



Think Safety!

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Relief Valves & Regulators

In the last issue of *Think Safety*, we discussed painting tanks. However, tank maintenance is not limited to paint. In this issue, we are going to discuss relief

valves and regulators. Pressure relief valves should be changed out after no longer than 10 years. The life of the valve can be shortened, however, due to

environmental conditions or other factors that could cause physical damage.

Any time a pressure relief valve discharges the valve should be inspected immediately. In the case of a fire, the

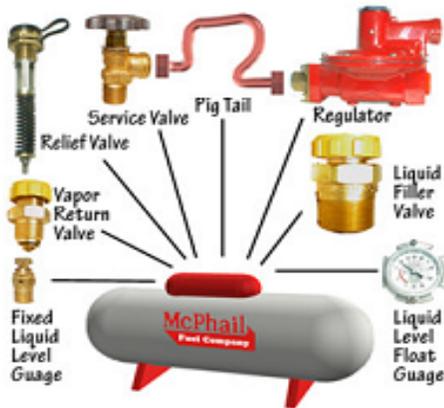
valve should be automatically removed from service.

Regulators have an extended life expectancy, but your insurance carrier may require that the regulator be changed after a specified number of years. Regulators in the field should be inspected on a regular basis and replaced if they are faulty no matter the time they have been in service.

Faulty regulators can cause a system to have three primary problems—high pressure gas downstream of the regulator,

leaks of propane into the atmosphere, and loss of pressure due to a freeze up in the orifice.

This time of year is a good time to make sure that you don't have to deal with valve and regulator issues during the fall and winter. By doing so you can avoid some of those late night calls not to mention potentially dangerous situations that occur when you have valve and regulator problems.



Inside . . .

Valve Inspection Continued Page 2

Regulator Inspection Page 2

Leak Testing A System Page 3

Underground Systems. Page 3

Relief Valve Inspection:

Relief valves should be inspected each time the tank is filled or at the very least once per year. Remember, the relief valve in a filled tank is under intense pressure. Never look di-

rectly into a relief valve or place any part of your body in an area that could be impacted by a discharge. A mirror can be used for the inspection.

There are several things
Continued on page 2

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Continued from page 1

to look for when inspecting a relief valve that is in service:

A rain cap. A rain cap is very important in protecting the integrity of the valve from debris or from the elements which can cause the valve to malfunction. Replace missing or damaged rain caps.

Open weep holes. If the weep hole is clogged, it will prevent proper drainage. Dirt, ice, paint or other de-



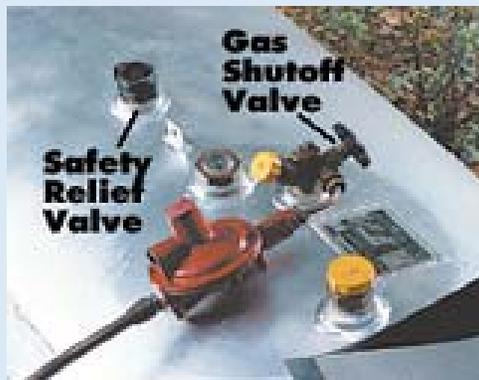
bris can clog the weep hole. If the weep hole cannot be unclogged, the valve should be replaced.

Deterioration and corrosion on the relief valve spring.

Contaminants such as road salt, chemicals or pollutants can accelerate corrosion. If the coating on the relief valve spring is cracked or chipped, the valve should be replaced.

Physical damage. If there are any indications of damage, the valve should be replaced.

Tampering or readjustment. The valve should be removed if there is any indication of tampering or re-



adjustment of the valve.

Seat leakage. Check for leaks in the seating area using a noncorrosive leak detection solution. Replace the valve if there is any indication of a leak.

Corrosion and contamination. If the valve shows signs of corrosion or contamination, it should be replaced.

Moisture, foreign

particles or contamination. Foreign material can impede the ability of the valve to relieve. Grease should never be placed in the valve body. The grease can harden over time and keep the valve from relieving.

Corrosion or leakage at container connection. Check the connection at the tank with a noncorrosive leak detection solution. Replace the valve if you discover a leak.



Regulator Inspection:

Freeze-ups:

Regulator freeze-ups are a real nuisance but can of-

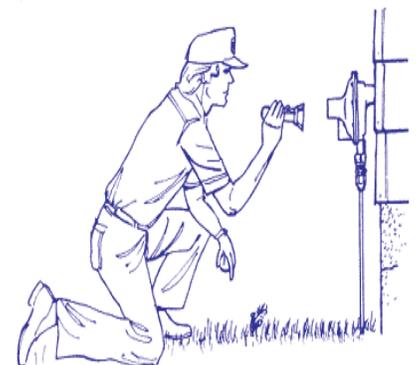
ten be prevented if the proper steps are taken.

Freeze-ups usually occur

when there is moisture in the gas. "Wet" propane should be treated with methanol to prevent freeze-ups.

Freeze-ups can also occur when the flow of propane is restricted. Kinked or bent pigtails are often a culprit in these situations. Make sure that your pigtails have no impingements.

Keep in mind, regulator



freeze-ups can occur at temperatures above freezing and are especially prevalent during extreme temperature

Continued on page 3



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Continued from page 2
changes.

Venting to the Atmosphere:

Regulators don't leak without cause, but when they do leak propane to the atmosphere they can pose a serious safety concern.

Several factors can lead to leaks of propane gas such as corrosion, foreign materials on the seat disc, and bad piping connections.

Corrosion of the relief valve spring can cause it to malfunction. The spring is

designed to move freely at the correct pressure. Corrosion reduces the flexibility of the spring. A casual inspection for corrosion should be made on a regular basis. If corrosion is discovered, the regulator should be replaced.

To inspect the spring, remove the cap and use a flashlight to see the spring inside. **(The regulator must have a cap.)**

Corrosion can also be a culprit in contributing foreign material to the regulator. Corrosion inside pigtails can flake off and lodge on the seat disc.

Fragments from inside the line can clog the seat disc as well. Take care to have clean installations free of contaminants. When cutting lines make sure any metal or plastic slivers are

removed and the surface is clean. Keep line free of any particles of dirt or other materials that could end up in the regulator.

This is the time of year when many companies are replacing regulators either in conjunction with Gas Check inspections or simply due to the age of the regula-

tors. When a either a first or second stage regulator is removed, the line should be blown out before the system is closed again. This should help remove any foreign contaminants that could create a problem later.

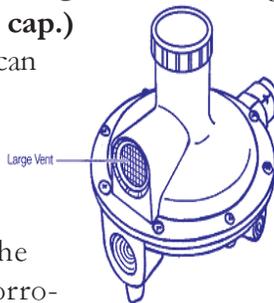
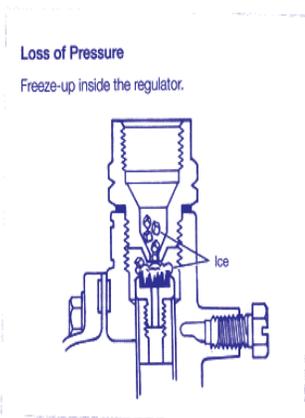
Bad piping connections at the regulator inlet and outlet can cause leaks. Make sure that when the regulator connections are made that they are tight but not excessively torqued. The



regulator can be damaged if it is excessively tightened causing it to leak. Always use the proper wrenches to install the regulator.

Always test for leaks at the time of installation, following a break in the line at the regulator, or any time a leak is suspected.

While you are inspecting the regulators and relief valves, it is also a good time to inspect the vapor return and the float gauges for leaks. The vapor return must also have a rain cap.



Leak Testing A System:

If you do have to replace a regulator or valve on the tank, then this will constitute an interruption in service, and a leak test must be performed on the system as required by NFPA-54.

The 2006 version of NFPA-54 lists three types of leak testing. The following is based on the prescribed methods.

Leak Testing A System

Unlike a pressure test, propane can be used during the performance of a leak test.

Step 1: Prepare for the test.

First, inspect all appliance valves and pipe connections to make sure they are wrench tight. All appliance shutoff valves must be turned on to test the 100% pilot shutoff. Turn off any appliance that does not have a 100% pilot shutoff (ie old style gas ranges with standing pilot).

Note: The test can be performed on either the high or low pressure portion of the

system. The procedure differs between the two.

First Test (Low Pressure)

Step 2: Make connection.

Insert a gauge or manometer into the downstream side of the final stage regulator.

Step 3: Pressurize the system. Open the tank valve to pressurize the system. Leave it open for a period of two or three seconds, then close it tightly.

Step 4: Check for leak. Bleed down to 9" plus-or-mi-

nus 1/2" and test for three minutes.

If the system holds pressure for three minutes without falling, it is considered a leak-tight system. However, a drop in pressure indicates a leak.

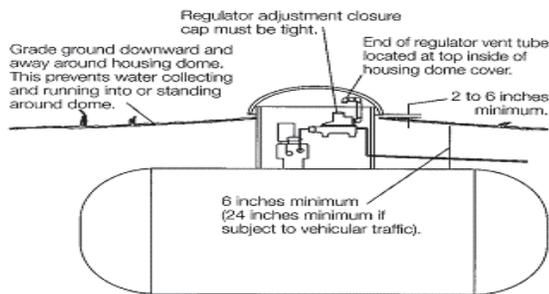
Second Test (High Pressure)

Step 2: Make connection.

Attach a high pressure (300-pound) gauge between the container valve and the first stage regulator.

Continued on page 4

Underground Systems:



Note: Water mark left in housing dome at level above regulator vent, or end of vent tube requires replacement of regulator. Then correct installation.

Underground systems present unique regulator problems, especially when the system is installed incorrectly.

Vent tubes can become clogged with water, mud, insects, or other debris if the tubes are not properly positioned. The tube should extend above any potential water. Also, make sure the vent tube is the same size as the regulator vent opening, usually

$\frac{3}{4}$ of an inch. The waterproof dome should be extended above the ground level enough to keep out water and mud.

Regulators installed on underground tanks should be inspected each time the tank is filled to make sure there is no material blocking the vent.

See the illustration for proper placement of the tank and regulator components.

Continued from page 3

Step 3: Pressurize the system. Open the container valve to pressurize the system. Leave it open for a period of two or three seconds, then close it tightly.

Step 4: Check for leak. Bleed down the system by 10 pounds. Test for three minutes. Observe the reading on the gauge. If the gauge reading remains constant, it can be assumed the system is leak tight.

If the pressure drops, it indicates a leak somewhere in the high or low-pressure piping.

Third Test
Step 2: Make connection. Install a 30-pound gauge into the outlet of the first stage regulator.

Step 3: Pressurize the system. Open the container valve to pressurize the system. Leave it open for a period of two or three seconds.

Step 4: Check for leak. Close the service valve tightly.

Bleed down the system by five pounds. Test for three minutes. Observe the reading on the gauge. If the gauge reading remains constant, it can be assumed the system is leak tight. If the pressure drops, it indicates a leak somewhere in the high or low-pressure piping.

A leak is Indicated. If a leak is indicated through any of these tests, check the joints and other possible leak points with an approved leak detec-

tor such as a gas detector or liquid leak detector. Soapy water will work, but it should be rinsed from the piping due to its corrosive nature. **Never test with an open flame.**

If the pressure increases, the tank valve is not shut completely off. Shut off the tank valve and repeat the test. If pressure continues to build, it may indicate a weepy service valve. The valve should be changed.

Training Quiz

Name _____ Social Security Number _____

1. Pressure relief valves should be changed out after no longer than ___ years
A. 5 B. 25 C. 10 D. 100
2. The life of a valve can be shortened by environmental conditions that can cause damage.
A. True B. False
3. Any time a pressure relief valve discharges, the valve should be inspected immediately.
A. True B. False
4. In the case of a fire, a pressure relief valve should be automatically removed from service.
A. True B. False
5. Regulators in the field should be inspected on a regular basis and replaced if they are faulty no matter the time they have been in service.
A. True B. False
6. Faulty regulators can cause a system to have these primary problems:
A. High pressure gas downstream B. Leaks of propane into the atmosphere C. Loss of pressure D. A,B, and C
7. Relief valves should be inspected each time the tank is filled, or at the very least, once per year.
A. True B. False
8. Never look directly into a relief valve or place any part of your body in an area that could be impacted by a discharge.
A. True B. False
9. A relief valve should be changed if the following is present:
A. Permanently clogged weep hole B. Cracked spring coating C. Indication of a leak D. A,B, and C
10. A rain cap is not very important in protecting the integrity of the valve from debris or from the elements which can cause the valve to malfunction.
A. True B. False
11. Grease should never be placed in the valve body.
A. True B. False
12. Regulator freeze-ups can occur at temperatures above freezing
A. True B. False
13. Which factors can lead to regulator leaks?
A. Corrosion B. Foreign materials on the seat disc C. Bad piping connections D. A, B, and C
14. If corrosion of the regulator relief valve spring is discovered, the regulator should be replaced.
A. True B. False
15. When cutting lines, make sure any metal or plastic slivers are removed and the surface is clean.
A. True B. False

Training Quiz Answers

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