

November 2009

## R600 and HSRL Series Instruction Manual



### WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

Fisher equipment must be installed, operated, and maintained in accordance with federal, state, and local codes and Fisher instructions. The installation in most states must also comply with NFPA No. 54 and 58 standards.

Only personnel trained in the proper procedures, codes, standards, and regulations of the LP-Gas industry should install and service this equipment.

### Things to tell the gas customer:

1. Show the customer the vent or vent assembly or vent tube. Stress that this opening must remain unobstructed at all times. Tell the customer to check the vent opening after a freezing rain, sleet storm, or snow to make sure ice has not formed in the vent.
2. Show the customer the shutoff valve on the container. The customer should close this valve immediately if gas is smelled, appliance pilot lights fail to stay on or appear higher than usual or any other abnormal situation occurs.
3. Tell the customer to call your company to service the regulator if the regulator vents gas or a leak develops in the system. **Only a qualified gas service person should install or service the regulator.**

### Introduction

#### Scope of the Manual

This instruction manual covers Installation and Maintenance for the R600 and HSRL Series regulators, which includes first stage, second stage, integral and



TYPE R622



TYPE R642



TYPE HSRL

*Figure 1. Types R622, R642 and HSRL Series Regulators*

2 psi (0,14 bar) service regulators used on LP-Gas vapor service applications. **They are not to be used on liquid service.**

### Description

#### Second Stage Low Pressure Regulators

The Types R622, R642, R652, and HSRL Series regulators provide low pressure, inches of water column, delivery pressures. They are normally set at 11-inches water column (27 mbar) pressure. They have high capacity internal relief valve construction. The regulators are normally painted PALM GREEN. The units differ in construction and capacity rating.



# R600 and HSRL Series LP-Gas Regulators

## Specifications

### Pressure Taps Size Restriction

**R600 Series:** 1/8 NPT: #54 (0.055 inch (1,40 mm))  
Drill on outlet and inlet  
**HSRL Series:** None

### Orifice Sizes

**R600 Series:** 7/32-inch (5,6 mm)  
**HSRL Series:** 3/8-inch (9,5 mm)

### Wide-open C<sub>g</sub> for Relief Sizing

**R600 Series:** 38  
**HSRL Series:** 105

### Maximum Allowable Inlet Pressure

**Types R622H, R632:** 250 psig (17,2 bar)  
**Types R622E, R652E:** 10 psig (0,69 bar)  
**Types R622, R642, R652, and HSRL Series:**  
10 psig (0,69 bar)

### Maximum Emergency Inlet Pressure

**Types R622H, R632:** 250 psig (17,2 bar)  
**Types R622E, R652E:** 15 psig (1,0 bar)  
**Types R622, R642, R652, and HSRL Series:**  
15 psig (1,03 bar)

### Temperature Capabilities

-20° to 160°F (-29° to 71°C)

### Pressure Registration

Internal

### Outlet Pressure Standard Setpoint

**Types R622, R642, R652, and HSRL Series:**  
11-inches w.c. (27 mbar)

### Type R632:

*First Stage:* approximately 10 psi (0,69 bar)

*Second Stage:* 11-inches w.c. (27 mbar)

**Types R622E, R652E:** 2 psi (0,14 bar)

**Type R622H:** 10 psi (0,69 bar), 5 psi (0,35 bar)

### Outlet Pressure Spring Range

**Types R622, R642, R652:** 7.5 to 9.5-inches w.c.  
(19 to 24 mbar), 9 to 13-inches w.c. (22 to 32 mbar),  
13 to 20-inches w.c. (32 to 50 mbar),  
16 to 40-inches w.c. (40 to 99 mbar)

### Type R632:

*First Stage:* non-adjustable

*Second Stage:* 9 to 13-inches w.c. (22 to 32 mbar)

**Types R622E, R652E:** 1 to 2.2 psi  
(0,069 to 0,15 bar)

**Type R622H:** 8 to 12 psi (0,55 to 0,83 bar),  
4 to 6 psi (0,28 to 0,41 bar)

**HSRL Series:** 9 to 13-inches w.c. (22 to 32 mbar)

### Approximate Weight

**Types R622H, R632 with POL Inlet:**

1.7 pounds (771 grams)

**All Other R600 Series:** 1.4 pounds (635 grams)

**HSRL Series:** 4.5 pounds (2 kg)

## Integral Two-stage Regulator

The Type R632 integral two-stage regulator contains a non-adjustable first stage regulator on the inlet. The second stage provides 11-inches water column (27 mbar) outlet pressure. The second stage portion has a high capacity internal relief valve construction. The first stage does not have an internal relief valve. The regulators are normally painted GRAY.

### First Stage and 2 PSI (0,14 bar) Service Regulators

The Types R622H, R622E and R652E regulators are designed for high pressure (pounds per square inch) vapor service. These regulators have high capacity internal relief valves.

When used on first stage service, the Type R622H regulator reduces container pressure to 10 psig (0,69 bar) for a second stage regulator. On final stage service the regulator reduces container pressure for a high pressure burner. The regulator is normally painted RED.

The Type R622E or R652E standard outlet pressure setting is 2 psig (0,14 bar). The regulator is painted PALM GREEN with a WHITE CAP. It is an intermediate stage regulator that reduces 10 psig (0,69 bar) first stage pressure to 2 psig (0,14 bar). They are used on 2 psig (0,14 bar) pressure systems. **The Types R622E and R652E are not suitable for first stage service.**

## Specifications

Specifications section, Tables 1 and 2 list the specifications for these regulators. Contact the factory if the regulator is to be used on any service other than LP-Gas, natural gas, or air. The following information is located on the spring case: Type number, orifice size, spring range, and date of manufacture.

## Installation



### WARNING

**All vents should be kept open to permit free flow of air in and out of the regulator. Protect vent openings against the entrance of rain, snow, ice formation, paint, mud, insects, or any other foreign material that could plug the vent or vent line.**

**LP-Gas may discharge to the atmosphere through the vent. An obstructed vent which limits air or gas flow can cause abnormally high pressure that could result in personal injury or property damage. Failure to use a vent line on**

# R600 and HSRL Series LP-Gas Regulators

**Table 1. Relief Valve Specifications**

TYPE	TYPICAL SETPOINT	NOMINAL RELIEF VALVE START-TO-DISCHARGE	MAXIMUM INLET PRESSURE TO NOT EXCEED OUTLET PRESSURE WITH DISC REMOVED	
			Inlet Pressure	Maximum Outlet Pressure
HSRL	11-inches w.c. (27 mbar)	1 psi (0,069 bar)	15 psig (1,0 bar)	2 psig (0,14 bar)
R622, R642			50 psig (3,4 bar)	
R652			250 psig (17,2 bar)	
R632	2 psi (0,14 bar)	3.5 psi (0,24 bar)	50 psig (3,4 bar)	5 psig (0,34 bar)
R622E				
R652E	10 psi (0,69 bar)	20 psi (1,37 bar)	Not Applicable	
R622H				

**Table 2. Capacity, Connection Sizes, and Vent Orientation**

REGULATOR APPLICATION	TYPE NUMBER	CAPACITY BTU/HR PROPANE <sup>(1)</sup>	INLET CONNECTION	OUTLET CONNECTION	OUTLET PRESSURE SETTING	3/4-INCH NPT SCREENED VENT STANDARD LOCATION
Second Stage	R622-BCF	875,000	1/2-inch FNPT	1/2-inch FNPT	11-inches w.c. (27 mbar)	Over Inlet
	R642-DFF	900,000	3/4-inch FNPT	3/4-inch FNPT		
	R652-DFF	1,000,000				
	R622-CFF	1,400,000	1/2-inch FNPT	3/4-inch FNPT	18-inches w.c. (45 mbar)	
	R622-DFF		3/4-inch FNPT			
	R622-CFGXA	1,125,000	1/2-inch FNPT	3/4-inch FNPT	11-inches w.c. (27 mbar)	
	HSRL-BFC <sup>(2)</sup>	2,100,000	3/4-inch FNPT	1-inch FNPT		
HSRL-CFC <sup>(2)</sup>	1-inch FNPT					
Integral Two-Stage	R632-BCF	700,000	1/4-inch FNPT	1/2-inch FNPT	11-inches w.c. (27 mbar)	First Stage <sup>(3)</sup> : Down
	R632-HCF		FPOL			
	R632-CFF	750,000	1/4-inch FNPT	3/4-inch FNPT		Second Stage: Over Inlet
	R632-JFF		FPOL			
2 PSI (0,14 bar) Service	R622E-BCH	1,250,000	1/2-inch FNPT	1/2-inch FNPT	2 psig (0,14 bar)	Over Inlet
	R622E-DCH	1,500,000	3/4-inch FNPT	3/4-inch FNPT		
	R652E-DFH	1,400,000				
First Stage	R622H-BGK	2,000,000	1/2-inch FNPT	1/2-inch FNPT	5 psig (0,35 bar)	Over Outlet
	R622H-BGJ	2,100,000			FPOL	
	R622H-HGJ					
	R622H-HGJKA	2,250,000	FPOL	3/4-inch FNPT	5 psig (0,35 bar)	
	R622H-JGK					
	R622H-JGJ					
	R622H-DGJ	2,400,000	3/4-inch FNPT	10 psig (0,69 bar)		

1. Capacities Based on:  
 Second Stage: 10 psig (0,69 bar) inlet pressure and 2-inches w.c. (5 mbar) droop.  
 Integral Two Stage: 30 psig (2,1 bar) and 2-inches w.c. (5 mbar) droop.  
 2 PSI (0,14 bar) Service: 10 psig (0,69 bar) inlet pressure and 20% droop.  
 First Stage: 30 psig (2,1 bar) inlet pressure and 20% droop.  
 2. Straight globe valve body configuration.  
 3. Integral First Stage Vent size: 7/16-24UN thread for 1/4-inch OD copper tube inverted flare fitting.

# R600 and HSRL Series LP-Gas Regulators

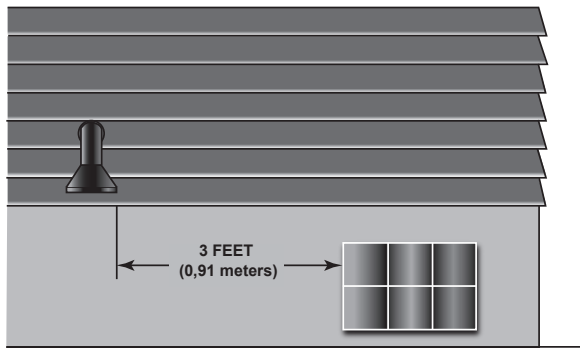
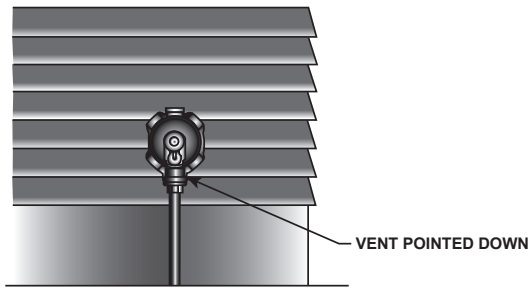


Figure 2. Regulator with Vent Pointed Down

Indoor Installations can cause a hazardous accumulation of gas which could result in personal injury or property damage.

Never use a Type R622H, R622E or R652E (pounds to pounds) regulator on low pressure (inches of water column) service because personal injury or property damage could occur. The Types R622E and R652E are not suitable for use as a “first stage” regulator.

## General Installation Instructions

Before installing the regulator,

- Check for damage, which might have occurred in shipment.
- Check for and remove any dirt or foreign material, which may have accumulated in the regulator body.
- Replace old pigtails. Blow out any debris, dirt or copper sulfate in the copper tubing and the pipeline.
- Apply pipe compound to the male threads of the pipe before installing the regulator.
- Make sure gas flow through the regulator is in the same direction as the arrow on the body. “Inlet” and “Outlet” connections are clearly marked.

## Installation Location

- The installed regulator should be adequately protected from vehicular traffic and damage from other external sources.
- **Install the regulator with the vent pointed vertically down, see Figure 2.** If the vent cannot be installed in a vertically down position, the regulator must be installed under a separate protective cover. Installing the regulator with the vent down allows condensation to drain, minimizes the entry of water or other debris from entering the vent, and minimizes vent blockage from freezing precipitation.
- **Do not install the regulator in a location where there can be excessive water accumulation or ice formation,** such as directly beneath a down spout, gutter, or roof line of building. Even a protective hood may not provide adequate protection in these instances.
- Install the regulator so that any gas discharge through the vent or vent assembly is over 3 feet (0,91 meters) horizontally from any building opening below the level of discharge.
- Install the regulator high enough above ground level at least 18-inches (45 cm) - so that rain splatter cannot freeze in the vent.

## Regulators Subjected to Heavy Snow Conditions

Some installations, such as in areas with heavy snowfall, may require a hood or enclosure to protect the regulator from snow load and vent freeze over.

## Horizontally Installed Regulators

Horizontally mounted regulators, such as found in single cylinder installations and ASME tanks, must be installed beneath a protective cover or under the ASME tank dome, refer to Figure 3. If possible, slope or turn the vent down sufficiently to allow any condensation to drain out of the spring case. Be careful that the slot in the tank dome or protective cover for the regulator’s outlet piping does not expose the vent to the elements. The first stage vent on the Type R632 should be pointed down.

## Meter Installations

Type R642 regulators have an angle body that makes it easy to install on to a gas meter instead of piping leading directly into a building.

**Meter and Type R642 with vent over regulator inlet:** Install the regulator per instructions given in the previous section “Installation Location”.

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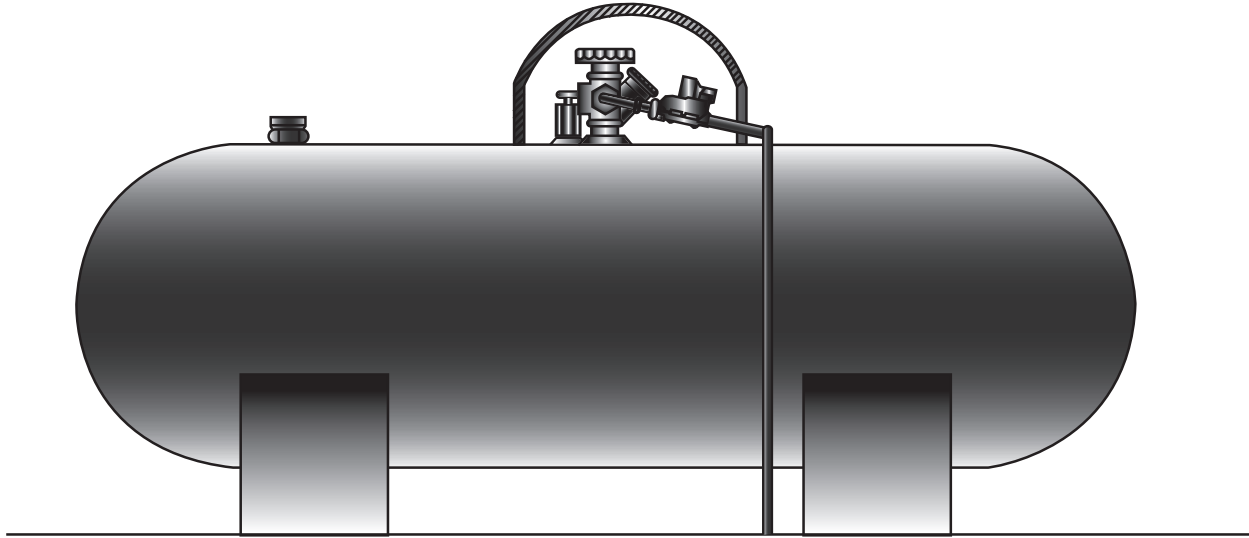


Figure 3. Tank Installation

**Meter and Type R642 with vent over the regulator outlet and installed over the top of the meter:** This installation orientation will put the Type R642 regulator vent in a vertical down position, but very close to the top of the gas meter. The regulator vent may become blocked during a freezing rain storm or heavy snows. Therefore, some type of protective cover should be installed over the regulator and meter or vent piping should be installed so that the vent remains open.

**Meter and Type R642 Regulator Installed Indoors:** Pipe the regulator vent per the section “Indoor Installations”.

## Indoor Installations

By code, regulators installed indoors have limited inlet pressure, and they **require** a vent line to the outside of the building, see Figure 4. A vent assembly, such as Fisher Y602 Series, should be used on the end of the vent line. The same installation precautions, previously discussed throughout this manual for the regulator vent, apply to the end of the vent tube assembly. Vent lines must not restrict the gas flow from the regulator’s internal relief valve. Vent lines should be at least 3/4-inch NPT pipe or 3/4-inch NPT size, Gray PVC Schedule 40 Rigid Non-metallic Electrical Conduit for above Ground Service, per UL 651. To install the vent line, remove the vent screen and apply a good grade of pipe dope to the male threads of the line. Vent lines should be as straight as possible with a minimum number of bends.

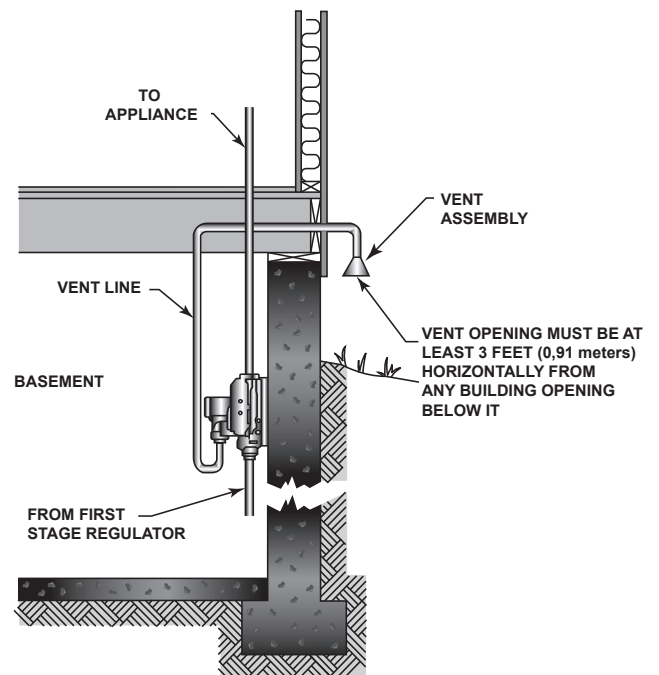


Figure 4. Basement Installation

# R600 and HSRL Series LP-Gas Regulators

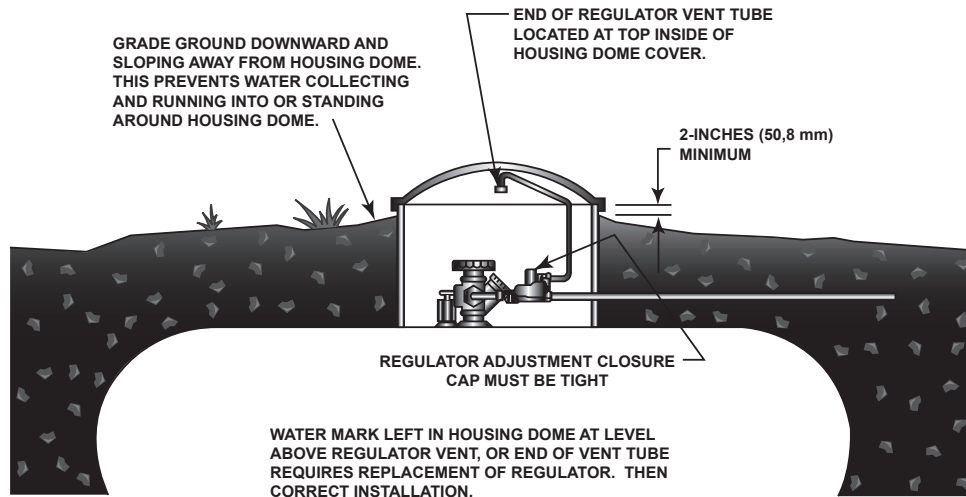


Figure 5. Underground Installation

## Underground Installations

### CAUTION

**Type R632 integral regulators require 2 vent tubes, one on the first stage vent and one on the second stage vent, when installed on underground tanks. Failure to use 2 separate vent tubes can result in early regulator failure and/or overpressuring the second stage that could result in fires or personal injury.**

Regulators installed in the dome of an underground container require a vent tube to prevent water from entering the regulator spring case, see Figure 5.

#### Note

**Type R632 integral regulators installed on underground tanks require the use of 2 vent tubes, one for the first stage vent (1/4-inch OD copper tube inverted flare connection: 7/16-24 UN thread) and the other for the second stage vent (3/4 NPT) of the regulator.**

Remove the vent screen and install a vent tube. The vent tube must be run from the regulator vent to above the maximum water table. The vent tube opening must terminate at the extreme top inside of the dome cover. Make sure the regulator's closing cap is on tightly, and maintain drainage away from the dome at all times.

## Adjustment

Each regulator is factory set. If it becomes necessary to increase the outlet pressure, remove the closing cap and turn the adjustment screw clockwise. Turn the adjusting screw counterclockwise to decrease the outlet pressure.

**The first stage portion of the Type R632 integral regulator is non-adjustable.** The outlet pressure plug may be removed using a 7/16-inch (11,1 mm) hexagon wrench. The pressure tap is restricted, so the plug can be removed with pressure on the outlet of the regulator. Install a pressure gauge to determine the regulator's outlet setting during adjustment, (Actual pressure at the second stage regulator may be less due to line loss.) After setting, reinstall the pipe plug and replace the closing cap. Check the plug for leakage.

Inlet pressure may be checked using the inlet pressure gauge tap and a pressure gauge. Remove the plug using a 7/16-inch (11,1 mm) wrench. The pressure tap is restricted, so the plug can be removed with pressure on the inlet of the regulator.

## Overpressure Protection

### WARNING

**Some type of overpressure protection is needed if actual inlet pressure can exceed the outlet pressure rating. Overpressuring any portion of this equipment above the**



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limits shown in the Specifications section may cause damage to regulator parts, leaks in the regulator, or personal injury due to bursting of pressure-containing parts or explosion of accumulated gas.

If any portion of the regulator is exposed to an overpressure condition that exceeds the limits in the Specifications section, it must be inspected for damage that may have occurred.

Large volumes of gas may discharge through the regulator vent during internal relief valve operation, which can, if not controlled, result in fire or explosion from accumulated gas.

The R600 and HSRL Series regulators, **except for the first stage of the Type R632**, contain internal relief valves. The internal relief valve in all units will give overpressure protection against excessive build-up resulting from seat leakage due to worn parts or chips or foreign material on the orifice. The amount of internal relief protection provided varies with the regulator type and the cause for the overpressure relief valve operation. When the internal relief valve opens, gas escapes to the atmosphere through the regulator's vent.

Some type of additional external overpressure protection must be provided if the outlet pressure in an overpressure condition exceeds the inlet pressure rating of the gas system or downstream equipment. Common methods of external overpressure protection include relief valves, monitoring regulators, shutoff devices, and series regulation.

## Maintenance



### WARNING

To avoid personal injury or equipment damage, do not attempt any maintenance or disassembly without first isolating the regulator from system pressure and relieving all internal pressure.

Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Fisher should be used for repairing Fisher regulators. Relight pilot lights according to normal startup procedures.

Due to normal wear or damage that may occur from external sources, these regulators must be inspected and maintained periodically. The frequency of inspection and replacement of the regulators depends upon the severity of service conditions or the requirements of local, state, and federal regulations. Even under ideal conditions, these regulators should be replaced after 20 years from date of manufacture or sooner should inspection reveal the need.

Visually inspect the regulator each time a gas delivery is made for:

- Improper installation, vent not pointed vertically down or under a cover; no vent tube on underground systems.
- Plugged or frozen vent.
- Wrong regulator or no regulator in the system.
- Internal or external corrosion.
- Flooded Regulator; water in spring case; regulator submersed on underground tanks
- Regulator age.
- Any other condition that could cause the uncontrolled escape of gas.

**Failure to do the above could result in personal injury or property damage.**

## Vent Opening

Make sure the regulator vent, vent assembly, or vent tube does not become plugged by mud, insects, ice, snow, paint, etc. The vent screen aids in keeping the vent from becoming plugged, and the screen should be clean and properly installed.

## Water inside Regulators from Floods, Weather or Water Table on Underground Systems

Replace any regulator that has been flooded or has been submersed below the water table of an underground tank, have had water in their spring case or show evidence of external or internal corrosion. Checking for internal corrosion can be done by removing the closing cap and with the aid of a flashlight observing the condition of the relief valve spring, main spring, and internal spring barrel area. A more detailed examination will require shutting

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down of the gas system and the complete removal of the adjusting screw. Closely examine regulators installed with their vent horizontal for signs of corrosion. Correct any improper installations.

## Regulator Replacement

Older regulators are more likely to catastrophically fail because of worn or corroded parts. Replace R600 and HSRL Series regulators over 20 years of age. Other service or environmental conditions may dictate replacement of the regulator before it becomes 20 years old. Regulators that are installed on underground systems and in areas that are subject to sea salt (coastal) atmospheres should be inspected annually for external and internal corrosion and may require replacement sooner. Refer to Fisher Bulletin LP-32 for additional information.

## Regulator Repair

Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Fisher should be used to repair Fisher regulators. Be sure to give the complete type number of the regulator when corresponding with the factory.

The type number, orifice size, and spring range are on a label attached to the spring barrel. The date of manufacture is stamped on the regulator. Always provide this information in any correspondence with your Fisher Distributor regarding replacement parts or technical assistance. **If construction changes are made in the field, be sure that the regulator marking is also changed to reflect the most recent construction.**

## LP-Gas Equipment

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