PBGII W/ GAS MANIFOLD

WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel. Adjustment of this equipment and its components by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

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A. GENERAL INFORMATION

Package Burner pre-piped gas manifolds are designed to serve a variety of functions. There are three configurable manifolds that come plumbed into the burner. The NFPA manifold comes with two safety shutoff valves complete with cross-connected control regulator functionality, visual indication, and one proof of closure switch, manual isolation valves, and high and low fuel pressure switches. This manifold option offers the greatest fuel flow turndown and is the most compact for all the components offered. The ratio control manifold comes with an independent cross-connected GIK control regulator, a fixed internal bypass, and an isolation valve. The fuel only control manifold features a fuel orifice meter, a modulating gas valve with a direct-coupled and fully programmable actuator, an isolation valve, and a high fire limiting valve. This option is designed for use with a fixed air capacity and a modulating fuel input that can vary with heat demand.

Optional pre-piped manifolds are also available. These manifolds are add-ons for the configurable manifolds, and are for use with ratio control manifold, fuel-only control manifold, or customer supplied control components. The optional manifold includes an isolation valve, a fuel filter, two safety shutoff valves with visual indication and proof of closure, and high and low fuel pressure switches.

B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.

C. INSTALLATION

IMPORTANT

All new installations should have an equipment isolation valve, sediment trap, strainer, fuel gas regulator, and overpressure protection installed upstream of the PGM to protect the safety shutoff valves from foreign material and over pressurization of downstream components. These components are available in a pre-piped regulator gas manifold (RGM); consult Hauck.

1. Prepare an area to install the manifold. Ideally, make provisions to isolate the manifold from plant or equipment vibration by installing a flexible connection between the manifold and the supply connection. The manifolds are assembled to the burner but rotation of the manifold may be possible. The NFPA manifold and fuel-only control manifold can be mounted vertically or horizontally. The GIK manifold must remain in the horizontal orientation for operation.

2. Before making any connection to the fuel manifold, have the main supply line purged. Purge the line long enough to remove any debris that may be in the line.

WARNING

If the gas line is not properly purged, debris can get into the safety shut-off valves. If this occurs, the shut-off valves may not fully close.

3. Fabricate and/or install a support structure for the manifold. Typically, if the installation location permits, the manifold can be supported by a rack below it or held up by a structure above the manifold.

4. Once purged and properly supported, remove any inlet covers from the manifold and connect the inlet of the manifold to the supply line. Use a suitable pipe sealant and tighten the supply connection to the manifold inlet. Hauck recommends the use of a high quality thread sealant with teflon (Loctite 565 or equal) for natural gas and propane gas service.

> **NOTE**
> When using a teflon based pipe sealant, avoid over-engagement of connections. Teflon will reduce the friction on the pipe threads and multiply the force when pipes are tightened. Valves, fittings, and pipe can crack when over-engaged.

5. Upon completing the piping, the manifold should be leak tested according to accepted practices. One method is pressurize the manifold and spray a solution of dishwashing liquid and water over all connection points and observe if any bubbles appear. Bubbles will indicate leaks. If any leaks appear, immediately repair them. Repeat the leak test until all leaks are repaired. Consult the local Gas Company for other leak test methods if necessary. **DO NOT EXCEED 3 psig (207 mbar) WHEN LEAK TESTING THE GIK MANIFOLD. DO NOT EXCEED 7.25 psig (500 mbar) WHEN LEAK TESTING THE NFPA OR FUEL-ONLY MANIFOLDS.**

6. When all leaks are repaired, ensure that all gas cocks are open and the manifold is now ready for operation.

D. OPERATION

Typical operating gas pressures will range from 1.25 to 3 psig (86 to 207 mbar). Adjust the fuel pressure reducing regulator to the appropriate fuel pressure. The pressure reducing regulator may be an existing component or supplied by Hauck a separate part.

The NFPA manifold and ratio control manifold are cross-connected to the burner air and will modulate based on the burner air pressure. The fuel-only control manifold relies on an input signal from the Hauck supplied burner control, or other control to device to modulate the fuel flow. The fuel-only control manifold also features a limiting valve to set the maximum capacity of the burner at the input desired.

E. ADJUSTMENTS

Both the NFPA manifold and ratio control manifold have low fire adjustment capabilities. Figure 1 shows the bias adjustment locations on both regulators.

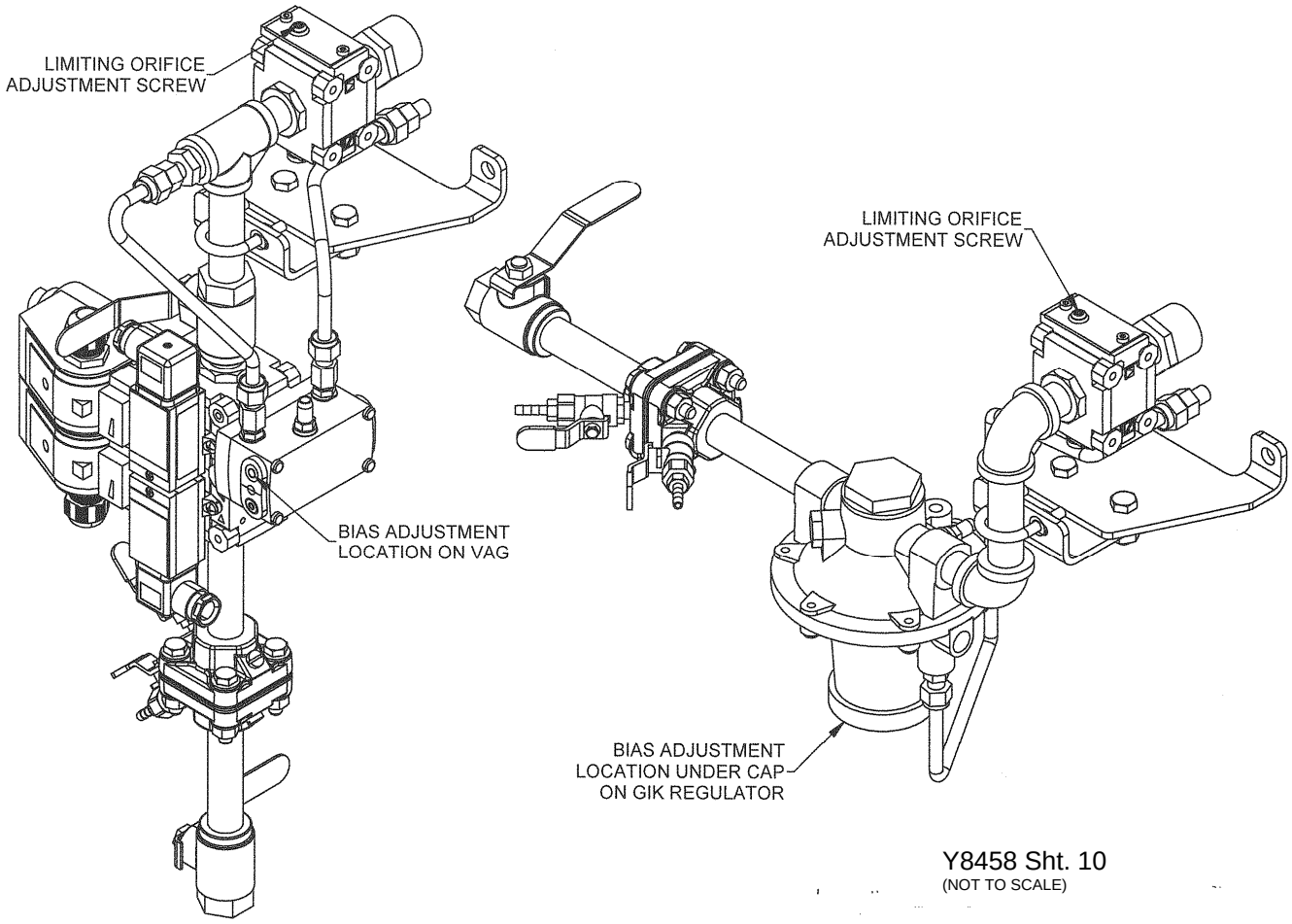

Figure 1. Bias Adjustment Locations

The NFPA manifold features a VAG ratio regulator and shutoff valve combination component. The VAG low fire adjustment, or bias, is preset for maximum turndown and ignition under neutral chamber conditions. To adjust the bias setting on the VAG, use a 3 mm allen wrench to rotate the wheel on the bottom of the regulator. **DO NOT USE EXCESSIVE FORCE ON THE COMPONENTS OR THEY WILL BREAK.** Rotating the dial indicator to the positive side of the scale, up to 3 mbar (1.2 inch w.c.), will provide more fuel flow, while rotating the dial to the negative side of the scale will reduce the fuel flow. Factory settings for the VAG bias are listed below in Table 1.

Burner Size	Bias Setting (mbar)
300	-3
500	-1.5
750	-2
1000	-3
2000	-1.5
3000	-2
5000	-1.5

Table 1. VAG Factory Bias Settings

The ratio control manifold features a GIK regulator with fixed internal bypass. This bypass ensures that the minimum gas flow for ignition is allowed through the regulator despite the cross-connected air loading pressure. The bias adjustment in the bottom of the GIK can be adjusted with a screwdriver either clockwise or counterclockwise to increase or decrease the low fire flow rate. The bypass sizes and flow rates are listed below in Table 2.

Burner Size	Bypass Size (Inches w.c.)	Flow rate (scfh)
300	0.055	15
500	0.055	15
750	0.081	32
1000	0.081	32
2000	0.079	70
3000	0.079	70
5000	0.116	90

Table 2. GIK Bypass Sizes and Flow Rates
(Flow rates based on 1.5 psig (103.5 mbar))

The fuel only control manifold has adjustable gas flow throughout the control range via the fully programmable IC40 gas valve actuator. The gas flow through the manifold can be measured by using the supplied orifice meter. For maximum turndown, the orifice meter has been designed for capacity fuel flow at approximately 10 inches w.c. (25 mbar). Figures 2 through 5 show the gas flow rate at differential pressure across the meter for all sizes of the PBG. Table 3 shows the orifice meter sizing used on each burner.

Burner Size	OMG Size (NPT)	Bore Size (inches)
300	1/2"	0.29
500	1/2"	0.37
750	1/2"	0.437
1000	1"	0.467
2000	1 1/2"	0.766
3000	1 1/2"	0.928
5000	1 1/2"	1.156

Table 3. OMG Gas Meter and Orifice Sizes

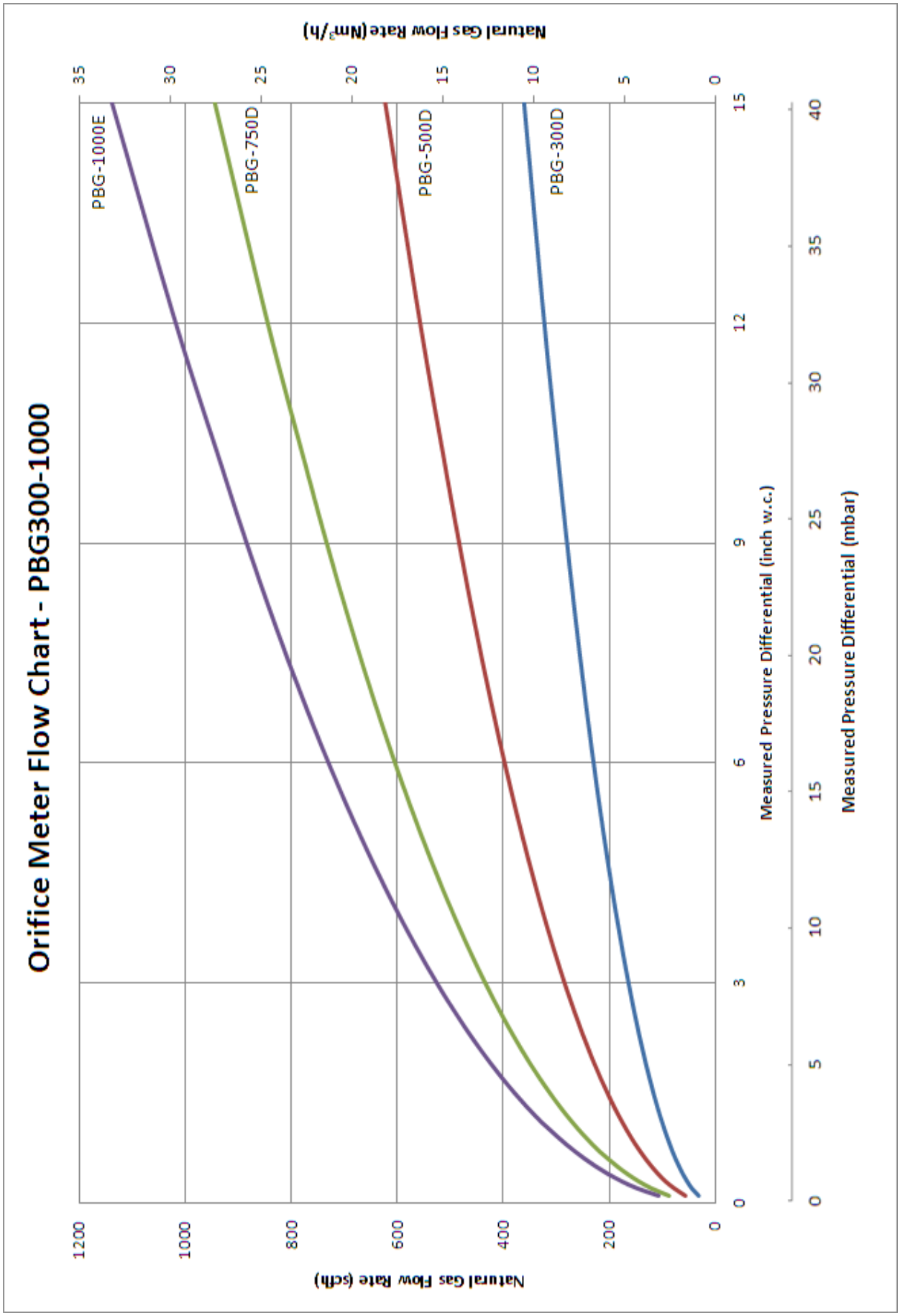

Figure 2. Natural Gas Pressure Drop vs. Flow across OMG

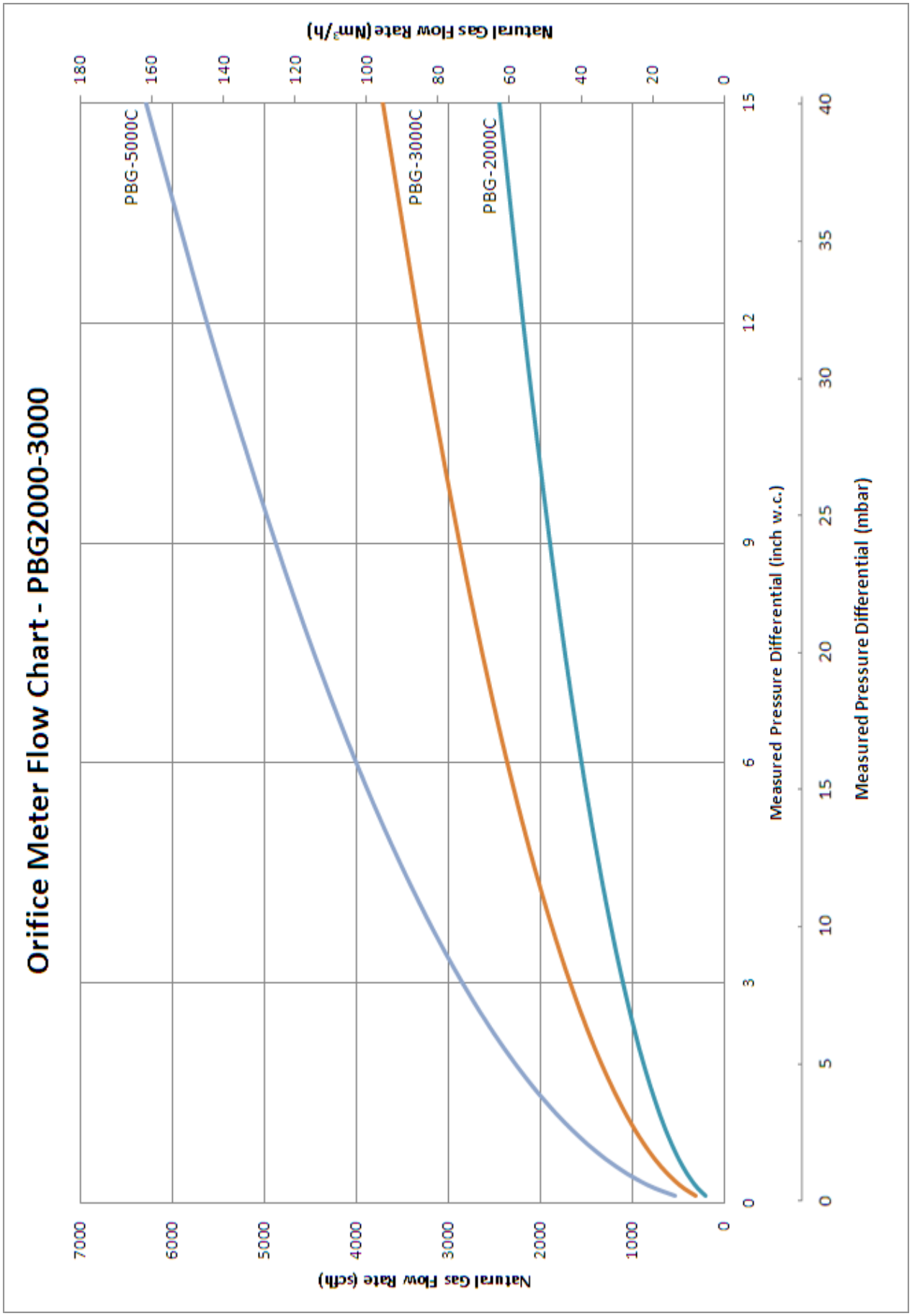

Figure 3. Natural Gas Pressure Drop vs. Flow across OMG

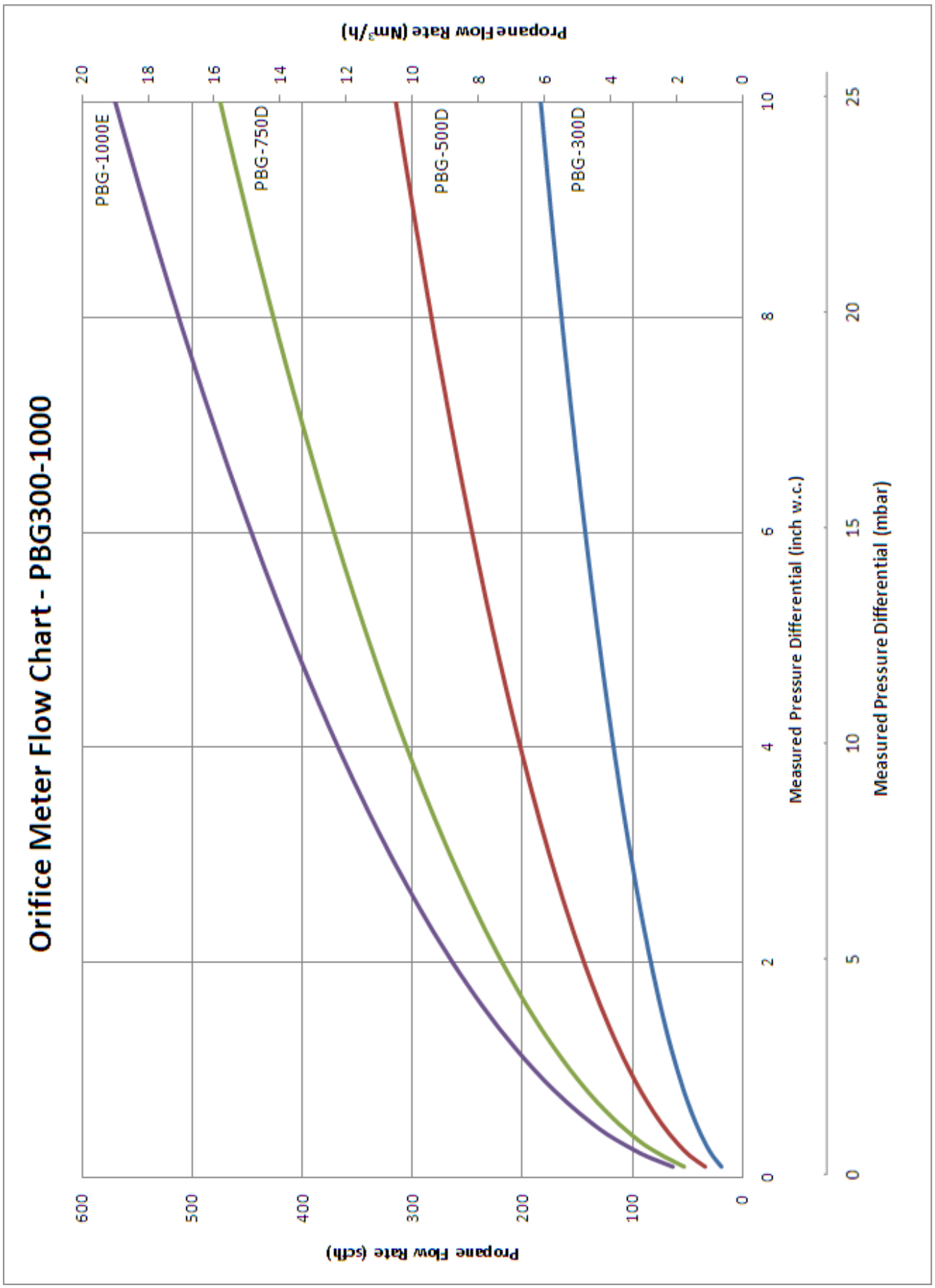

Figure 4. Natural Gas Pressure Drop vs. Flow across OMG

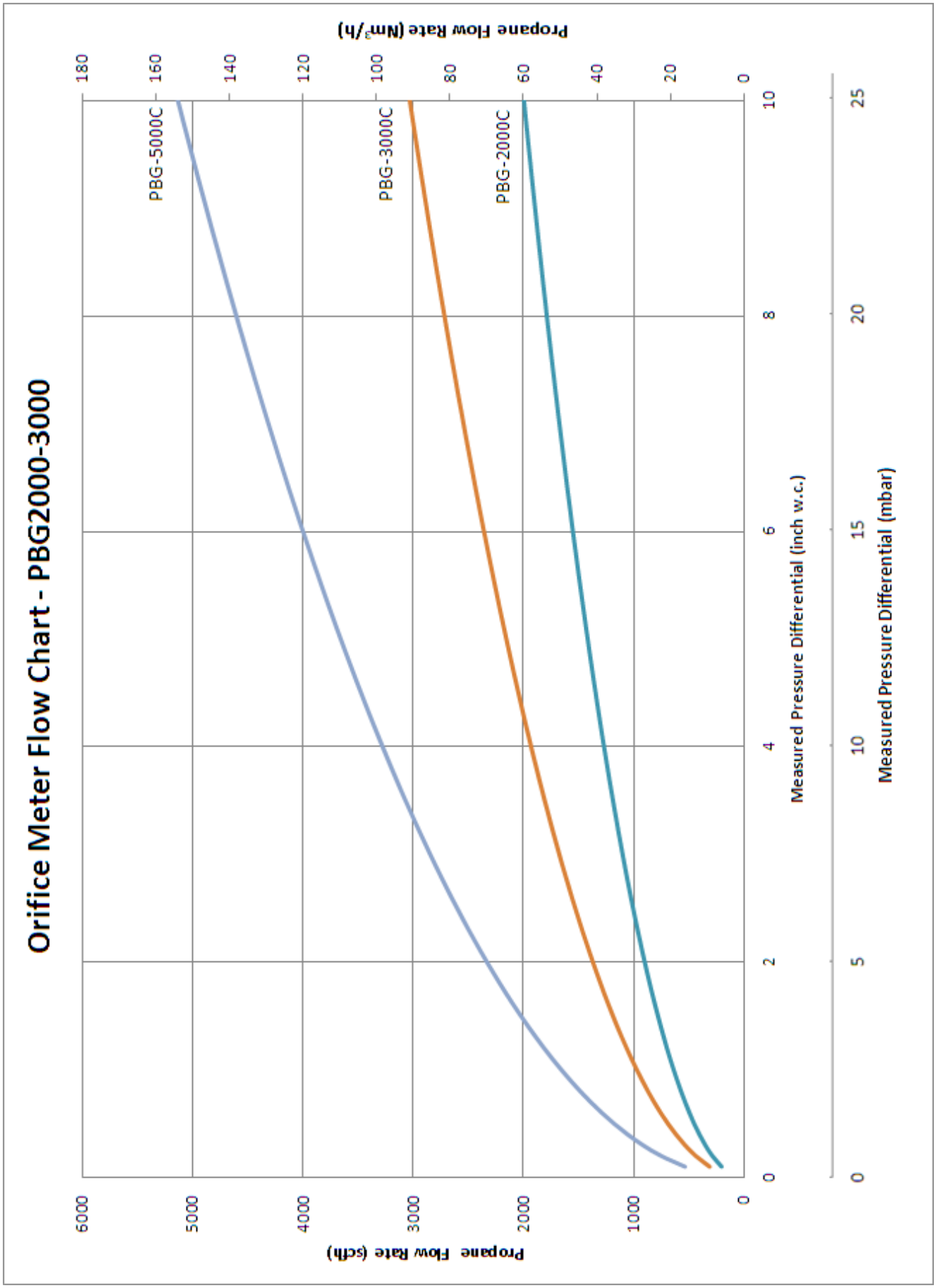

Figure 5. Natural Gas Pressure Drop vs. Flow across OMG

F. SHUTOFF VALVE LEAK TESTING

In addition to leak testing the entire manifold, the automatic shutoff valves must also be leak tested. Both the main and blocking valve must be leak tested and the high and low pressure switches must be tested on a yearly basis at minimum.

G. MAINTENANCE

The fuel manifold requires minimal maintenance. On a yearly basis as a minimum, the manifold must be leak tested and any leaks should be repaired immediately. The pressure switches must also be tested on a yearly basis at minimum. If the optional NFPA manifold with fuel filter is selected, the filter should also be inspected or cleaned at that time. For additional component information, further documentation is available on www.docuthek.com.