

September 2008

Leak Check and Pressure Test

The purpose of this document is to set forth general safety practices for the installation, operation, and maintenance of LP-gas equipment. It is not intended to be an exhaustive treatment of the subject, and should not be interpreted as precluding other procedures which would enhance safe LP-gas operations. Issuance of this document is not intended to nor should be construed as an undertaking to perform services on behalf of any party either for their protection or for the protection of third parties. The Alabama Propane Gas Association assumes no liability for reliance on these procedures. Members of the Alabama Propane Gas Association are not required to use this document.

The National Fuel Gas Code (NFPA 54), 1999 Edition defines these two procedures as follows:

Leak Check: An operation performed on a complete gas piping system and connected equipment to verify that the system does not leak.

Pressure Test: An operation performed to verify the gastight integrity of gas piping following its installation or modification.

How are these two very different “Checks” or “Tests” performed?

Requirements covering **Pressure Testing** are contained in Chapter 4 of the National Fuel Gas Code, 1999 Edition and list the following requirements:

1. 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.
2. Inspection shall consist of visual examination, during or after manufacture, fabrication, assembly, or pressure tests as appropriate.
3. Where repairs or additions are made following the pressure test, the affected piping shall be tested. Minor repairs and additions are not required to be pressure tested provided that the work is inspected and connections are tested with a noncorrosive leak-detecting fluid or other leak-detecting methods approved by the authority having jurisdiction. *(Example: if you are adding a new section of piping to an existing system, that has previously been pressure tested, the new section is required to be pressure tested. You do not have to pressure test the entire system, only the newly installed section. In an event where you might replace a short piping nipple or an elbow, then you are not required to do a pressure test on the newly installed portion (as this would be impractical to do on such a short portion of the system) you are permitted to carefully inspect the pipe fittings that you have installed and test the system with noncorrosive leak-detecting solution or other acceptable methods, such as an electronic leak detector.*
4. Where new branches are installed from the point of delivery to new appliances, only the newly installed branch(es) shall be required to be pressure tested. Connections between the new piping and the existing piping shall be tested with noncorrosive leak-detecting fluid or approved leak-detecting methods.
5. A piping system shall be tested as a complete unit or in sections. Under no circumstances shall a valve in a line be used as a bulkhead between gas in one section of the piping system and test medium in an adjacent section, unless two valves are installed in series with a valved “tell tale” located between these valves. A valve shall not be subjected to the test pressure unless it can be determined that the valve, including the valve closing mechanism, is designed to safely withstand the pressure.

6. **Test Medium:** The test medium shall be air, nitrogen, carbon dioxide or an inert gas. **Oxygen shall never be used. Propane gas is not permitted as a test medium for a pressure test.**
7. Appliances and equipment that are not to be included in the test shall 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 shall not be required to be tested.
8. Where the piping system is connected to appliances, equipment, or equipment components designed for operating pressures of less than the test pressure, such appliances, equipment, or equipment components shall be isolated from the piping system by disconnecting them and capping the outlet(s). *(Example for 7 & 8: you must disconnect all appliances which operate at less than the test pressure prior to performing the pressure test to prevent damage to expensive appliance controls. Most appliances are designed to operate at 11" Water Column (less than 1/2# pressure) and pressure tests are performed at 1 1/2 times the working pressure of the piping system, but not less than 3.0 pounds per square inch. Even though we use gas valves on each outlet upstream of the appliance control valve, many of these valves are not designed to hold this much pressure. If you simply shut off the valve and leave the appliance connected to the piping system, excessive pressure might bleed past the shut off valve and subject the appliance control valve to excessive pressure, above 11" W.C., which might damage the control valve and require its replacement)*
9. Prior to testing, the interior of the pipe shall be cleared of all foreign material.
10. **Test Pressure:** Test pressure shall be measured 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 shall be isolated before the pressure tests are made. The test pressure to be used shall be no less than 1 1/2 times the proposed maximum working pressure, but not less than 3 psi, irrespective of design pressure.
11. **Test Duration:** The test duration shall be not less than 1/2 hour for each 500 cubic feet of pipe volume or fraction thereof. *(Example: 500 cubic feet of pipe volume would be a system of approximately 8,000 feet of 1" pipe. We won't encounter this very often)* When testing a system having a volume less than 10 cubic feet or a system in a single-family dwelling, the test duration shall be a minimum of 10 minutes. The duration of the test shall not be required to exceed 24 hours. *(Example: the vast majority of the time, we will test a system for a minimum of 10 minutes. It is very important to record the **actual time of the test** rather than simply marking down 10 minutes. If you hold the test pressure for 15 minutes, then record 15 minutes as the test period. If you do 18 minutes, then record that. It always looks suspicious when an accident investigator reviews pressure tests and finds that 10 minutes is **always** the time recorded.)*

You have now completed the requirements of the "Pressure Test" provided that the test indicated the system was leak free at the pressures utilized for the period of time of the test.

You must now uncap the gas lines, install valves on each line that will be connected to an appliance, install appliance connectors and then perform a "Leak Check" or a "System and Equipment Leakage Test" of the entire system including the newly installed valves, appliance connectors, regulators, and tank connector. This test will also indicate the gas-tight integrity of the gas appliance valves.

1. Test Gases: Leak checks using fuel gas shall be permitted in piping systems that have been pressure testing in accordance with Section 4.1. *(you can use propane for this test)*

2. Before gas is introduced into a system of new gas piping, the entire systems shall 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.
3. Test for Leakage: 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 tested for leakage. Where leakage is indicated, the gas supply shall be shut off until the necessary repairs have been made.
4. Gas utilization equipment shall not be placed in operation until after the piping system has been tested in accordance with 4.2.3 and purged in accordance with 4.3.2.

The “Suggested Method of Checking for Leakage” is covered in Appendix D of NFPA 54, 1999 Edition and gives the following suggestions as methods which are acceptable for this procedure:

1. *For Gas Systems Using Undiluted Liquefied Petroleum Gas System Preparation for Propane.* A leak check performed on an LP-Gas system being placed back in service should include all regulators, including appliance regulators, and control valves in the system. Accordingly, each individual equipment shutoff valve should be supplying pressure to its appliance for the leak check. This check will prove the integrity of the 100 percent pilot shutoff of each gas valve so equipped, so the manual gas cock of each gas valve incorporating a 100 percent pilot shutoff should be in the on position. Pilots not incorporating a 100 percent pilot shutoff valve and all manual gas valves not incorporating safety shutoff systems are to be placed in the off position prior to leak checking, by using one of the following methods: *(Explanation: the reason for connecting all of the gas burning appliances prior to the leak test is to test the entire system for leakage. This test will check the gas-tight integrity of the gas valves installed on each line, the gas appliance connector and, most importantly, the gas safety valve(s) on those gas appliances equipped with 100 percent safety shutoff systems. For those appliances that have a standing pilot, such as a gas range whose top burners are lighted by the standing pilots, it will be necessary to shut off the pilot lines to the standing pilots. This will allow the test to prove the leak free status of the entire system, including the gas range piping. You could shut off the gas valve installed upstream of the gas connector for those appliances that do not have 100 percent safety shutoff systems, but-----this will not allow you to test the appliance internal piping which will be done if you shut off the pilot valve. In the event you have to shut off the system at the appliance connector, when the test is completed, it will be necessary to check the appliance valve, the appliance connector, and the appliance piping by using an approved leak-detection solution or another method of leak detection, such as an electronic leak detector.*

Recommended methods are as follows:

- (a) 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.
- (b) 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 insures 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.

- (c) 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.

General information:

1. You can use propane gas for “Leak Checks”. Air is permitted also as a test medium.
2. You must hold the test pressure for a minimum of 3 minutes. It is acceptable to hold the test as long as you desire as long as you exceed the minimum of 3 minutes. Many companies ask that “Leak Checks” be held for 5 or 10 minutes.
3. It is very important that you record the actual time the “Leak Check” is held. If you hold the test pressure for 3 ½ minutes, then record 3 ½ minutes. If you do the test for 6 minutes, then record 6 minutes.
4. “Leak Checks” can be performed using a variety of test instruments. A “0 to 300” psi gauge is frequently used for a “block test” as outlined in (a) above. Several companies have developed test gauges that allow the technician to use one of the “test ports” provided on newer style regulators.
5. “Leak Checks” can be performed using water manometers or low pressure test gauges as outlined in (b) above.
 - (a) If using the low pressure method, via a water monometer or low pressure test gauge, it is **critically important that the pressure be reduced to 9 in. w.c. + or – ½ in. w.c.** (or use a test pressure between 8 ½ in w.c. and 9 ½ w.c.) for the test. As explained above, this “unlocks” all of the regulators in the system and insures that the test pressure is reaching all of the piping, controls, valves, and equipment.

After a successful “Leak Check” has been completed, it is the responsibility of the technician to light all pilot lights on the gas burning appliances and insure that main burners are properly adjusted.

The following two pages are “Suggested Procedures for Pressure Testing” and “Suggested Procedures for Leak Checking.” You should copy these procedures for your employees or call APGA to get laminated copies mailed to you.

Suggested Procedures for Pressure Testing

The purpose of these procedures is to set forth general safety practices for the installation, operation, and maintenance of LP-gas equipment. It is not intended to be an exhaustive treatment of the subject, and should not be interpreted as precluding other procedures which would enhance safe LP-gas operations. Issuance of these procedures is not intended to nor should they be construed as an undertaking to perform services on behalf of any party either for their protection or for the protection of third parties. The Alabama Propane Gas Association assumes no liability for reliance on these procedures. Members of the Alabama Propane Gas Association are not required to use this document.

A pressure test shall be performed before any connections are made to the container, regulators, and/or appliances. The following procedures shall be performed on a system of new piping or newly installed branch piping. The test shall be performed using air, nitrogen, carbon dioxide or an inert gas. **Oxygen shall never be used. Propane gas is not permitted as a pressure source for a pressure test.**

- A visual inspection shall be performed on the piping system to ensure compliance with the requirements of NFPA 54 in regard to design, installation, fabrication, and materials utilized.
- Disconnect all gas burning appliances. To do this, remove the appliance connector(s) and the equipment shutoff valve(s) from the piping system and cap those pipe openings.
- Select proper pressure measuring device. When using a pressure gauge, code requires the test gauge scale be no greater than 5 times the test pressure. The test pressure to be used shall be no less than 1 ½ times the proposed maximum working pressure, but not less than 3 psi, irrespective of design pressure. (Example: for a 3 psi test, the scale shall be no greater than a 0-15 psi gauge. For a 15 psi test, the scale shall be no greater than a 0-75 psi gauge.)
- Attach pressure measuring device at the point in the piping system requiring the pressure test.
- Pressurize system with air, nitrogen, carbon dioxide or an inert gas.
- You **must** hold test pressure for a minimum of 10 minutes.
- If system **does not** hold test pressure for a minimum of 10 minutes, locate and repair leak(s) and repeat pressure test.
- When the system holds the test pressure for a minimum of 10 minutes, record in writing on a service order or company approved document the beginning and ending test pressure as well as the amount of time pressure was held.
- After properly documenting the test results, you must uncap the gas lines, install valves on each line that will be connected to an appliance, install appliance connectors and then perform a leak check of the entire system including the newly installed valves, appliance connectors, regulators, and tank connector.

Suggested Procedures for Leak Checking

The purpose of these procedures is to set forth general safety practices for the installation, operation, and maintenance of LP-gas equipment. It is not intended to be an exhaustive treatment of the subject, and should not be interpreted as precluding other procedures which would enhance safe LP-gas operations. Issuance of these procedures is not intended to nor should they be construed as an undertaking to perform services on behalf of any party either for their protection or for the protection of third parties. The Alabama Propane Gas Association assumes no liability for reliance on these procedures. Members of the Alabama Propane Gas Association are not required to use this document.

A leak check shall be performed 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 check can be performed using propane gas as the pressure source.

- Shut off gas at container.
- Ensure that appliance equipment shutoff valves are open allowing gas to flow to the appliance controls.
- The equipment shutoff valve shall be placed in the **on** position for appliances equipped with a 100% pilot shutoff valve. Appliances not equipped with a 100% pilot shutoff valve and all manual gas valves not equipped with safety shutoff systems shall be placed in the **off** position prior to the leak check.
- Determine gauging device (high pressure block test, low pressure gauge/manometer, or 30 psi pressure gauge).
- If using the **high pressure block test**, insert or attach the pressure gauge between the container shutoff valve and the first regulator in the system.
 - Open the container shutoff valve to admit full container pressure to the system.
 - Close the container shutoff valve.
 - Release enough pressure so that the system pressure is lowered by 10 psi.
- If using a **low pressure (ounce) gauge or a water manometer**, insert or attach the device into the system downstream of the final system regulator.
 - Open the container shutoff valve to admit full container pressure to the system.
 - Close the container shutoff valve.
 - Release enough pressure from the system to drop the system pressure to 9 in. w.c. + or - ½ in. w.c.
- If using a **30 psi pressure gauge**, insert or attach the device into the system downstream of the first stage regulator.
 - Open the container shutoff valve to admit normal operating pressure to the system.
 - Close the container shutoff valve.
 - Release enough pressure from the system to lower the pressure gauge reading by 5 psi.
- Allow the system to stand for a minimum of 3 minutes without showing an increase or a decrease in the pressure gauge reading.
- If a pressure drop on the gauge is noted, the source of the leak shall be determined and repaired and the leak check must be repeated.
- If a pressure increase on the gauge is noted, the container shutoff valve is leaking. You must repair the leak (repair or replace the valve) and repeat the leak check.
- Upon completion of a successful leak check, record in writing on a service order or company approved document the beginning and ending pressure as well as the amount of time pressure was held. If a leak is detected, document the exact location in the system.
- After properly documenting a successful leak check, it is the responsibility of the technician to light all pilot lights on the gas burning appliances and ensure that main burners are properly adjusted.

September 2008 Test

Leak Check and Pressure Test

Name: _____

Date: _____

Instructions: Read and answer each of the following questions. When complete, grade the test and review incorrect answers so each employee is “armed” with the correct answers before they leave the training.

1. A leak check is the same as a pressure test.
 - a) True
 - b) False

2. Leak checks are required when:
 - a) You need to perform a pressure test
 - b) A gas system is restored after an interruption of service
 - c) You fill a cylinder at a commercial filling station
 - d) The regulator is not functioning properly

3. When performing a pressure test, the test medium shall be:
 - a) Oxygen
 - b) Propane
 - c) Air
 - d) All of the above

4. When performing a leak check walk-through, make sure that all 100% safety shutoff valves are in the on position.
 - a) True
 - b) False

5. One reason for conducting a walk-through is that it enables you to identify which appliances are fueled by propane.
 - a) True
 - b) False

6. One factor that dictates which testing instrument you should use for a leak check is:
 - a) The time of day the leak was discovered
 - b) Which personal protective equipment is available at the time you conduct the test
 - c) The most convenient location to tap into the gas line
 - d) How long you suspect the leak check will take you to complete

7. When performing a pressure test, the system must hold pressure for a minimum of _____ minutes.
 - a) 5
 - b) 3
 - c) 6
 - d) 10

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Answer Sheet

1. B
2. B
3. C
4. A
5. A
6. C
7. D