GAS DELIVERY PRESSURE AND MEASUREMENT

I. PURPOSE:

To establish a uniform basis on which to provide gas measurement and pressure regulation facilities on customers' premises.

II. DELIVERY PRESSURES AND PROVISIONS:

The measurement base for billing purposes is six (6) inches w.c. pressure at the meter outlet. Elevated regulated pressures, if provided, will be supplied at two (2) pounds, five (5) pounds or at unregulated intermediate line pressures (i.e., at the same pressure as the distribution main serving a given meter setting). Any deviation from the delivery pressures listed above shall be approved by the Director of Engineering and Gas Supply or, in their absence, the Superintendent of Gas Operations Services.

A. Gas Pressure Regulators. A gas pressure regulator or gas equipment pressure regulator shall be installed where the gas appliance is designed to operate at a lower pressure than the fuel gas system. Access shall be provided to pressure regulators. Pressure regulators shall be protected from physical damage. Regulators installed on the exterior of the building shall be approved for outdoor installation (IMC Sec. 1307.1, IRC Sec. G2420.1). *

   Gas pressure regulators that require a vent shall have an independent vent to the outside of the building (IMC Sec. 1307.4, IRC G2420.3)

B. Equipment Shutoff Valve. Every gas outlet shall have an individual shutoff valve. The shutoff valve shall be in the same room and within 6 feet of the appliance served. Access shall be provided to the shutoff valve (IMC Sec. 1305.1). For multiple lines, follow procedures outlined in IMC 1305.2.

   Each appliance shall be provided with a shutoff valve separate from the appliance. The shutoff valve shall be located in the same room as the appliance, not further than 6 feet form the appliance, and shall be installed upstream from the union, connector or quick disconnect device it serves. Such shutoff valves shall be provided with ready access (IRC Sec. G2419.5).

C. Piping Materials. Piping materials and specifications shall be in accordance with the IMC Sec. 1303 and IRC Sec. G2413.

Corrugated Stainless Steel Tubing (CSST) systems shall be tested, listed and installed in compliance ANSI/AGA LC 1 (IMC Sec. 1303.3, IRC Sec. G2413.5.3). CSST may be used for pressures up to 5 psig.

D. Identification. For other than black steel pipe, exposed piping shall be identified by a yellow label marked "Gas" in black letters. The marking shall be spaced at intervals not exceeding 5 feet. The marking shall not be required on pipe located in the same room as the equipment served (IMC Sec. 1301.5, IRC Sec.G2411.5).

All tubing carrying medium-pressure gas shall be marked with a label at the beginning and end of each tubing section (IMC Sec. 1301.5).

E. Maximum Design Operating Pressure. The maximum design operating pressure for piping systems located inside buildings shall not exceed 5 psig except where one or more of the following conditions are met:

1. The piping system is welded (IRC Sec. G2412.5; "welded steel pipe" IMC Sec. 1306.5).
2. The piping is located in a ventilated chase or otherwise enclosed for protection against accidental gas accumulation (IRC Sec. G2412.5).
3. The piping is a temporary installation for buildings under construction (IRC Sec. G2412.5).
4. The piping is located inside buildings or separate areas of buildings used exclusively for (IMC Sec. 1306.5):
   - 4.1 Industrial processing or heating,
   - 4.2 Research,
   - 4.3 Warehousing, or
   - 4.4 Boiler or mechanical equipment rooms.

However, Citizens Gas & Coke Utility recommends (but does not require) all elevated pressure lines 2 ½ " or larger be of welded construction.

III. PIPE SIZING PRACTICES:

A. General Considerations. Piping systems shall be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand without undue loss of pressure between the point of delivery and the gas utilization equipment (IRC Sec. G2412.1).

All pipe utilized for the installation, extension and alteration of any gas piping system shall be sized to supply the full number of outlets for the intended purpose (IMC Sec. 1302.1).

B. Maximum Gas Demand. The volume of gas to be provided in ft^3 per hour shall be determined directly from the manufacturers' input ratings of the gas utilization equipment served. Where input rating are not indicated, the gas supplier, equipment manufacturer, or an approved agency shall be contacted for estimating the volume of gas to be supplied (IRC Sec. G2412.2).

The total connected hourly load shall be used as the basis for piping sizing assuming that all equipment could be operating at full capacity simultaneously (IRC Sec. G2412.2).

The hourly volume of gas demand at each outlet shall not be less than the maximum hourly demand, as specified by the manufacturer of the appliance served (IMC Sec. 1302.2).

C. Allowable Design Operating Pressure. The design pressure loss in any piping system under maximum probable flow conditions, from the point of delivery to the inlet connection of the equipment, shall be such that the supply pressure at the equipment is greater than the minimum pressure required for proper equipment operation (IRC Sec. G2412.4).

Piping sizes shall be determined by the use of approved accurate gas flow, computer or pressure drop charts. The maximum pressure drop for point of delivery to any appliance shall not exceed 0.5 inch of water column (IMC Sec. 1302.8)

D. Sizing. Gas piping shall be sized in accordance with IMC Sections 1302.5, 1302.6, 1302.7, 1302.8 and IRC Sec. G2412.3 Tables 1 through 6 or other approved engineering methods.

IV. METERING PRACTICES:

A. Overpressure Protection. Overpressure protection devices shall be provided to prevent the pressure in the piping system from exceeding that value that would cause unsafe operation of any connected and properly adjusted gas utilization equipment. Each pressure limiting or pressure relieving device shall be set so that the pressure shall not exceed a safe level beyond the maximum allowable working pressure for the piping and appliances connected.

B. Temperature Compensation. Temperature compensation shall be applied to all loads. All settings metered at line pressure, shall include a correcting device for temperature, pressure, and supercompressibility.

C. Pressure Correction. Pressure correction for billing purposes shall be in accordance with General Instruction #80, Standard Unit of Volume for

Gas Measurement (see attached Pressure Factor Table). Intermediate or higher line pressure delivery shall be corrected to base conditions by suitable instrumentation.

D. Meter setting design shall be the responsibility of the Engineering Standards & Measurement Section.

V. EXCEPTIONS:

A. Exceptions to the elevated delivery pressures may be approved by the Director of Engineering and Gas Supply with the following submitted in advance:
   1. Plans for the installation.
   2. Equipment specifications.
   3. Other necessary information.

* IMC = International Mechanical Code
IRC = International Residential Code

ATTACHMENT A

PRESSURE FACTOR TABLE
(Includes Supercompressibility)

Metering Pressure	Factor
6”	1.000
7”	1.002
8”	1.005
9”	1.007
10”	1.010
11”	1.012
12”	1.015
.5#	1.019
1#	1.054
2#	1.123
3#	1.192
4#	1.261
5#	1.330
6#	1.399
7#	1.468
8#	1.537
9#	1.606
10#	1.675
11#	1.744
12#	1.813
13#	1.882
14#	1.952
15#	2.021

Consult Engineering Standards & Measurement Section for Pressure Factors higher than those listed.