

## 2-L Pressure Control O+M

Unitil Pipeline Safety Procedures - Rev. 4.0 April 2014

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### OPERATOR QUALIFICATION TASKS REQUIRED FOR THIS PROCEDURE

#### **1.0 GENERAL [192.739(a)] [192.749(a)]**

- (a) This procedure applies to *gas* pressure regulating stations operated and maintained by Unitil.
- (b) Each pressure limiting station, relief device (except rupture discs), and pressure regulating station and its equipment *shall* be inspected and tested at intervals not exceeding 15 months, but at least once each calendar year to *determine* that it is:
  - (1) In good mechanical condition;
  - (2) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed;
  - (3) Set to function at the correct pressure; and
  - (4) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.
- (c) Personnel shall follow the *Confined Space* Entry Procedure when entering a regulator station where applicable. (See Procedure 1-D, Section 17.0)
- (d) The following pressure limitations apply to pressure limiting devices specified below. [192.201(a)(2)]
  - (1) Control Regulator: The outlet set pressure shall not exceed the established maximum allowable operating pressure (*MAOP*).
  - (2) Monitor Regulator and/or Overpressure Protection Devices: The monitor regulator for the overpressure protection device *shall* be set

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to ensure that the outlet of the pressure regulating station does not exceed the allowable buildup pressure limits in Table 2-L-1.

**Table 2-L-1 - Allowable Pressure Buildup in Other than Low Pressure Distribution Systems\***

<b>MAOP</b>	<b>Allowable Buildup</b>
Less than 12 psig	MAOP + 50%
12 psig or greater but less than 60 psig	MAOP + 6 psig
60 psig or greater	MAOP + 10% or 75% of SMYS , whichever is lower

\* In a *low pressure* distribution system, the pressure may not cause the unsafe operation of any connected and properly adjusted *gas* utilization equipment.

**2.0 OPERATION OF BYPASS VALVES**

When it is necessary to maintain *gas* flow through a manually controlled bypass in order to inspect or test station components, the manual bypass valve *shall* be operated by personnel who are *qualified* by training and experience to control the pressure in the downstream system at or below its *MAOP* . The pressures shall be continuously monitored and the valve adjusted to prevent an overpressure condition. The manual bypass valve *should* be clearly marked showing the direction it is to be turned to either open or close the valve.

**3.0 VISUAL INSPECTIONS**

Visual inspections *should* be made to *determine* that a satisfactory condition exists which will allow proper operation of the equipment. The following will be included in the inspection, where appropriate.

- (a) Station piping supports, pits, vaults, buildings, and fencing for general condition and indications of ground settlement.
- (b) Station doors and gates, and pit and vault covers to ensure that they are functioning properly and that access is adequate and free from obstructions.
- (c) Ventilating equipment installed in station *building s* or vaults for proper operation, and for evidence of accumulation of water, ice, snow, or other obstructions.
- (d) Control, sensing, and supply lines for conditions which could result in a *failure* .
- (e) All locking devices for proper operation and security.
- (f) Posted station schematics for correctness.

- (g) All piping that is exposed to the atmosphere for evidence of atmospheric corrosion. If *atmospheric corrosion* is found, remedial action *shall* be taken in accordance with Procedure 2-O, Section 5.2. [192.481]

#### **4.0 INSPECTING STOP VALVES**

An inspection or test of stop valves should be made to ensure that the valves will operate and are correctly positioned. See Procedure 2-E, Section 1.2, Field Inspection. Caution *should* be used to avoid any undesirable effect on system pressure during operational checks. The following valves should be included in the inspection or test.

- (a) Station inlet, outlet, and bypass valves.
- (b) Relief device isolation valves.
- (c) Control, sensing, and supply line valves.

#### **5.0 INSPECTING PRESSURE REGULATING EQUIPMENT**

##### 5.1 General

##### 5.2 Special Conditions

##### 5.3 Annual Regulator Performance Test

##### 5.4 Internal Inspection of Regulators at Gate Stations

##### 5.5 Internal Regulator Inspection at Regulator Stations

#### **5.1 General**

If practical, inspection and testing of pressure regulating equipment *should* be performed during times of low station throughput or when the station can be taken out of service. Each pressure regulator used for pressure reduction or for pressure limiting *shall* be inspected or tested. The inspection will ensure that each regulator:

- (1) Is in good working order;
- (2) Controls at its set pressure;
- (3) Operates or strokes smoothly; and
- (4) Shuts off within expected and accepted limits.

#### **5.2 Special Conditions**

- (a) Regulator bodies which are subjected to erosive service conditions *may* require visual internal inspection.
- (b) More frequent inspection or additional inspections may be required as a result of construction and hydrostatic testing upstream.
- (c) More frequent inspections or additional inspections may be required as a result of abnormal changes in operating conditions or unusual flows or velocities.
- (d) Whenever abnormal pressures are imposed on pressure or flow devices, the event *should* be investigated and a determination made as to the need for inspection or repairs.

- (e) If there are indications of abnormally high or *low pressure*, the regulator and the auxiliary equipment *shall* be inspected and the necessary measures employed to correct any unsatisfactory operating conditions.  
[192.741(c)]

### **5.3 Annual Regulator Performance Test**

#### **1. General**

Each year, each regulator *shall* be subjected to a systematic performance test to *determine* that it is in proper operating condition.

#### **2. Performance Test**

The test *shall* include the following.

- (a) Record the inlet pressure.
- (b) Record the outlet pressure.
- (c) Visually check the condition of the regulator and *observe* for proper functioning.
- (d) Check the regulator for lock-up:
  - (1) On a self-operated regulator, change the setting and *determine* if the regulator will lock up.
  - (2) On a pilot-operated regulator, change the setting on the pilot regulator and determine if the *main* regulator will lock up.
- (e) Check the pressure recording chart for indications of "stitching" or other regulator malfunction at stations where pressure recorders are installed.
- (f) Reset the regulator and verify that it is set for the correct operating pressure.
- (g) Check vent and control lines for blockage.
- (h) Clean all filter elements.
- (i) *Record Keeping*. Record the test on the appropriate form.

### **5.4 Internal Inspection of Regulators at Gate Stations**

#### **1. Scope**

This procedure applies to maintenance and inspection of regulators at gate stations. Refer to and follow the manufacturer's procedures for each regulator.

#### **2. General**

Each year, each regulator *shall* be inspected to *determine* that it is properly installed and protected from dirt, liquids, or other conditions that might prevent the proper operation of the regulator. An internal inspection *shall* be conducted and the necessary parts repaired or replaced.

#### **3. Inspection Procedure**

The inspection *shall* be conducted in accordance with the following procedure.

- (a) Notify Dispatch of the planned work.
- (b) Monitor pressures during the inspection.

- (c) If a bypass valve exists, open it as necessary to maintain outlet pressure while the inspection is being conducted (see Procedure 2-L, Section 2.0).
- (d) Isolate the regulator by closing appropriate main line shutoff and control line valves in the appropriate sequence. Follow the manufacturer's instructions for taking the regulator out of service. Test to be sure that the regulator has been completely isolated by opening a vent valve or, as a last resort, by disconnecting a static line before disassembling equipment.
- (e) Remove inspection plates or disassemble the regulator body and the pilot regulators to inspect *gas* flow restricting devices (e.g., orifices, valve discs, "O" rings, tubes) and diaphragm link for wear.
- (f) Pressure test or visually inspect diaphragms for tightness.
- (g) Check regulator vent lines, control lines, and differential control restricting devices (e.g., needle valves, adjustable variable orifices) for blockage.
- (h) Reassemble the regulator.
- (i) After reintroducing *gas* to the regulator, check the regulator for leakage.
- (j) Follow the manufacturer's instructions for putting the regulator into service. Open the appropriate control lines and main line valves in the appropriate sequence.
- (k) Set the regulator to the desired pressure.
- (l) If a bypass exists and is in use, close the valve.
- (m) Check the regulator's setting to function at the correct operating pressure.
- (n) For a pilot-operated regulator, change the setting on the pilot regulator and *determine* if the main regulator responds and locks-up.
- (o) Reset the regulator to the desired operating pressure.
- (p) Notify Dispatch at the completion of the inspection.
- (r) *Record Keeping*. Note the results of the inspection and work performed on the appropriate forms.

## **5.5 Internal Regulator Inspection at Regulator Stations**

### **1. General**

Every five years, each regulator *shall* be inspected to *determine* that it is properly installed, protected from dirt, liquids, or other conditions that might prevent the proper operation of the regulator. An internal inspection shall be conducted and the necessary parts repaired or replaced.

### **2. Inspection Procedure**

The inspection *shall* be conducted in accordance with the following procedure.

- (a) Notify Dispatch of the planned work.
- (b) Monitor pressures during the inspection.

- (c) If a bypass valve exists, open it as necessary to maintain the outlet pressure while the inspection is being conducted (see Section 2.0).
- (d) Isolate the regulator by closing the appropriate *main* line shutoff and control line valves in the appropriate sequence. Follow the manufacturer's instructions for taking the regulator out of service. Test to be sure the regulator has been completely isolated by opening a vent valve or, as a last resort, by disconnecting a static line before disassembling equipment.
- (e) Remove inspection plates or disassemble the regulator body and the pilot regulators to inspect *gas* flow restricting devices (e.g., orifices, valve discs, "O" rings, tubes) and diaphragm link for wear.
- (f) Pressure test or visually inspect diaphragms for tightness.
- (g) Check regulator vent lines, control lines, and differential control restricting devices (e.g., needle valves, adjustable variable orifices) for blockage.
- (h) Reassemble the regulator.
- (i) After reintroducing gas to the regulator, check the regulator for leakage.
- (j) Follow the manufacturer's instructions for putting the regulator into service. Open appropriate control lines and *main* line valves in the appropriate sequence.
- (k) Set the regulator to the desired pressure.
- (l) If a bypass exists and is in use, close the valve.
- (m) Check the regulator setting to function at the correct operating pressure.
- (n) For a self-operated regulator, change spring setting and *determine* if regulator responds and locks-up.
- (o) For a pilot-operated regulator, change the setting on the pilot regulator and determine if *main* regulator will follow change and lock off.
- (p) Reset the regulator to the desired operating pressure.
- (q) Notify Dispatch at the completion of inspection.
- (r) *Record Keeping*. Note the results of the inspection and work performed on the appropriate forms.

## **6.0 INSPECTING AND TESTING RELIEF DEVICES**

### 6.1 Annual Relief Valve Testing and Inspection

#### 6.2 Test for Correct Set Pressure

#### 6.3 Review and Calculation of Capacity

### **6.1 Annual Relief Valve Testing and Inspection**

#### **1. General**

Each year, each relief valve *shall* be subjected to a systematic inspection and test in accordance with the following procedure.

## 2. Inspection Procedure

- (a) The inspection shall consist of a check to ensure that the relief valve is:
- (1) In good mechanical condition. (free of obstruction and not mechanically "frozen")
  - (2) Set to function at the correct pressure. (See Section 6.2 below)
  - (3) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed. (See Section 6.3)
  - (4) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.
- (b) Relief valve testing in place, **if feasible**, shall consist of the following.
- (1) Check records for pressure at which valve should relieve.
  - (2) Isolate the relief valve from the system it is designed to protect. In most cases, this can be done by unlocking and closing the isolation valve ahead of the relief valve.
  - (3) Connect a temporary line from a pressure supply to the piping between the relief valve and the now closed isolation valve. This pressure supply *may* be existing *gas* pressure before a regulator, an air tank, a nitrogen bottle, or other device with a pressure greater than the relief pressure. A pressure gauge *should* be installed on the temporary supply line.
  - (4) Turn on the pressure supply and operate the relief valve. Take note of the pressure at which the valve relieves. Any serious deviation from the desired relief pressure should be corrected.
  - (5) Shut off the supply pressure and *observe* the gauge connected to the piping before the relief valve. A constant pressure *reading* on the gauge indicates a positive seal on the relief valve.
  - (6) Disconnect the temporary supply line from the relief valve piping and close the outlet valve in the piping.
  - (7) Open the isolation valve ahead of the relief valve and lock, or tag, with a warning to prevent a change of position.
- (c) **If relief valve testing in place is not feasible**, determination of capacity can be performed by removing the relief valve and bench testing using the procedure above or by capacity review and calculation. Capacity review and calculation *shall* consist of the following.
- (1) Calculation of the required capacity of the relieving device at each station shall be conducted at intervals not exceeding 15 months but at least once each calendar year and these required capacities compared with the rated or experimentally determined relieving capacity of the device for the operating conditions under which it operates.
  - (2) After initial calculations, subsequent calculations are not required if the review demonstrates that operating parameters have not

changed in a manner that would cause the capacity to be less than required.

- (3) If the relieving device is of insufficient capacity, a new or additional device shall be installed to provide the additional capacity required.
- (d) *Record Keeping*. A record of the inspection or test and all changes or repairs shall be completed utilizing the appropriate form or in the *Compliance Management System*. The records will be maintained for the life of the device.

## 6.2 Test for Correct Set Pressure

One of the methods below *may* be used to test for correct set pressure. Tests connections *should* include a gauge or deadweight tester so arranged that the pressure at which the device becomes operative may be observed and recorded.

- (a) The pressure *may* be increased in the segment until the device is activated. During the tests, care *should* be exercised to ensure that the pressure in the segment protected by the relief device does not exceed the allowable buildup pressure in the second column of Table 2-L-1 above.

Use of this procedure may require two personnel with a reliable method of communications between them, such as by electronic means.

- (b) The pressure from a secondary pressure source *may* be added to the pilot or control line until the device is activated; or
- (c) The device may be removed and transported to a shop for testing and then returned to service. When the device is to be shop-tested or otherwise rendered inoperative, adequate overpressure protection of the affected segments *shall* be maintained during the period of time the relief device is inoperative.

## 6.3 Review and Calculation of Capacity [192.743]

- (a) It may not be feasible to physically test the capacity of relief valves in place due to environmental, noise, operational, and economic reasons.
- (b) If a relief valve is used as the required overpressure protection device to protect certain facilities, a review and calculation of the required capacity of the relief valve *shall* be made each calendar year, at intervals not exceeding 15 months. The required capacity shall be compared with the rated relieving capacity of the relief valve for the operating conditions under which it operates. After the initial calculations, subsequent calculations are not required if the review documents that parameters have not changed in a manner that would cause the capacity to be less than required.
- (c) If the relieving device is of insufficient capacity, a new or additional device *shall* be installed to provide the additional capacity required.
- (d) If more than one regulating station supplies a *pipeline*, the required relief capacity at each station based on a complete *failure* of the largest



capacity regulator or any single run of lesser capacity regulators at the station such that pressures in any part of the pipeline will not exceed those for which the pipeline was designed, or against which it is protected, whichever is lower.

- (e) If a relief valve does not serve as the required overpressure protection device, calculation and review of its capacity is not required. An example of this is a relief valve installed in addition to a monitor regulator, where the monitor regulator serves as the primary overpressure protection device.

## **7.0 INSPECTION OF VAULTS [192.749]**

- (a) Refer to the *confined space* entry procedures in Procedure 1-D, Section 17.0.
- (b) Each vault housing pressure regulating and pressure limiting equipment, and having a volumetric internal content of 200 cubic feet (5.66 cubic meters) or more, *shall* be inspected at intervals not exceeding 15 months, but at least once each calendar year, to *determine* that it is:
  - (1) In good physical condition, and
  - (2) Adequately ventilated.
- (c) If *gas* is found in the vault,
  - (1) The equipment in the vault shall be inspected for leaks, and
  - (2) Any leaks found shall be repaired.
- (d) The ventilating equipment shall also be inspected in accordance with Section 3(c) above.
- (e) Each vault cover shall be inspected to ensure that it does not present a hazard to public safety.

## **8.0 TELEMETERING AND RECORDING GAUGES**

- (a) Gas Control will monitor the status of telemetered pressure *alarms* on transmission lines and in distribution systems.
- (b) Systems Operations will maintain the pressure recording equipment at pressure-reducing stations operated and maintained by Unitil.
- (c) Systems Operations personnel who change charts *should* promptly report to their supervisor any unusual condition observed, including excursions above the *MAOP*.
- (d) The Systems Operations supervisor should review the charts for operational inconsistencies.
- (e) The Systems Operations supervisor *shall* be responsible for initiating any corrective action.
- (f) Unusually low pressures should be brought to the attention of *gas* engineering.
- (g) If there are indications of abnormally high or *low pressure*, the regulator and the auxiliary equipment shall be inspected. Necessary measures

shall be taken to correct any unsatisfactory operating conditions.  
[192.741(c)]

- (h) Recording charts which provide a redundant or secondary means of monitoring system pressure (e.g., seasonal charts) should be changed periodically.
- (i) Instruments used for telemetering and recording pressures *should* be inspected, tested, and calibrated in accordance with manufacturer's instructions.
- (j) Pressure recording charts should be changed in accordance with the established schedule.
- (k) For information regarding the determination of the number and location of telemetering and recording gauges, see Procedure 4-D, Section 17.2.

### **9.0 INSPECTION OF OTHER DEVICES AND EQUIPMENT**

Other devices and equipment that are installed at the pressure regulating stations *should* be inspected according to the manufacturer's recommendations. Such additional equipment might include heaters, cleaners, filters, or separators.

### **10.0 CHARTS AND PRESSURE RECORDS**

- (a) Pressure records from telemetering or recording pressure gauges *shall* be retained for 5 years, plus the current year. In **New Hampshire**, these records, for at least the past 2 years, shall be available for inspection by the commission or its agents. [NH Puc 504.03(c)]
- (b) The results of inspections on pressure control equipment or facilities shall be recorded on the appropriate form or in PMTS, as appropriate.
- (c) In New Hampshire, Unitil shall retain the following.
  - (1) Station records of the operation of its plant to show the characteristics and performance of each unit; and [NH Puc 507.01]
  - (2) The layout of all principal metering and regulator stations and production plants to show size, location and character of all major equipment, pipe lines, connections, valves and other equipment used. [NH Puc 507.03(c)]
  - (3) These stations records shall be preserved by Unitil for a period of 5 years. Unitil *shall* make such records available to the commission or its staff upon request at the Unitil's New Hampshire office. [NH Puc 507.05]
- (d) In **New Hampshire**, Unitil *shall* comply with the following with regard to gas supply measurement records. [NH Puc 507.02]
  - (1) Unitil shall install a suitable measuring device at each source of supply in order that a record *may* be maintained of the quantity produced.

- (2) Unless sufficient information is furnished by the utility supplying the gas, Unitil shall maintain adequate instruments and meters to obtain complete information as to gas purchases.
- (3) Unitil shall *determine* on a *daily* basis the quantity of gas supply produced or purchased and received from each source of supply; and
- (4) Summarize those quantities each month.
- (5) Unitil shall record and transmit to the commission its 12 month totals of gas supply purchased, produced, and received as part of its annual report to the commission.