the end user. **NFPA 58, §4.2.**

Ethel Mercaptan is added to propane as the odorizing agent; however, the Ethel Mercaptan vaporizes at a slightly slower rate than propane. This means that, over time, it will accumulate in the tank. As the amount of Ethel Mercaptan increases in the tank, it exceeds the percentage at which the flame will burn the odorant. Many propane tanks which have been in service for several years, will contain excessive Ethel Mercaptan and when the percentage in the tank gets low the odor of propane will fill the air even though there is no leak.

NEVER assume the propane odor inside any building is a result of a tank that is getting low! LP-gas vapor is heavier than air and will settle in low areas. This is the reason that houses with basements and crawl spaces are especially dangerous if a propane leak is undetected.

The odorant in propane smells like rotten eggs or a dead animal. Some consumers, such as older adults, people on certain medications, or people under the influence of alcohol or drugs, may have difficulty smelling propane. Scratch and sniff brochures are available from the OK LP Gas Commission to help you familiarize your customers with the smell.

Odor fade is another possible occurrence, although rare, that may make it more difficult to smell propane. Odor fade is an unintentional decrease of the odorant concentration in the container. It is suspected this may be caused by air, water, or rust inside the container; passage through soil or exposure to building materials, masonry, or fabrics.

Since there is a possibility of problems with the sense of smell or odor fade or you should respond immediately to even a faint odor of gas.

RESPONDING TO A REPORTED GAS LEAK

While it is not a regulatory requirement, it is strongly recommended that each company develop a policy for responding to a customer that calls reporting a gas leak. This policy should have detailed guideline for what should be done, and each employee should be trained regarding the policy.

Remember the following general guidelines when a customer calls to report a possible leak and can smell, see, or hear propane:

1. Eliminate Ignition Sources- Put out any open flames and do not smoke; do not operate appliances, switches, lights, telephones- any flame or spark could trigger a fire or an explosion.
2. Confirm that they have left the location of the suspected gas leak. If not, have them leave the area immediately and call from a safe nearby location.
3. Ask specific questions to determine the severity of the leak.
4. If it is safe to do so, ask the customer to shut off the main gas supply valve at the container. Remind them to turn it clockwise to close.
5. Tell them not to return to the home until a propane professional determines that it is safe to do so.

PRESSURE TESTING

According to **Chapter 8 of NFPA 54 2024** edition:

- Prior to acceptance and initial operation, all piping installations shall be inspected, and pressure tested to determine that the materials, design, fabrication, and installation practices comply with the requirements of this code. **NFPA 54 §8.1.1.1.**
- The test medium shall be air, nitrogen, carbon dioxide, or an inert gas. OXYGEN SHALL NEVER BE USED. **NFPA 54 §8.1.2.**
- Appliances and equipment that are not to be included in the test must be either disconnected from the piping or isolated by blanks, blind flanges, or caps. Flanged joints at which blinds are inserted to blank off other equipment during the test must not be required to be tested. **NFPA 54, §8.1.3.3.**
- Where the piping system is connected to appliances or equipment designed for operating pressures of less than the test pressure, such appliances or equipment must be isolated from the piping system by disconnecting them and capping the outlet(s). **NFPA 54, §8.1.3.4.**
- Where the piping system is connected to appliances or equipment designed for operating pressures equal to or greater than the test pressure, such appliances or equipment must be isolated from the piping system by closing the individual appliance or equipment shutoff valve(s). **NFPA 54, §8.1.3.5.**
- Test pressure must be measured with a manometer or with a pressure measuring device designed and calibrated to read, record, or indicate a pressure loss due to leakage during the pressure test period. The source of pressure must be isolated before the pressure tests are made. Mechanical gauges used to measure test pressures shall have a range such that the highest end of the scale is not greater than 5 times the test pressure. **NFPA 54, §8.1.4.1.**
- The test pressure to be used shall be no less than I 1/2 times the proposed maximum working pressure, but not less than 3 psi, irrespective of design pressure. **NFPA 54, §8.1.4.2.**
- When testing a system in a single-family dwelling, the test duration must be a minimum of 10 minutes. The duration of the test shall not be required to exceed 24 hours. **NFPA 54, §8.1.4.3.**
- Where leakage or other defects are located, the affected portion of the piping system must be repaired or replaced and retested. **NFPA 54, §8.1.5.3.**
- Before gas is introduced into a system of new gas piping, the entire system must be inspected to determine that there are no open fittings or ends and that all valves at unused outlets are closed and plugged or capped. **NFPA 54, §8.2.2.**

LEAK TESTING

Immediately after the gas is turned on into a new system or into a system that has been initially restored after an interruption of service, the piping system shall be checked for leakage. Where leakage is indicated, the gas supply shall be shut off until the necessary repairs have been made. **NFPA 54, §8.2.3.**

SUGGESTED METHODS

The "Suggested Method of Checking for Leakage" in **Annex C of NFPA 54, 2024 Edition** offers the following suggestions which are acceptable for this procedure. These methods are not part of the code and do not represent the only way to check for leakage in an LP Gas system. Most importantly, your company should insure an accurate and consistent method for leakage testing is used every time.

Recommended methods are as follows:

1. By inserting a pressure gauge between the container gas shutoff valve and the first regulator in the system, admitting full container pressure to the system and then closing the container shutoff valve. Enough gas should then be released from the system to lower the pressure gauge reading by 10 psi. The system should be allowed to stand for 3 minutes without showing an increase or a decrease in the pressure gauge reading.
2. For systems serving appliances that receive gas at pressures of ½ psi or less, by inserting a water manometer or pressure gauge into the system downstream of the final system regulator, pressurizing the system with either fuel gas or air to a test pressure of 9 in. w.c. + or - ½ in. w.c., and observing the device for a pressure change. If fuel gas is used as a pressure source, it is necessary to pressurize the system to full operating pressure, close the container service valve, and then release enough gas from the system through a range burner valve or other suitable means to drop the system pressure to 9 in. w.c. +or-½ in. w.c. This ensures that all regulators in the system are unlocked and that a leak anywhere in the system is communicated to the gauging device. The gauging device should indicate no loss or gain of pressure for a period of 3 minutes.
3. By inserting a 30 psi pressure gauge on the downstream side of the first stage regulator, admitting normal operating pressure to the system and then closing the container valve. Enough pressure should be released from the system to lower the pressure gauge reading by 5 psi. The system should be allowed to stand for 3 minutes without showing an increase or a decrease in the pressure gauge reading.

ADDITIONAL INFORMATION REGARDING LEAK TESTING:

1. Propane is commonly used for leakage testing. Air is also acceptable as a test medium.
2. Test pressure must be held for a minimum of 3 minutes. While you may hold the test for longer always meet or exceed the minimum of 3 minutes. Follow your company's policies and procedures. Some companies require the test pressure be held for 5 or 10 minutes.
3. Record the actual time the leak check is held. If you hold the test pressure for 3 minutes, then record 3 minutes. If you do the test for 6 1/2 minutes, then record 6 1/2 minutes.
4. A variety of test instruments may be used to complete a leak check. A "0-300" psi gauge is frequently used for the first test previously outlined. Some newer style regulators provide a test port that certain test gauges have been developed to use. If using a low-pressure method (water manometer or low-pressure test gauge) remember that the pressure must be reduced to 9 in. w.c. + or - ½ in. w.c. for the test. This ensures that the test pressure is reaching all the piping, valves, controls, and equipment.
5. Each appliance to be used for LP-gas shall have a label or plate attached stating "This appliance to be used for LP-gas." (Older appliances that have been in service may not have a tag or decal, it may have fallen off).
6. Before leaving, the technician should ensure that all pilots are burning in the LP gas appliances and that the main burners are properly adjusted.
7. LP-gas appliances shall be permitted to be placed into service after the LP-gas system has passed a leak check and the appliances are inspected for proper installation and operation.

TESTING PUBLIC BUILDINGS:

Piping systems serving appliances in buildings to which the public is invited, such as churches, schools, business houses, tourist courts, etc., shall be tested for leaks after each interruption of service. However, some companies may require an annual leak check to limit liability.

No person shall connect a liquefied petroleum gas tank to any piping without having first determined that such piping complies with NFPA 54, 58 and the laws of the State of Oklahoma and the rules and regulations of the LP-Gas Administrator relative to liquefied petroleum gas piping.

TEST ALL PIPING AND TUBING:

All piping, tubing, or hose shall be tested after assembly and proved free from leaks. After installation, piping and tubing of all domestic and commercial systems shall be tested and proved free of leaks using a manometer or equivalent device that will indicate a drop in pressure. Test shall NOT be made with a flame.

Provision shall be made for expansion, contraction, jarring, and vibration, and for settling. Flexibility shall be provided using bends, loops, offsets, or expansion joints.

Supports, hangers, and anchors shall be installed so as not to interfere with the free expansion and contraction of piping between anchors. All parts of the supporting system shall be designed and installed so they are not disengaged by movement of the supported piping. **NFPA 54, §7.2.6.4.** Piping outside buildings may be buried, above ground, or both, but shall be well supported and protected against physical damage.

PLANS AND APPROVAL:

Plans must be submitted to, and approved by, the LPGas Administration, for temporary or permanent installation of containers of 2000 water gallons or more, containers with an aggregate water capacity of 4000 gallons or more, any public building, or any dispenser used for resale. NFPA 58, §4.3 and OAC 420: 10- 1-14(c).

DOCUMENTATION:

Pressure tests and leak tests are required to be documented on an approved Form 4 or other board approved form. OAC 420:10-1-15(b).

FORM 4 REQUIREMENTS:

The form shall be completed with one (1) copy on file at the office or branch office serving the account, one (1) copy filed with the LP Gas Administration within fifteen (15) workings days after tests are performed, and one (1) copy to the owner, renter, or responsible person.

Form 4's and other approved forms must be completed in their entirety, legible and with all required signatures. If Form 4's are not completed properly they will not be accepted as a testing record. OAC 420:10-1-15(c).

Completed Form 4's shall be filed with the LP Gas Administration within 15 working days after the test is performed. The Form 4 provided by the OK LP Gas Research, Marketing, & Safety Commission is an approved form and available for free in triplicate. OAC 420:10-1-15(b).

A Form 4 or other Board approved form shall be utilized to document pressure or leak tests as follows:

1. Prior to injecting gas in a system for the first time (new customer), or if a period of 24 months has passed since gas was injected into a system previously serviced.
2. After any circumstance as described in **NFPA 54** that would require a pressure test or leak test, such as, but not limited to the following:
    a. a section of new or modified gas piping is placed into service;
    b. gas leakage is suspected;
    c. an out-of-gas situation occurs;
    d. an interruption of service.

INSTRUCTIONS TO CONSUMER:

The consumer should be thoroughly instructed by demonstration on how to operate the appliance properly and safely before it is left in operation. When operating instruct ions are furnished by the manufacture, they shall be left with the customer or in a proper position near the appliance.

Customers shall be given a delivery ticket with the propane company name, customer name, and be mechanically imprinted with the gallons delivered. **OAC 420: 10-1-14(6)(B)(iii).**

LP-gas meters shall be calibrated to within + or - 1% every 2 years on bobtails & every 4 years on dispensers. The meter shall be sealed and designed to read to the nearest 1/10th of a gallon. The LP-Gas Administration shall be notified anytime the seal is broken. OAC 420:10-1-14(6)(c).

ASME CONTAINERS

LP-Gas containers typically fall into two categories: ASME and DOT.

ASME tanks are built to the standards defined in Section VIII, Division I, Boiler & Pressure Vessel Code of the American CID Society of Mechanical Engineers. A data plate permanently affixed to the steel container is stamped with the **ASME** "Clover Leaf' to verify conformity to this standard.

The data plate must be attached and visible on the container. The data plate shall be legible enough to read the critical information such as, working pressure, water gallons, serial number, ASME symbol, and tank manufacturer. If the data plate of a container is missing or not legible it shall be removed from service.

Any propane tank installed since 1969 shall be installed on concrete, masonry, or other noncombustible surface. Underground tanks will have UG or UG/AG on the data plate. Tanks with only an AG designation shall not be installed below ground. If an underground tank is properly installed and maintained, it should last as long as an aboveground tank. Sacrificial anode testing NFPA 58 6.20.3

Relief valves are designed to relieve excess pressure in a propane tank. External relief valves have exposed steel springs that will rust or corrode over time and may eventually fail. Never attempt to reseat a leaking relief valve or look directly into a relief valve.

Note: The working pressure shall be at least 250 psi for most tanks and 200 psi for older tanks. 200psi tank may remain in service as long as they are properly maintained. 200psi tanks may NOT be brought in from another state without additional testing as required by the Oklahoma Rules & Regulations. OAC 420:10-2-14(23)(b).

Containers that have excessive denting, bulging, gouging or corrosion shall also be removed from service. If repairable, the repairs or modifications are required to comply with the code, rules, or regulations under which the container was manufactured. Field welding is allowable only on saddle plates, lugs, pads, or brackets that were attached by the container fabricator.

The number of container openings is not limited by NFPA 58. However, all AMSE containers must be equipped with the openings necessary for the type of service it will be used for. Propane shall NOT be put into or taken out of any container without the permission of the owner of the container.

LOCATION OF CONTAINERS:

Each individual container shall be located with respect to the nearest important building, group of buildings or lines of adjoining property which may be built on in accordance with the following table:

MINIMUM DISTANCES

Water Capacity Per Container	Underground Containers	Above Ground Containers	Between Containers
Less Than 125	10 feet	None	None
125—250	10 feet	10 feet	None
251—500	10 feet	10 feet	3 feet
501—2000	10 feet	25 feet	3 feet

While consideration should be given to customer preference, accessibility for delivery and adherence to the regulations published in NFPA 58 must take precedence, as well as any State or local regulations.

LP gas containers shall not be in an area 6 feet horizontally from a vertical plane beneath overhead electric power lines that are over 600 volts nominal.

Any tank less than 2000 water gallons, being used as an LP-Gas dispenser, shall be at least 25 feet from an important building or property line which can be built upon.

REGULATOR INFORMATION

An LP-gas regulator is truly the heart of the LP-gas installation. It must compensate for variations in tank pressure from as low as 10 psig to 200 psig or higher and still deliver LP-gas to the consuming appliances at approximately 11" w.c. pressure. The regulator must also deliver this pressure despite a variable load from intermittent use of appliances.

- The gas pressure regulator must be accessible for servicing. **NFPA 54, §5.7.3.**
- Pressure regulators must be protected against physical damage. **NFPA 54, §5.7.4.**
- A regulator installed outdoors shall have the vent pointing down within 45 degrees or covered. NFPA 58, §6.10.1.4.
- The color of the regulator may be used to determine the type and outlet pressure of the regulator.
- An appliance pressure regulator must be installed if the gas supply pressure to an appliance is higher than that at which the appliance is designed to operate or varies beyond the design pressure limits of the appliance. **NFPA54 §5.7.1.**
- Single stage regulators shall not be installed in fixed piping systems after June 30, 1997, except for small outdoor cooking appliances and portable appliances. NFPA 58, § 6.10.2.3. – 6.10.2.3.

Though a single regulator may perform adequately in many installations, the use of two-stage regulation offers the ultimate in pinpoint regulation.

TWO-STAGE REGULATION has the following advantages:

1. Uniform Appliance Pressures: The use of two regulators-one at the container to compensate for varied container pressures and the other at the building to supply a constant pressure w.c. to the appliances- assures year-round efficiency and trouble-free operation of appliances.
2. Minimum Service Calls: Regulator freeze up is due to moisture in the gas and is more severe in a single stage system because of the extreme chilling effect when the LP-gas expands across a single small regulator nozzle. This is largely eliminated with two-stage regulation because both regulators have larger orifices and because the expansion is divided into two steps with less chilling effect at each regulator.
3. Economy of Installation: Two-stage regulation allows the use of much smaller size piping or tubing between the system tank and the building because of the higher transmission pressure. Often the saving in the cost of the transmission line can offset the cost of the first stage regulator.
4. Allowance for Future Appliances: Providing the high-pressure regulator can handle an increased load, an additional low-pressure regulator may be installed to serve added appliances.

REGARDING REGULATOR "FREEZE UP"

Propane regulators can become covered in frost during normal operation. While this "freezing" of the regulator may be a symptom of an actual problem, it usually is a sign that outside humidity is at a level capable of producing Condensation. The only difference is, the condensation forming on a regulator is frozen. Keep in mind that the regulator will only deliver a constant pressure on the outlet side while inlet pressures can significantly vary. As the propane passes through the regulator, it expands (resulting in subzero temperatures) and causes the regulator to gradually reach the extremely cold temperature of the propane vapor passing through it. Depending on the temperature and humidity of the surrounding air, the regulator will produce condensation, much like that of a frozen mug or glass taken out of a freezer.

Therefore, under normal operation in hot and humid climates, the external surface of a regulator will freeze and appear to be frozen or frosted. One issue that may cause a regulator to freeze is liquid propane entering and passing through the regulator. Liquid propane can produce an effect of extreme freezing when introduced abruptly into a regulator. This is not typical and is more than likely the result of: I) the container being overfilled or, 2) the container, usually a cylinder, is not positioned upright with the service valve communicating with the vapor space of the container.

PIPING INFORMATION

DETERIMING TOTAL LOAD:

To properly size the storage container, regulator, and piping, the total Btu load must be determined. The total load is the sum of all gas usage in the installation. It is arrived at by adding up the Btu input of all appliances in the installation. The Btu input may be obtained from the nameplate in the appliance or manufacturer's literature.

SIZE OF SUPPLY PIPING FOR GAS APPLIANCES:

Gas piping shall be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand without undue loss of pressure between the regulator or meter and the appliance or appliances. The size of gas piping depends on the following factors:

a. Allowable loss in pressure from meter or regulator.
b. Maximum gas (BTU/hour) needed.
c. Length of piping and number of fittings.
d. Pressure in piping (11 inc. for second or single stage, 5-20 lbs. for first or two-stage systems.
e. Any future additions or demands.

The pipe size of each section of gas piping must be determined using the longest length of piping from the point of delivery to the most remote outlet and the load of the section. **NFPA 54, § 6.1.2.**

TROUBLESHOOTING:

When troubleshooting a low gas pressure reading at an appliance, you should first check the outlet pressure at the regulator. You should then determine if the line is properly sized for the distance and the maximum Btu load. Then check for a restriction in the line, such as debris, water, or a crimped line.

PIPING PLAN:

It is recommended that before proceeding with a domestic installation of a gas piping system, a piping sketch or plan be prepared showing the proposed location of the piping as well as the size of the different branches. Adequate consideration should be given to future demands and provisions made for added gas service.

State law requires that prior to installation of liquefied petroleum gas systems in schools, churches, courthouses, office buildings, and other buildings to which the public is invited, such as cafes, dance halls, tourist courts and parks, plans and specifications for such installations in duplicate, shall be submitted to and approved by the State Liquefied Petroleum Gas Administrator before work starts; and before such systems are filled with liquefied petroleum gas, they shall be physically inspected and a report made to the State Liquefied Petroleum Gas Administrator. OAC 420:10-1-14(2).

INSTALLING PIPING:

Piping shall be installed with a minimum of 12 inches of cover. The minimum shall be increased to 18 inches if external damage is likely to result. Piping installed with less than 12 inches of cover shall be protected from damage by encasing the piping in conduit or bridged (shielded). **NFPA 58, § 6.11.3.13.**

WORKMANSHIP AND DEFECTS:

Gas pipe or tubing and fittings shall be clear and free from cutting burrs and defects in structure or threading and shall be thoroughly brushed and chip and scale blown.

Defects in pipe or tubing or fittings shall not be repaired. When defective pipe, tubing or fittings are in a system the defective material shall be replaced.

USE OF OLD PIPE:

Gas pipe, tubing, fittings, and valves removed from any existing installation shall not be used again until they have been thoroughly cleaned, inspected, and ascertained to be adequate for the service intended.

JOINT COMPOUND:

Joint compounds (pipe dope) shall be resistant to the action of liquefied petroleum gases. **NFPA 54, § 5.5.6.4.3.**

CAP ALL OUTLETS:

Each outlet, including a valve, shall be closed gastight with a threaded plug or cap immediately after installation and shall be left closed until the appliance or equipment is connected thereto. When an appliance or equipment is disconnected from an outlet and the outlet is not to be used again immediately, it shall be capped or plugged gastight. **NFPA 54, § 7.7.2.1.**

In no case shall the outlet be closed with tin caps, wooden plugs, corks, or by any other improvised methods.

PIPING, TUBING AND FITTINGS:

- Cast-iron pipe must not be used. **NFPA 54, § 5.5.2.1.**
- Steel and wrought-iron pipe must be at least of standard weight (Schedule 10). **NFPA 54, § 5.5.2.2.**
- Copper tubing must comply with standard Type K or Type L of ASTM B 88, *Specification for Seamless Copper Water Tube,* or ASTM B 280, *Specification for Seamless Copper Tube* for *Air Conditioning and Refrigeration Field* Service. **NFPA 54, § 5.5.3.4.**

Corrugated stainless steel tubing must be listed in accordance with ANSI LC I /CSA 6.26, *Fuel Gas Piping* Systems *Using Corrugated Stainless-Steel Tubing.* **NFPA 54, § 5.5.3.6. CSST.**

- must be grounded or bonded.
- Plastic pipe, tubing, and fittings used to supply fuel gas must be used outdoors underground only and must conform to ASTM D 2513, *Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.* Pipe to be used must be marked "gas" and "ASTM D 2513". **NFPA 54, § 5.5.4.1.1.**
- Persons joining polyethylene pipe should be trained under the applicable joining procedure established by the manufacturer. **NFPA 58, § A.5.11.5.1.**

PIPE JOINTS:

Pipe joints may be screwed, flanged, welded, and nonferrous pipe may be braised with a material having a melting point exceeding 1000°F. Joints on seamless copper, brass, steel, or non-ferrous gas tubing shall be made by means of approved gas tubing fittings or braised with a material having a melting point exceeding 1000°F.

Pipe fittings are normally marked with the working pressure or the series which corresponds to a specific pressure rating. For operating pressures of 125 psig or less, fittings shall be designed for a pressure of at least 125 psig. For operating pressures above 125 psig, fittings shall be designed for a minimum of 250 psig.

The use of threaded cast iron pipe bushings is prohibited.

Fittings used at pressures higher than container pressure, such as on the discharge side of the pump, shall be designed with a minimum working pressure of 350 psi.

APPROVED FLEXIBLE HOSE:

Approved flexible hose may be used on the low-pressure side of a system as follows:
Only on appliances which are necessarily portable, or which have to be moved from place to place or which require a vibration joint, may be connected with flexible hose. On such appliances, the shutoff shall be in the solid connection or piping only and not at the appliance end of the hose. The flexible connector shall not be concealed, shall not extend from one room to another, or pass through any walls, partitions, ceilings, or floors. Piping, tubing, and fittings shall comply with NFPA 54 and NFPA 58.

Hose used for LP gas vapor pressure more than 5 psi shall have a minimum working pressure of 350 psi.

PIPING IN FLOORS:

In industrial occupancies, gas piping in solid floors such as concrete shall be laid in channels in the floor and covered to permit access to the piping with a minimum of damage to the building. Where piping in floor channels could be exposed to excessive moisture or corrosive substances, the piping shall be protected in an approved manner. NFPA 54, §7.3.5.1
In other than industrial occupancies and were approved by the authority having jurisdiction, gas piping embedded in concrete floor slabs constructed with Portland cement shall be surrounded with a minimum of 1-1/2 inches of concrete and shall not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors.

PROTECTION AGAINST CORROSION:

Underground metallic piping shall be protected against corrosion as warranted by soil conditions. **NFPA 58, § 6.11.3.15.**

All metallic equipment and components that are buried or mounded shall be coated or protected and maintained to minimize corrosion. **NFPA 58, § A6.8.6.1(H).**

PIPING THROUGH FOUNDATION WALL:
Underground gas piping, when installed below grade through the outer foundation or basement wall of a building, shall be encased in a sleeve or otherwise protected against corrosion. The piping or sleeve shall be sealed at the foundation or basement wall to prevent entry of gas or water.

PIPING BENEATH BUILDINGS:
When installed underground beneath buildings, gas piping shall be encased in an approved conduit. Conduit shall extend into a normally usable and accessible portion of the building and, at the point where the conduit terminates in the building, the space between the conduit and the gas piping shall be sealed to prevent the possible entrance of any gas leakage.

The conduit shall extend at least **4** inches outside the building, be vented above grade, and be installed in a way as to prohibit the entrance of water and insects. The entire installation shall be such that the gas piping can be readily replaced without damage to the building.

VALVES:
Any appliance installed since November 1, 1969, shall have an approved manual shutoff valve with a non-displaceable valve member installed within 6 feet of the appliance that is serves. (Note: There are exceptions for vented fireplaces and valves installed at a manifold.)

PROVIDE SEDIMENT TRAPS WHERE NECESSARY:
Where a sediment trap is not incorporated as a part of the appliance, a sediment trap shall be installed downstream of the appliance shutoff valve as close to the inlet of the appliance as practical at the time of appliance installation. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet or other device recognized as an efficient sediment trap. Illuminating appliances, ranges, clothes dryers, decorative appliances for installation in vented fireplaces, gas fireplaces, and outdoor grills shall not be required to be so equipped. **NFPA 54, §9.6.8.**

PROHIBITED LOCATIONS:
Except for ducts used to provide combustion and ventilation air or to above-ceiling spaces, gas piping inside any building must not be installed in or through a ventilating duct, dumbwaiter, or elevator shaft or installed in or through a circulating air duct, clothes chute, chimney, or gas vent. **NFPA 54, §7.2.5.**

Where gas piping is to be concealed, unions, tubing fittings, right and left couplings, bushings, swing joints, and compression couplings made by combinations of fittings must not be used. Connections must be of the following type:

1. Pipe fittings such as elbows, tees, and couplings
2. Joining tubing by brazing **(see 5.5.7.2). NFPA 54, §7.3.2.**

PIPING INFORMATION

BASEMENT INSTALLATIONS:
No appliance shall be installed in any basement or semi-basement unless it is fully automatically controlled and properly vented. OAC 420:10-1-14(a). All appliances that are required be vented shall be vented to the outside atmosphere.

EXTRA DEVICE OR ATTACHMENT:

No device or attachment shall be installed on any appliance which may in any way impair the combustion of gas.

INSTALLATION IN GARAGES:
Appliances in residential garages and in adjacent spaces that open to the garage and are not part of the living space of a dwelling unit shall be installed so that all burners and burner ignition devices are located not less than 18 inches above the floor unless listed as flammable vapor ignition resistant. **NFPA 54, §9.1.10.1.**

Such appliances shall be located or protected so they are not subject to physical damage by a moving vehicle. **NFPA 54, §9.1.10.2.**

Where appliances are installed in a separate, enclosed space having access only from outside of the garage, such appliances shall be permitted to be installed at floor level, providing the required combustion air is taken from the exterior of the garage. **NFPA 54, §9.1.10.3**

INSTALLATION OF WATER HEATERS:

Except for Direct Vent water heater, water heaters shall not be installed in bathrooms, bedrooms, or any occupied rooms normally kept closed. Water heaters shall be located as close as practical to the chimney or gas vent. They should be located to provide short runs of piping to fixtures.

Water heaters shall be connected in a manner to permit observation, maintenances, and servicing.

INSTALLATION OF ROOM HEATERS:

Prohibited Installations: Unvented room heaters shall not be installed in bathrooms or bedrooms except under the conditions noted in **NFPA 54, § 10.21.2.**

EXCEPTIONS/ ADDITIONAL REQUIREMENTS:

- Unvented room heaters (meeting all NFPA requirements) installed in bathrooms shall NOT have an input rating over 6,000 BTU/hr. **NFPA 54, §10.21.2.**
- Unvented room heaters (meeting all NFPA requirements) installed in bedrooms shall NOT have an input rating over I 0,000 BTU/hr. **NFPA 54, §10.21.2.**
- Unvented room heaters shall NOT be installed in institutions such as health care institutions or residential board and care institutions. **NFPA 54, § 10.21.3.**

CLEARANCE:

A room heater shall be placed so as not to cause a hazard to walls, floors, curtains, furniture, or doors when open, and so on, and to the free movements of persons within the room. Heaters designed and marked "For use in noncombustible fireplace only" shall not be installed elsewhere. Listed room heaters shall be installed in accordance with the manufacture's installation instructions.

VENTING

Improperly vented or defective appliances can cause potentially fatal carbon monoxide poisoning. Propane systems and appliances should be inspected periodically.

- Appliances with vent openings shall be connected to properly installed vent pipes as required by NFPA and the manufactures recommendations. **NFPA 54, § 12.4.2.**
- Natural draft, vented gas appliances shall be operated for several minutes and checked to see if they are venting properly.
- A vent connector shall slope upward at least 1/4 inch per foot.
- Single-wall metal vent pipe connectors shall NOT pass through any interior wall.
- Where two or more gas appliances are connected to a common vent, the vent size shall be determined using the venting tables in NFPA 54.
- Only two 90-degree elbows are allowed in a single appliance natural draft venting system without reducing its capacity.

GAS VENT OR CHIMNEY TERMINATION:

A chimney for residential-type or low-heat appliances shall extend at least 3 ft above the highest point where it passes through a roof of a building and at least 2 ft higher than any portion of a building within a horizontal distance of 10 ft.

Type B Gas Vent- A vent for venting listed gas appliances with draft hoods and other Category I appliances listed for use with Type B gas vents.

ADJUSTING THE BURNER INPUT:

Each burner shall be adjusted to its proper input in accordance with the Manufacturer's instructions. Overrating of burner is prohibited.

PROPANE BULK STORAGE REQUIREMENTS

- Propane bulk storage facilities are required to be locked or secured anytime it is unattended. **NFPA 58, §6.22.4.**
- Propane bulk storage facilities equipped with emergency shutoff valves shall have a manual remote emergency shut down device attached to the liquid and vapor emergency shutoff valves. **NFPA 58, §5.9.4.2.**
- A bobtail delivery driver shall NOT load and shall notify the owner or manager if the manual remote emergency shut down device at the propane storage facility is broken or missing.
- Propane bulk storage facilities shall have explosionproof electrical switches and wiring within a 15-foot radius of the tank and the point of transfer. **NFPA 58, §6.26.2.2.**

FIRE EXTINGUISHERS:

The National Fire Protection Association (NFPA) requires the fire extinguisher at the propane bulk storage, a propane dispenser, and on LP-Gas delivery trucks to have a net content of not less than 18 lbs. of dry chemical and have a current inspection label attached. NFPA 58, §9.4.7.1.

LP-gas fires shall not be extinguished until the source of LP-gas is shut off or can be shut off. It should also be noted that a propane container involved in a fire is still subject to BLEVE when the relief valve is operating properly.

POINT OF TRANSFER

- While filling propane tanks, the propane truck shall be at least 10 feet away from the container being filled. **NFPA 58, §7.2.3.3.**
- Smoking is NOT permitted within 25 feet of an LP-Gas delivery truck or bulk storage facility. **NFPA 58, §7.2.3.2(B).**
- LP-gas delivery trucks shall not transfer LP-gas into a dispensing station storage while on a public roadway. **NFPA 58, §7.2.3.4.**
- Propane cylinders may be filled by a propane delivery vehicle if the cylinders are filled by weight (when required), all distance requirements are met, and it can be done in a safe manner that will not result in overfilling the cylinder.
- Under normal conditions, vapor may not be released into the atmosphere except through the fixed maximum level gauge, which has a #54 drill size opening.

FILLING PROPANE TANKS

Before a propane tank is filled it shall be thoroughly inspected to ensure that it is not marked as the property of another propane company.

FAILURE TO COMPLY MAY BE COSTLY:

- Failing to complete or late filing of LPG Form 4: $1,000.00 maximum fine per occurrence. OAC 420:10-1-15(b).
- 420: 10-1-20 (11) Failing to report accident: $1,000.00 maximum fine per occurrence. OAC 420:10-1-14(b)(3).

OKLAHOMA ADMINISTRATIVE RULE 420:10-1-20. Suspension or revocation of registration permits and fines; appeals

(a) Authority. The Administrator is authorized to suspend or revoke any registration permit issued by the Board, if it is found at a hearing on the matter, that the registrant has violated or is violating or has failed or is failing to comply with any provisions of Title 52, O.S., Section 420.1 and following, or these rules or specifications, or has delivered a lesser quantity of gas than the registrant bills the customer for with intent to defraud.

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