

DUKE ENERGY AND SUBSIDIARY COMPANIES**CUSTOMER PROCEDURE FOR INSTALLING HOUSE PIPING****AND EQUIPMENT****Duke Energy Gas & Electric Services**

For information regarding installation specifications.

Call (513) 651-0444
Toll Free 1-800-262-3000 Extension 3866

To Report Gas Trouble

Call (513) 651-4466
Toll Free 1-800-634-4300

For All Inspections and Meter Sets

All gas meter sets, applications, inspections, and to inquire on status of existing requests for these services, call Duke Energy Gas & Electric Services (513) 651-0444

Toll Free 1-800-262-3000 Extension 3866

For Locations of any Underground Utility

Call Before You Dig – Ohio 1-800-362-2764

Call Before You Dig – Kentucky 1-800-752-6007

Call Before You Dig – Indiana 1-800-382-5544

Call the Utilities Protection Service at least two (2) working days in advance.

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.

The *National Fuel Gas Code* ANSI Z223.1/NFPA54, is an integral part of this manual. This code covers gas piping from the outlet of the gas meter to the inlet of the gas appliance, including appliance installations. Company requirements replace NFPA when they differ.

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.). See Exhibit A.

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.

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.

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

Plastic piping shall in accordance with requirements for plastic customer service piping. See Section E of the Gas Installer's Manual and Exhibit B of this handout. 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 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 Exhibit C)

Where customer house piping is buried, Company requirements and specifications covering "customer service lines" shall apply, unless a specific exception is stated in this document. Buried metallic house piping shall be insulated and cathodically protected.

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 3 or larger (horizontal)	10	7/8 or 1	8
1 3 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 can not be maintained, the pipe shall be installed in conduit or bridged (shielded).

For corrosion protection on underground house piping, refer to the Company requirements and specifications covering customer service lines.

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. Refer to the table in section 4.3 of this document to determine the correct spacing of the supports.

5. HOUSE PIPING SHUTOFF VALVES

5.1 General

The Company will install a shutoff valve on the inlet piping to every meter installation. In some situations the customer is also required to install a meter outlet valve at the meter set. In those instances where the meter is not located at the building, a shutoff 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 shutoff 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 shutoff 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.

If the valve is in a finished basement or adjacent room, the valve shall be accessible through a door or open area and must be identified.

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

Shutoff valves supplied with gas log lighters are considered appliance valves and, therefore, require a separate approval shutoff 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 **Commercial 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 Exhibit D 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 above ground 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.

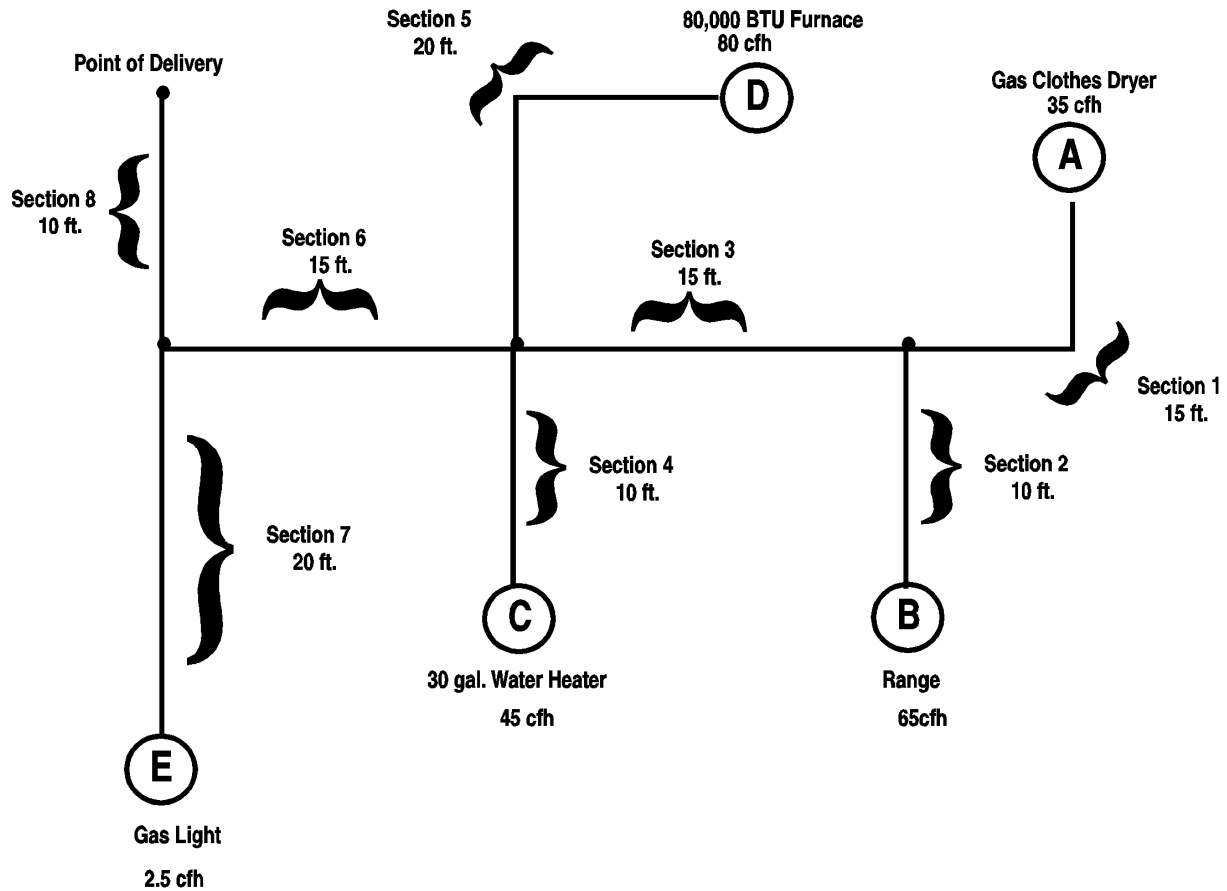
EXHIBIT A

Table A									
MAXIMUM CAPACITY OF PIPE IN CUBIC FEET OF GAS PER HOUR									
(Based on a Pressure Drop of 0.3 inch Water Column and 0.6 Specific Gravity Gas)									
Length (feet)	Nominal Iron Pipe Size, Inches (Internal Diameter, Inches)								
	1/2 (.622)	3/4 (.824)	1 (1.049)	1 1/4 (1.380)	1 1/2 (1.610)	2 (2.067)	2 1/2 (2.469)	3 (3.068)	4 (4.026)
10	90	195	400	950	1500	3000	5400	8500	17500
20	64	140	290	700	1100	2200	3900	6000	12000
30	53	118	240	560	900	1800	3200	5000	10000
40	45	100	210	500	790	1550	2800	4400	8800
50	40	90	185	450	700	1400	2500	3900	7900
60	37	83	170	400	650	1300	2300	3500	7200
70	35	76	160	370	600	1200	2100	3300	6600
80	33	72	150	350	560	1100	2000	3100	6300
90	30	68	140	340	540	1050	1900	2900	5900
100	29	65	130	310	500	1000	1800	2800	5500
125	26	58	120	290	460	900	1600	2500	5000
150	23	52	110	260	410	820	1500	2300	4600
175	22	49	100	240	390	760	1350	2150	4300
200	20	45	95	220	360	700	1250	1950	4000

Follow these steps to determine the sizing for gas house piping according to Table A

1. Lay out the piping system. You need this information:
 - C Length of pipe
 - C Gas demand of each appliance (determine in terms of cubic feet per hour for each piping system outlet)
2. Measure the length of piping from the point of delivery to the most remote outlet in the building.
3. Select the row on the table that matches the length determined in Step 2. If the exact length is not on the table, use the row showing the next longer length.
4. Use this row only to determine all the gas demand figures for this particular system of piping.
5. Begin with the most remote outlet and move to the column with the gas demand for that outlet. If the exact figure is not shown, choose the next larger figure in the same row.
6. The correct pipe size for that segment can be found at the top of that column.
7. Repeat the same steps for each outlet and each section of gas piping. Determine the total gas demand supplied by each section. You must use the total gas demand supplied by that section of pipe, including the total gas demand needed to supply appliances beyond that section.

EXHIBIT A EXAMPLE



In the piping system above, the total distance is 55 feet (distance from the Point of Delivery to the most remote appliance). Therefore, use the 60 ft. row on Table A to determine the pipe size. The table below indicates the correct pipe size for each section in this piping system:

Section	Demand (cfh)	Pipe Size (inches)
1	35	1/2
2	65	3/4
3	100	1
4	45	3/4
5	80	3/4
6	225	1 1/4
7	2.5	1/2
8	227.5	1 1/4

EXHIBIT B

TYPICAL UNDERGROUND PLASTIC HOUSE PIPING INSTALLATION
BY CUSTOMER 1" CTS, 1 1/4" IPS OR 2" IPS POLYETHYLENE

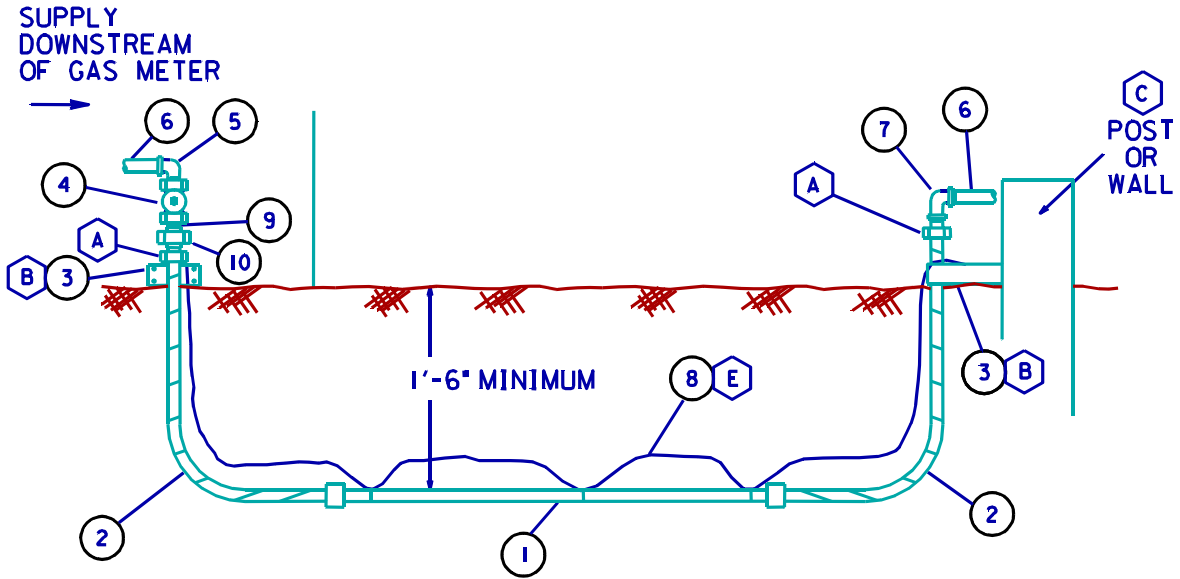


EXHIBIT B**TYPICAL UNDERGROUND PLASTIC HOUSE PIPING INSTALLATION
BY CUSTOMER 1" CTS, 1 ¼" AND 2" IPS POLYETHYLENE**

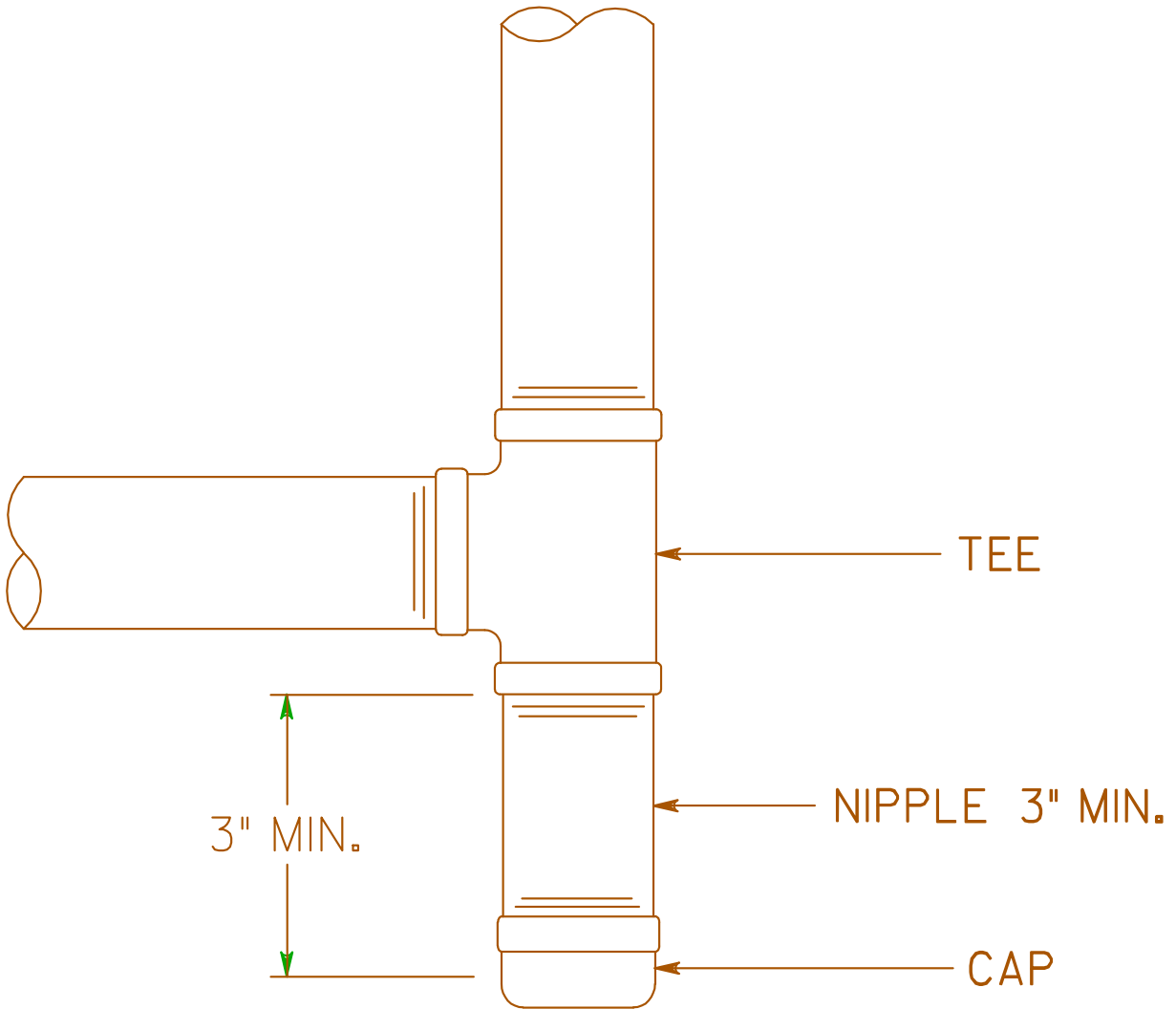
MATERIALS	
1.	Polyethylene Piping-One Continuous Length
2.	Flexible Riser Casing
3.	Riser Bracket
4.	Gas Stopcock
5.	Street Ell
6.	Nipple-Length as Required
7.	Plain Ell
8.	#12 AWG Tracer Wire
9.	Nipple
10.	Union

NOTES FOR SKETCH 10

- A. Riser bracket at grade line.
- B. Bracket can also be attached to a treated 4" X 4", or 6" X 6" post installed 24" below grade minimum.
- C. Coat all steel piping with rust resistant paint.
- D. Pressure test by Company.
- C. Tracer wire is to be taped to the plastic pipe at 6' intervals.
- F. Riser includes a blind end stab coupling. Do not attempt to make this connection. Company will connect the plastic pipe to the riser. Customer must provide riser. Pipe must be capped and extend above ground near riser bracket.

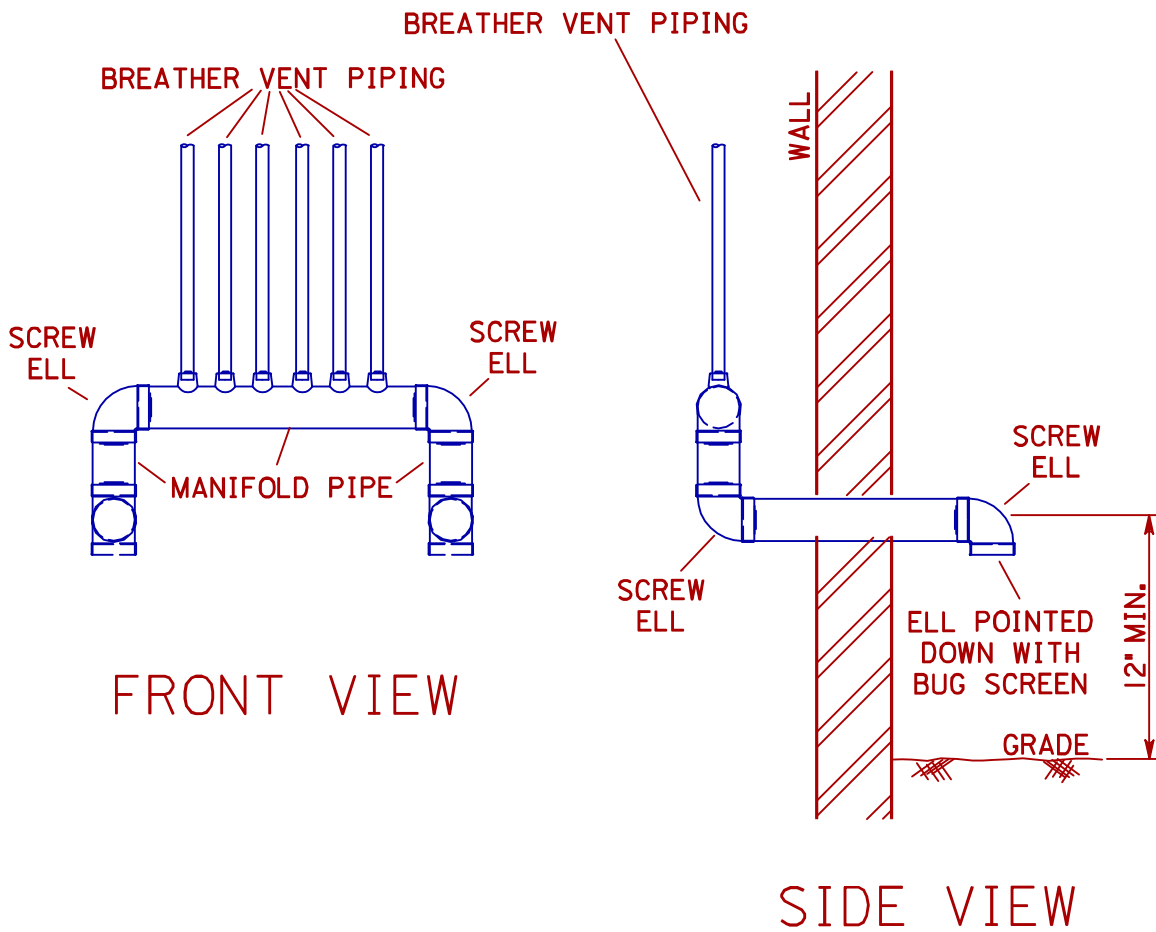
EXHIBIT C

SUGGESTED METHOD OF INSTALLING SEDIMENT TRAP



**EXHIBIT D
MANIFOLD VENTING**

**SUGGESTED METHOD OF INSTALLING
BREATHER VENT MANIFOLD**



NOTES FOR EXHIBIT D**MANIFOLD VENTING**

- A. Diaphragm breather vents may be connected to a common manifold for appliance regulators and pressure switches operating with an inlet pressure of 14" W.C. or less. All bleed valves, all pressure relief valves, and any component operating with an inlet pressure greater than 14" W.C. must be vented separately to the outside.
- B. Piping connecting a diaphragm case to the manifold shall be sized as if the vent were routed separately. The sizing procedure shall assume a pipe length measured from the diaphragm case through the manifold to the most distant opening to the outside.
- C. Breather vent piping shall connect to the top or the side of the manifold. Vent piping shall not be connected to the bottom of the manifold.
- D. The manifold pipe size shall be determined by adding the breather vent piping flow areas. The manifold shall have a flow area equal to or larger than the sum. For example: If the six breather vent connections shown in Exhibit D are ¾" schedule 40 piping having a flow area of 0.533 square inches each, the manifold shall have at least 3.20 square inches of flow area. A 2" schedule 40 manifold would be acceptable with a flow area of 3.35 square inches.
- E. Both ends of the manifold piping shall be vented to outside locations.
- F. Manifold piping shall slope downward at least 1/4 inch per foot to facilitate drainage to an outside location. Where this method of drainage is not practical, a one (1) inch minimum size drip shall be provided.
- G. Vents shall be designed to prevent the entry of water, insects, or other foreign material that could cause blockage. Vent openings should be inspected regularly for blockage.