Gas Piping Best Practice

Chris Wolfe
Ray Murray Inc.

This session will provide considerations needed to install gas piping for hearth products. In this session you will learn:

- Different materials used and best options.
- General pipe sizing and charts will be reviewed.
- NFPA# 54 code requirements and how to be compliant.
- Different methods of leak checking and operating tests.

2020 HPBExpo Education
Sponsored by:

HE@RTH Online Training
www.nficertified.org/online-training
GAS PIPING BEST PRACTICES

Presented by:

Chris Wolfe
Manager of Technical Support and Training
Ray Murray Inc.

Deciding Factors for Gas Piping Installation

• What will the customer prefer?
• What will the cost be for installing the gas line?
• What will be the ease of installation?
• What line size will provide enough gas pressure?
• What will codes allow you to do?

Nat Gas – Propane Comparison

<table>
<thead>
<tr>
<th></th>
<th>Nat Gas</th>
<th>Propane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition Temperature</td>
<td>1,100 deg</td>
<td>920 deg</td>
</tr>
<tr>
<td>Vapor Specific Gravity</td>
<td>.60</td>
<td>1.50</td>
</tr>
<tr>
<td>Lower Explosive Limit</td>
<td>5%</td>
<td>2.15%</td>
</tr>
<tr>
<td>Upper Explosive Limit</td>
<td>15%</td>
<td>9.6%</td>
</tr>
<tr>
<td>Ideal Combustion Ratio</td>
<td>6.5%</td>
<td>4%</td>
</tr>
<tr>
<td>BTU's per Cubic Foot</td>
<td>1,000</td>
<td>2,500</td>
</tr>
<tr>
<td>Typical Gas Pressure</td>
<td>3.5 - 7&quot; w.c</td>
<td>11&quot; w.c</td>
</tr>
<tr>
<td>Chemical Compound</td>
<td>CH4</td>
<td>C3H8</td>
</tr>
</tbody>
</table>
Typical Gas Line materials

WHAT WILL THE CUSTOMER PREFER?

Typically the customer will want the gas line concealed and not exposed. This may be difficult depending on the installation and location of the appliance.

• Is the appliance on an outside wall?
• Is the appliance in the middle of a room?
• Is the appliance in the basement or 2nd floor?

These are all challenges to install a gas line to an appliance that the customer will not visually see for aesthetic reasons.

What are some of the ways we can accomplish this?

What will the cost be for installing the gas line?

Consideration must be taken for the cost of labor and materials to accomplish the installation of the gas line. Typical gas line materials are CSST, Copper Tubing, Black Iron Pipe and Polyethylene Tubing.

• What will the cost be for different types of gas line?
• What will my labor cost be for each type of gas line?
• Do I have the gas line in inventory?
• Generally the customer will want the least expensive option.
What will be the ease of installation?

For propane, determine the placement of the LP tank or connect to an existing gas line. Attempt to install the gas line as short as possible with the least amount of fittings.

- This will minimize the pressure drop in the gas line.
- The least amount of fittings will be less chance of a leak.
- A shorter gas line has less exposure for damage.

The easier installation should mean the less cost for the customer.

What line size will provide enough gas pressure?

Line sizing is based on charts and not rule of thumb. Learning to use a line sizing chart will ensure you run the correct size gas line for the application. There are three different line sizing methods.

- Longest Length Method
- Branch Method
- Hybrid Method

The method of choice will be determined by the existing gas line you will be connecting to or the new one you install.

The Annex of NFPA# 54 discusses how to use these methods to line size.

Longest Length Method

[Diagram showing line sizing for different appliances: Furnace, Water Heater, Range, Dryer, BBQ, and their respective BTU needs with distances marked in feet.]
Pipe Sizing Chart Example

What will codes allow you to do?

NFPA# 54, manufacturer’s instructions and the AHJ set the guidelines for the installation of appliances and the gas line. Consider all three to be sure the gas line is being installed correctly. The most stringent of the three will usually take precedence. Some locations require a permit and inspection for installing appliances and gas lines.

NFPA# 54 2018 EDITION

10.6 – Decorative Appliances for Installation in Vented Fireplaces
10.7 – Gas Fireplaces, Vented
9.6.5 – Appliance Shutoff Valves and Connections
9.6.8 – Sediment Traps
7.1 – Installation of Underground Piping
7.12.2 – CSST
7.12.3 – Arc-Resistant Jacketed CSST
9.6.5.1 – The shutoff valve must be located within 6 ft. of the appliance it serves. (9.6.5.2 is an exception)
9.6.5.1(B) – Shutoff valves serving decorative appliances in a fireplace shall not be located within the fireplace firebox except where the valve is listed for such use.
9.6.5.2 – Shutoff valves serving appliances installed in vented fireplaces and ventless firebox enclosures shall not be required to be located within 6 ft. of the appliance where such valves are readily accessible and permanently identified.

9.6.8 – Where a sediment trap is not incorporated as 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. Illuminating appliances, gas ranges, clothes dryers, decorative appliances for installation in vented fireplaces, gas fireplaces, and outdoor cooking appliances shall not be required to be so equipped.

7.1.1 – Underground gas piping shall be installed with sufficient clearance from any other underground structure to avoid contact therewith, to allow maintenance, and to protect against damage.
7.1.2 – Means shall be provided to prevent excessive stressing of the piping due to soil conditions or heavy vehicular traffic.
7.1.2.1 – Minimum of 12" of cover over piping. Must increase to 18" if external damage is likely to result from external forces.
7.1.5 – Piping through a foundation wall must be encased in a protective sleeve and sealed between the two so as to prevent entry of gas and water.
NFPA# 54 2018 EDITION

7.12.2 – CSST gas piping systems, and gas piping systems containing one or more segments of CSST, shall be electrically continuous and bonded to the electrical service grounding electrode system or, where provided, lightning protection grounding electrode system.

7.12.2.1 – Jumper must be connected to pipe fitting, not the CSST.
7.12.2.2 – Cannot be smaller than 6 AWG copper wire or equivalent.
7.12.2.3 – Jumper cannot exceed 75 feet to grounding electrode.

YELLOW COATED PIPE

NFPA# 54 2018 EDITION

7.12.3 – CSST listed with an arc resistant jacket or coating system in accordance with ANSI LC1/CSA 6.26, Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing, shall be electrically continuous and bonded to an effective ground fault current path…..Arc-resistant jacketed CSST shall be considered to be bonded when it is connected to appliances that are connected to the appliance grounding conductor of the circuit supplying that appliance.

BLACK COATED PIPE

Location of LP Gas Containers – DOT Cylinders
Location of LP Gas Containers – ASME Tanks

Who is in Charge?

Pressure Test, Leak Check and Operating Test
Pressure Test

According to NFPA 54, a pressure test checks for leaks in the interior lines of a vapor distribution system. This covers the lines downstream of the outlet of an integral 2-stage regulator, second-stage regulator, or meter. This test applies pressure of not less than 1½ times the proposed maximum working pressure of the interior piping, but not less than 3 psig. The test medium shall be air, nitrogen, carbon dioxide, or an inert gas. It is performed only on newly-installed interior piping systems or on systems repaired or modified as specified by NFPA 54. A system in a single-family dwelling, a test duration shall be a minimum of 10 minutes and be documented.

Leak Check

A leak check identifies leaks by applying pressure to entire vapor distribution system up to the outlets of the equipment shutoff valves. This test is normally conducted using propane and a pressure gauge or water manometer to monitor a pressure change, which would indicate a leak. A leak check is performed when a new or modified gas piping system is placed into service, or when there has been an interruption of service, such as a gas outage, gas leak, or regulator replacement. The test pressure must be 9” w.c. + or – ½” w.c. The gauging device should indicate no loss or gain of pressure for a period of 3 minutes and be documented.

Leak Check – NAT Gas

“Clocking the Meter” – Confirm the meter is working properly. The leak check can be done by carefully watching the test dial of the meter. Place a piece of tape directly over the centerline of the hand as soon as the gas is turned on. This observation should be made with the test hand on the upstroke. The observation times will vary depending on the meter dials.

<table>
<thead>
<tr>
<th>Dial Styles (cu.ft.)</th>
<th>Test Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼</td>
<td>5</td>
</tr>
<tr>
<td>½</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>
Flow Test
A flow test measures the pressure downstream of the first-stage and final-stage regulators when the appliances are operating. It determines if the regulators are supplying the amount of gas the system requires. This test is conducted by temporarily installing a water manometer or pressure gauge in the outlet pressure tap of the final-stage regulator or in the distribution line close to the appliance that is furthest away from the final-stage regulator. The manometer or pressure gauge is used to monitor the delivery pressure at the test location when all appliances are turned on. Refer to your company policy for specific procedures.

QUESTIONS?
• Did you have fun?
• Did you learn something?
• If you answered “Yes” to either question, today was a success!
• Thank You!!!