

SECTION G
CUSTOMER HOUSE PIPING AND EQUIPMENT

1. GENERAL

The Company in the interest of safe and reliable service has adopted these requirements for the installation, operation, and maintenance of gas piping and gas equipment. In applying these requirements and specifications, if any provision herein conflicts with any local, state or federal ordinance, rule or regulation, the latter shall govern in the area in which the installation is made.

Certain local governments have assumed the responsibility for house piping inspections and testing. Please contact the local building department for installation requirements. In these instances, the Company requires an approved house piping inspection & pressure test performed by the local inspection department before the Company turns on a meter.

1.1 Ownership and Responsibility

The customer, at his own expense, shall have house piping installed by qualified personnel. The house piping consists of pipe and fittings from the outlet of the meter to the equipment shutoff valve. The customer will be responsible for the installation and maintenance of the house piping and the customer assumes all risk resulting from defects therein.

2. GAS PIPING SYSTEM DESIGN

2.1 Sizing

Gas piping shall be designed in accordance with accepted engineering practice to be of such size and installed to provide a supply of gas to meet the maximum expected demand. Standard pressure piping systems should be sized such that the pressure loss does not exceed 0.3 inch water column (W.C.).

2.2 Piping Extensions

When remodeling or extending existing house piping, connections shall be made so that sizes can be maintained in accordance with the provisions of this section. Where the pressure drop exceeds 0.3 inch W.C. a separate pipe from the meter shall be installed to supply the additional load requirements.

2.3 Minimum Pipe Size

No pipe smaller than standard 1/2 inch iron pipe size (IPS) shall be used in house piping. Gas piping to an appliance shall not be smaller than the manifold size or connection at the appliance.

3. MATERIAL

3.1 General

Each length of pipe shall be examined before connecting and any dirt or obstructions removed. Any burrs left by the cutting tool shall be removed.

Customer's installer shall replace any defective pipe or fittings.

Material and installation requirements for Corrugated Stainless Steel Tubing (CSST) are detailed in a separate Gas Installer's Manual Handout.

Copper piping is no longer used for new installations. Where extending existing copper piping systems, contact your Duke Energy representative for material and installation requirements.

Plastic piping shall in accordance with requirements for plastic customer service piping in Section E. Plastic piping shall only be used outside and underground.

3.2 Pipe

Steel gas pipe shall be at least standard weight (Schedule 40) and shall comply with ASTM A53 or ASTM A106.

3.3 Fittings

All screw fittings except stopcocks and valves shall be steel, brass, bronze, or black malleable iron, standard weight of the banded and beaded type. Except as noted in Section G 3.4, screw fittings are acceptable on 4" and smaller diameter steel pipe. Bushings, all-thread close nipples, saddles, and cast iron connections are not permitted. Unions are permitted only as follows:

1. A union may be installed between a shutoff valve and an appliance.
2. Unions may be installed to connect buried piping to above ground piping.

Fittings for plastic pipe shall be installed only outside and underground. Mechanical fittings must be a compression type specifically designed and manufactured for use on polyethylene pipe and tube.

3.4 Pressure Piping

1. General - Piping operating at 1 PSIG or more is considered Pressure Piping. If pressure gas is required, it is provided in 1 PSI increments starting at 1 PSIG.
2. Sizing - The recommended pressure drop in pressure piping is 10% of the delivery pressure. The pressure drop is measured from the meter outlet to the appliance valve. (Ex. 5 PSIG delivery pressure - 0.5 PSI pressure drop allowable)

3. Steel Joints - Although welding is preferred, threaded joints and fittings are permitted for pipe sizes up to and including 4" operating at 5 PSIG or less. Pressure piping larger than 4" and all pressure piping above 5 PSIG regardless of size must be welded or flanged.
4. Pressure Rating of Customer Regulators - For a given delivery pressure at the regulator inlet, the emergency pressure rating must meet or exceed the following requirements. The Emergency Pressure Rating or Emergency Exposure Limit is the pressure at which pressure beyond this limit may cause damage to regulator components or cause the regulator to malfunction.

<u>Pressure Delivered (PSIG)</u>	<u>Minimum Pressure Rating - Emergency (PSIG)</u>
1 - 2	10
3 - 8	15
9 - 15	25
16 - 40	60
41 - 50	75

5. Pressure Boosters - Piping installed downstream of a pressure booster shall conform to the same rules as pressure piping if the booster pressure is 1 PSIG or above. The piping design pressure will be the high pressure shut-off limit for the pressure booster. When a pressure booster is used, back pressure and low pressure protection must be provided.

3.5 Valves

All house piping valves shall be of the type approved for use on natural gas.

4. INSTALLATION

4.1 General

A sediment trap shall be installed at the base of all appliance drops to catch dirt or other foreign materials. The sediment trap shall be of the same size as the pipe to which it is attached. The sediment trap should be installed as close as practical to the inlet of the equipment, preferably downstream of the equipment shutoff valve. See Sketch 12 Section K.

Where customer house piping is buried, the requirements and specifications covering "customer service lines" shall apply as stated in Section E, unless a specific exception is stated in this section of the manual. Buried metallic house piping shall be insulated and cathodically protected. (See Section F.)

Where passing through an outside wall, above ground piping shall be protected against corrosion by coating or wrapping with an inert material.

Customer is responsible for connecting house piping to outlet of meter assembly.

4.2 Prohibited Locations

Except as otherwise provided in this section, gas piping shall not be installed in or pass through any air conditioning, heating or ventilating duct system, clothes chute, chimney, flue, or elevator shaft.

House piping may enter a duct system only when all the following conditions are met:

1. The gas utilization equipment is used to pre-heat outside make-up air.
2. The gas utilization equipment is approved for such use.
3. The use is confined to commercial/industrial occupancies.
4. The installation meets all local, state, or federal code.

4.3 Supporting Pipe

Gas piping shall be supported with the proper size pipe hooks, metal pipe straps, bands or hangers. The supports must be of adequate strength and quality, and located at proper intervals, so that the piping cannot be moved accidentally from the installed position. The building structure shall not be weakened by the installation of any gas piping. Gas piping shall not be supported by other piping. Spacing of supports in gas piping installations shall not be greater than shown in the following table:

Steel Pipe Nominal Size of Pipe (Inches)	Spacing of Supports (Feet)	Nominal Size of Tubing (Inch OD)	Spacing of Supports (Feet)
1/2	6	1/2	4
3/4 or 1	8	5/8 or 3/4	6
1 1/4 or larger (horizontal)	10	7/8 or 1	8
1 1/4 or larger (vertical)	Every floor level		

4.4 Outlets

All piping outlets shall be installed to provide sufficient clearance from ceilings, walls and floors to permit use of a pipe wrench of suitable size without straining or bending the pipe. The outlet fitting or piping shall not be placed behind doors.

Each outlet, including pipe terminating with a valve, shall be securely closed gas-tight with an approved threaded plug, threaded cap, or listed convenience outlet immediately after installation and shall be left closed until an appliance is connected.

4.5 Concealed Pipe and Fittings

When installing house piping that will be concealed, the number of fittings shall be kept to a minimum.

When gas piping within the perimeter of a building is to be concealed underground, or within concrete or other solid construction the piping shall be properly cased or channeled. The entire installation shall be such that the gas piping can be readily replaced.

Channel shall be suitably covered providing protection to the pipe from moisture and corrosive substances.

4.6 Piping Between Buildings

Underground piping systems shall be installed with at least 18-inches of cover. The cover may be reduced to 12-inches if external damage to the pipe is not likely to result. If a minimum of 12-inches of cover cannot be maintained, the pipe shall be installed in conduit or bridged (shielded).

For corrosion protection on underground house piping, see Section F.

In industrial or large commercial establishments, or where it is not practicable to install piping underground, alternate methods may be used as permitted by code requirements.

4.7 Exposed Piping Outside

Exposed piping installed outside such as rooftops shall be coated with a rust inhibitor to prevent atmospheric corrosion and located where it will be protected from physical damage.

Rooftop piping shall be installed above the rooftop surface, supported on materials designed for outdoor use such as treated lumber. Recommended pipe support is a treated lumber 4" x 4" - 1' long. Attach pipe to support with pipe straps or bands. For spacing of supports see table in G-4.3.

5. HOUSE PIPING SHUTOFF VALVES

5.1 General

The Company will install a shutoff valve on the inlet piping to every meter installation. In those instances where the meter is not located at the building, a shut off valve shall be installed, by the customer, in the house piping at the building wall in an accessible location.

5.2 Multiple House Piping

In multiple tenant buildings supplied through a master meter or where meters are not readily accessible from the appliance location, an individual shutoff valve for each apartment or for each house piping system shall be provided at a convenient point of general accessibility. Each valve must be plainly marked with a permanent tag by the installing agency so the individual gas piping systems can be readily identified.

6. APPLIANCE

6.1 General

Appliances shall be connected to the gas piping system with rigid pipe or A.G.A. approved flexible metal appliance connectors. An approved shut off valve shall be installed by the customer on the rigid pipe section of the house piping system ahead of the appliance controls, the union, flanges, or the approved flexible connector as the particular case may warrant. The valve shall be in an accessible location, and within six (6) feet of the appliance. Where local building departments invoke *CABO One and Two Family Dwelling Code*, the valve shall be installed within three (3) feet and in the same room as the appliance.

6.2 Gas Fireplaces/Log Lighter/Fire Place Piping

An approved shut off valve shall be installed by the customer on the rigid pipe section of the house piping system ahead of the appliance controls. The valve shall be in an accessible location within six (6) feet of the appliance. Where local building departments invoke *CABO One and Two Family Dwelling Code*, the valve shall be installed within three (3) feet and in the same room as the appliance.

In the event the valve is in a finished basement or adjacent room, the valve shall be accessible through a door or open area. This valve shall be identified.

Equipment shutoff valves shall not be located in fireplaces used for solid fuel burning.

Shut off valves supplied with gas log lighters are considered appliance controls and, therefore, require a separate approved shut off valve.

Casing is not required to sleeve gas piping serving a fireplace through core-drilled concrete, brick or rock hearth wall. Casing must be provided when concrete is poured around piping. Screw fitting joints are not permitted to be enclosed in core hole or casing.

6.3 **Non-Portable Appliances**

Central heating, unit heaters, room heaters, water heaters, incinerators and similar non-portable equipment shall be connected to the customer's gas pipe with approved rigid pipe and fittings. Exception: In an area where a heater or infra-red heater is subject to vibration, an approved flexible connector should be used to connect the appliance.

6.4 **Portable Appliances**

Domestic gas ranges, room heaters, refrigerators, fireplace heaters, clothes dryers, hot plates and similar equipment shall be connected to the customer's gas pipe with rigid pipe, or A.G.A. approved flexible metal appliance connectors. When a flexible connector is used, the connection shall be made to an outlet in the same room as the appliance and the connector shall not be in a concealed location.

6.5 **Temporary Portable Construction Heaters**

Portable construction heaters must be connected to the gas piping with an A.G.A. approved gas hose rated at 150 P.S.I. minimum; the hose, in this case, may exceed the six (6) foot limit in length, but no longer than necessary. The hose shall be connected to hard piping in the same room being heated. It shall not pass through any walls, partitions, ceilings or floor and must not be concealed. The rigid piping shall be installed in the same manner as permanent piping. The hose must be controlled by a stopcock where connected to the hard piping and have a stopcock at the appliance end. The hose shall be protected from damage and excessive heat.

6.6 **Fully Portable Appliances**

A.G.A. approved flexible gas hose may be used on fully portable gas appliances, such as irons, flat irons, Bunsen burners, hand torches, dentist torches and similar appliances. The flexible gas hose shall not exceed six (6) feet in length and shall not extend from one room to another nor pass through any walls, partitions, ceilings or floors and shall not be concealed from view.

6.7 **Diaphragm Breather Vents**

Diaphragm breather vents shall be piped to outside locations unless the built-in capacity of the breather vent is less than 2.5 CFH and the breather vent is located in a ventilated area. Diaphragm breather vents for equipment operating at pressures greater than 2 PSIG shall be piped to outside locations.

Appliance regulators with vent connections must be vented separately to an outside location in accordance with the following table.

Minimum Piping Sizes for Appliance Regulator Diaphragm Breather Vents	
Length	Minimum Size
0 - 10 Feet	Same size as Manufacturer's Connection
10 - 40 Feet	One pipe size larger than manufacturer's connection
40 - 100 Feet	Two pipe sizes larger than Manufacturers connection
Over 100 Feet	Manufacturer's recommendations

Minimum sizes listed above are in lieu of manufacturer's recommendations. Where a manufacturer recommends larger sizes, their guidelines should be followed. Additionally, the above sizes are for diaphragm breather lines only. Vent piping for relief valves are sized based on manufacture's recommendations.

Excessive vent piping restricts the ability of a regulator to breathe and, therefore, may affect its performance. By increasing two pipes sizes, restrictions are decreased significantly and regulator performance should not be affected for vent lengths up to 100 feet.

Every effort should be made to pipe diaphragm breather vents separately to an outside location. Where separate venting is not practical, manifold venting in accordance with Sketch 12, Section K may be used. This manifold venting system is designed to prevent multiple failures from a single event.

7. ELECTRICAL BONDING, GROUNDING AND CIRCUITS

7.1 Gas Piping Bonding and Grounding

Each aboveground portion of a gas piping system upstream from the equipment shutoff valve shall be electrically continuous and bonded to any grounding electrode, as defined by the *National Electrical Code*. ANSI/NFPA 70.

7.2 Electrical Grounding

Gas piping shall not be used as a grounding electrode.

7.3 Electrical Circuits

Electrical circuits shall not utilize gas piping or components as conductors.

Exception: Low-voltage (50 volts or less) control circuits, ignition circuits, and electric flame detection device circuits shall be permitted to make use of piping or components for a part of an electrical circuit.

8. MODIFICATIONS TO NATIONAL FUEL GAS CODE

When installing house piping refer to the National Fuel Gas Code, ANSI Z223.1/NFPA 54 except for the following modifications.

1. The Company does not accept wrought iron pipe, ductile iron pipe, copper pipe, copper tubing, brass pipe, brass tubing, aluminum pipe, or aluminum tubing.
2. The Company does not accept zinc coated or galvanized pipe or fittings.
3. Fittings used with steel pipe shall be steel, brass, bronze, or malleable iron.
4. Gland-type compression fittings must be restrained to prevent pull out.
5. The Company requires tracer wire to be a minimum of AWG 12.
6. The Company does not permit the use of a fuel gas for testing.
7. Unvented space heaters must be equipped with an oxygen depletion safety shut off device.
8. When converting BTU to cubic foot, The Company recommends using 1,000 BTU per cubic foot.