

**CALIFORNIA PLUMBING CODE – MATRIX ADOPTION TABLE
CHAPTER 12 - FUEL GAS PIPING**

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user. See Chapter 1 for state agency authority and building application.)

Adopting Agency	BSC	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CA	SL	SLC
			1	2	1-AC	AC	SS	SS/CC	1	2	3	4							
Adopt Entire Chapter	X	X	X	X			X	X	X	X	X	X							
Adopt Entire Chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below																			
Chapter/Section																			
1210.18																			

READ ONLY

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CHAPTER 12

FUEL GAS PIPING

1201.0 Scope of Gas Piping.

1201.1 Coverage of Piping System. Coverage of piping systems shall extend from the point of delivery to the appliance connections. For other than undiluted liquefied petroleum gas systems, the point of delivery shall be the outlet of the service meter assembly or the outlet of the service regulator or service shutoff valve where no meter is provided. For undiluted liquefied petroleum gas systems, the point of delivery shall be considered the outlet of the final pressure regulator, exclusive of the line gas regulators where no meter is installed. Where a meter is installed, the point of delivery shall be the outlet of the meter. [NFPA 54-12:1.1.1.1(A)]

1201.2 Piping System Requirements. Piping systems requirements shall include design, materials, components, fabrications, assembly, installation, testing, inspection, operation, and maintenance. [NFPA 54:1.1.1.1(C)]

1201.3 Application. This code shall not apply to the following (reference standards for some of which appear in Chapter 14):

- (1) Portable LP-Gas appliances that are not connected to a fixed fuel piping system.
- (2) Installation of appliances such as brooders, dehydrators, dryers, and irrigation equipment used for agricultural purposes.
- (3) Raw material (feedstock) applications, except for piping to special atmosphere generators.
- (4) Oxygen-fuel gas cutting and welding systems.
- (5) Industrial gas applications using gases such as acetylene and acetylenic compounds, hydrogen, ammonia, carbon monoxide, oxygen, and nitrogen.
- (6) Petroleum refineries, pipeline compressor or pumping stations, loading terminals, compounding plants, refinery tank farms, and natural gas processing plants.
- (7) Large integrated chemical plants or portions of such plants where flammable or combustible liquids or gases are produced by chemical reactions or used in chemical reactions.
- (8) LP-Gas installations at utility gas plants.
- (9) Liquefied natural gas (LNG) installations.
- (10) Fuel gas piping in electric utility power plants.
- (11) Proprietary items of equipment, apparatus, or instruments such as gas-generating sets, compressors, and calorimeters.
- (12) LP-Gas appliances for vaporization, gas mixing, and gas manufacturing.
- (13) LP-Gas piping for buildings under construction or renovations that are not to become part of the permanent building piping system—that is, temporary fixed piping for building heat.
- (14) Installation of LP-Gas systems for railroad switch heating.

(15) Installation of LP-Gas and compressed natural gas systems on vehicles.

(16) Gas piping, meters, gas-pressure regulators, and other appurtenances used by the serving gas supplier in distribution of gas, other than undiluted LP-Gas. [NFPA 54-12:1.1.1.2]

1202.0 General.

1202.1 Installation. The regulations of this chapter shall govern the installation of fuel gas piping in or in connection with a building, structure or within the property lines of premises up to 5 pounds-force per square inch (34 kPa), other than service pipe. Fuel oil piping systems shall be installed in accordance with NFPA 31.

1203.0 Inspection.

1203.1 Inspection Notification. Upon completion of the installation, alteration, or repair of gas piping, and prior to the use thereof, the Authority Having Jurisdiction shall be notified that such gas piping is ready for inspection.

1203.2 Excavation. Excavations required for the installation of underground piping shall be kept open until such time as the piping has been inspected and approved. Where such piping is covered or concealed before such approval, it shall be exposed upon the direction of the Authority Having Jurisdiction.

1203.3 Type of Inspections. The Authority Having Jurisdiction shall make the following inspections and either shall approve that portion of the work as completed or shall notify the permit holder wherein the same fails to be in accordance with this code.

1203.3.1 Rough Piping Inspection. This inspection shall be made after gas piping authorized by the permit has been installed and before such piping has been covered or concealed or fixture or appliance has been attached thereto. This inspection shall include a determination that the gas piping size, material, and installation meet the requirements of this code.

1203.3.2 Final Piping Inspection. This inspection shall be made after piping authorized by the permit has been installed and after portions thereof that are to be covered or concealed are so concealed and before fixture, appliance, or shutoff valve has been attached thereto. This inspection shall comply with Section 1213.1. Test gauges used in conducting tests shall be in accordance with Section 318.0.

1203.4 Inspection Waived. In cases where the work authorized by the permit consists of a minor installation of additional piping to piping already connected to a gas meter, the foregoing inspections shall be permitted to be waived at the discretion of the Authority Having Jurisdiction. In this event, the Authority Having Jurisdiction shall make such inspection

as deemed advisable in order to be assured that the work has been performed in accordance with the intent of this code.

1204.0 Certificate of Inspection.

1204.1 Issuance. Where upon final piping inspection, the installation is found to be in accordance with the provisions of this code, a certificate of inspection shall be permitted to be issued by the Authority Having Jurisdiction.

1204.2 Gas Supplier. A copy of the certificate of such final piping inspection shall be issued to the serving gas supplier supplying gas to the premises.

1204.3 Unlawful. It shall be unlawful for a serving gas supplier, or person furnishing gas, to turn on or cause to be turned on, a fuel gas or a gas meter or meters, until such certificate of final inspection, as herein provided, has been issued.

1205.0 Authority to Render Gas Service.

1205.1 Authorized Personnel. It shall be unlawful for a person, firm, or corporation, excepting an authorized agent or employee of a person, firm, or corporation engaged in the business of furnishing or supplying gas and whose service pipes supply or connect with the particular premises, to turn on or reconnect gas service in or on a premises where and when gas service is, at the time, not being rendered.

1205.2 Outlets. It shall be unlawful to turn on or connect gas in or on the premises unless outlets are securely connected to gas appliances or capped or plugged with screw joint fittings.

1206.0 Authority to Disconnect.

1206.1 Disconnection. The Authority Having Jurisdiction or the serving gas supplier is hereby authorized to disconnect gas piping or appliance or both that shall be found not to be in accordance with the requirements of this code or that are found defective and in such condition as to endanger life or property.

1206.2 Notice. Where such disconnection has been made, a notice shall be attached to such gas piping or appliance or both that shall state the same has been disconnected, together with the reasons thereof.

1206.3 Capped Outlets. It shall be unlawful to remove or disconnect gas piping or gas appliance without capping or plugging with a screw joint fitting, the outlet from which said pipe or appliance was removed. Outlets to which gas appliances are not connected shall be left capped, gastight on a piping system that has been installed, altered, or repaired.

Exception: Where an approved listed quick-disconnect device is used.

1207.0 Temporary Use of Gas.

1207.1 General. Where temporary use of gas is desired and the Authority Having Jurisdiction deems the use necessary, a permit shall be permitted to be issued for such use for a period of time not to exceed that designated by the Authority Having Jurisdiction, provided that such gas piping system

otherwise is in accordance with the requirements of this code regarding material, sizing, and safety.

1208.0 Gas Piping System Design, Materials, and Components.

1208.1 Installation of Piping System. Where required by the Authority Having Jurisdiction, a piping sketch or plan shall be prepared before proceeding with the installation. This plan shall show the proposed location of piping, the size of different branches, the various load demands, and the location of the point of delivery. [NFPA 54:5.1.1]

1208.1.1 Addition to Existing System. Where additional appliances are being connected to a gas piping system, the existing piping shall be checked to determine whether it has adequate capacity. Where inadequate, the existing system shall be enlarged as required, or separate gas piping of approved capacity shall be provided. [NFPA 54:5.1.2]

1208.2 Provision for Location of Point of Delivery. The location of the point of delivery shall be acceptable to the serving gas supplier. [NFPA 54:5.2]

1208.3 Interconnections Between Gas Piping Systems.

1208.3.1 Interconnections Supplying Separate Users. Where two or more meters, or two or more service regulators where meters are not provided, are located on the same premises and supply separate users, the gas piping systems shall not be interconnected on the outlet side of the meters or service regulators. [NFPA 54:5.3.1]

1208.3.2 Interconnections for Standby Fuels. Where a supplementary gas for standby use is connected downstream from a meter or a service regulator where a meter is not provided, a device to prevent backflow shall be installed. A three-way valve installed to admit the standby supply, and at the same time shut off the regular supply, shall be permitted to be used for this purpose. [NFPA 54:5.3.2]

1208.4 Sizing of Gas Piping Systems. Gas piping systems shall be of such size and so installed as to provide a supply of gas to meet the maximum demand and supply gas to each appliance inlet at not less than the minimum supply pressure required by the appliance. [NFPA 54:5.4.1]

1208.4.1 Maximum Gas Demand. The volumetric flow rate of gas to be provided (in cubic feet per hour) shall be calculated using the manufacturer's input ratings of the appliance served, adjusted for altitude. Where the input rating is not indicated, the gas supplier, appliance manufacturer, or a qualified agency shall be contacted or the rating from Table 1208.4.1 shall be used for estimating the volumetric flow rate of gas to be supplied.

The total connected hourly load shall be used as the basis for piping sizing, assuming the appliances are operating at full capacity simultaneously.

Exception: Sizing shall be permitted to be based upon established load diversity factors. [NFPA 54-12:5.4.2]

1208.4.2 Sizing Methods. Gas piping shall be sized in accordance with one of the following:

**TABLE 1208.4.1
APPROXIMATE GAS INPUT FOR
TYPICAL APPLIANCES
[NFPA 54: TABLE 5.4.2.1]**

APPLIANCE	INPUT (Btu/h approx.)
Space Heating Units	
Warm air furnace	
Single family	100 000
Multifamily, per unit	60 000
Hydronic boiler	
Single family	100 000
Multifamily, per unit	60 000
Space and Water Heating Units	
Hydronic boiler	
Single family	120 000
Multifamily, per unit	75 000
Water Heating Appliances	
Water heater, automatic storage 30 to 40 gallon tank	35 000
Water heater, automatic storage 50 gallon tank	50 000
Water heater, automatic instantaneous	
Capacity at 2 gallons per minute	142 800
Capacity at 4 gallons per minute	285 000
Capacity at 6 gallons per minute	428 400
Water heater, domestic, circulating or side-arm	35 000
Cooking Appliances	
Range, freestanding, domestic	65 000
Built-in oven or broiler unit, domestic	25 000
Built-in top unit, domestic	40 000
Other Appliances	
Refrigerator	3000
Clothes dryer, Type 1 (domestic)	35 000
Gas fireplace direct vent	40 000
Gas log	80 000
Barbecue	40 000
Gaslight	2500

For SI units: 1000 British thermal units per hour = 0.293 kW

- (1) Pipe sizing tables or sizing equations in this chapter.
- (2) Other approved engineering methods acceptable to the Authority Having Jurisdiction.
- (3) Sizing tables included in a listed piping system manufacturer's instructions. [NFPA 54:5.4.3]

1208.4.3 Allowable Pressure Drop. The design pressure loss in a piping system under maximum probable flow conditions, from the point of delivery to the inlet connection of the appliance, shall be such that the supply

pressure at the appliance is greater than or equal to the minimum pressure required by the appliance. [NFPA 54:5.4.4]

1208.5 Acceptable Piping Materials and Joining Methods.

Materials used for piping systems shall be in accordance with the requirements of this chapter or shall be acceptable to the Authority Having Jurisdiction. [NFPA 54:5.6.1.1]

1208.5.1 Materials. Pipe, fittings, valves, or other materials shall not be used again unless they are free of foreign materials and have been ascertained to be approved for the service intended. [NFPA 54:5.6.1.2]

1208.5.1.1 Other Materials. Material not covered by the standards specifications listed herein shall be investigated and tested to determine that it is safe for the proposed service and, in addition, shall be recommended for that service by the manufacturer and shall be acceptable to the Authority Having Jurisdiction. [NFPA 54:5.6.1.3]

1208.5.2 Metallic Pipe.

1208.5.2.1 Cast-Iron. Cast-iron pipe shall not be used. [NFPA 54:5.6.2.1]

1208.5.2.2 Steel and Wrought-Iron. Steel and wrought-iron pipe shall be not less than standard weight (Schedule 40) and shall comply with one of the following standards:

- (1) ASME B36.10
- (2) ASTM A 53
- (3) ASTM A 106 [NFPA 54:5.6.2.2]

1208.5.2.3 Copper and Brass. Copper and brass pipe shall not be used where the gas contains more than an average of 0.3 grains of hydrogen sulfide per 100 standard cubic feet (scf) of gas (0.7 mg/100 L). [NFPA 54:5.6.2.3]

Threaded copper, brass, or aluminum alloy pipe shall not be used with gases corrosive to such material. [NFPA 54:5.6.2.4]

1208.5.2.4 Aluminum Alloy. Aluminum alloy pipe shall comply with ASTM B 241 (except that the use of alloy 5456 is prohibited) and shall be marked at each end of each length indicating compliance. Aluminum alloy pipe shall be coated to protect against external corrosion where it is in contact with masonry, plaster, insulation or is subject to repeated wettings by such liquids as water, detergents, or sewage. [NFPA 54:5.6.2.5]

Aluminum alloy pipe shall not be used in exterior locations or underground. [NFPA 54:5.6.2.6]

1208.5.3 Metallic Tubing. Seamless copper, aluminum alloy, or steel tubing shall not be used with gases corrosive to such material. [NFPA 54:5.6.3]

1208.5.3.1 Steel. Steel tubing shall comply with ASTM A 254. [NFPA 54:5.6.3.1]

1208.5.3.2 Copper and Brass. Copper and brass tubing shall not be used where the gas contains more

than an average of 0.3 grains of hydrogen sulfide per 100 scf of gas (0.7 mg/100 L). Copper tubing shall comply with standard Type K or L of ASTM B 88 or ASTM B 280. [NFPA 54:5.6.3.2]

1208.5.3.3 Aluminum Alloy. Aluminum alloy tubing shall comply with ASTM B 210 or ASTM B 241. Aluminum alloy tubing shall be coated to protect against external corrosion where it is in contact with masonry, plaster, insulation, or is subject to repeated wettings by such liquids as water, detergent, or sewage. Aluminum alloy tubing shall not be used in exterior locations or underground. [NFPA 54:5.6.3.3]

1208.5.3.4 Corrugated Stainless Steel. Corrugated stainless steel tubing shall be tested and listed in accordance with the construction, installation, and performance requirements of CSA LC-1. [NFPA 54:5.6.3.4]

1208.5.4 Plastic Pipe, Tubing, and Fittings. Polyethylene plastic pipe, tubing, and fittings used to supply fuel gas shall be in accordance with ASTM D 2513. Pipe to be used shall be marked "gas" and "ASTM D 2513." [NFPA 54-12:5.6.4.1.1]

1208.5.4.1 Regulator Vent Piping. Plastic pipe and fittings used to connect regulator vents to remote vent terminations shall be PVC in accordance with UL 651. PVC vent piping shall not be installed indoors. [NFPA 54-12:5.6.4.2]

1208.5.4.2 Anodeless Risers. Anodeless risers shall comply with Section 1208.5.4.2(A) through Section 1208.5.4.2(C). [NFPA 54:5.6.4.3]

1208.5.4.2(A) Factory-Assembled Anodeless Risers. Factory-assembled anodeless risers shall be recommended by the manufacturer for the gas used and shall be leak-tested by the manufacturer in accordance with written procedures. [NFPA 54:5.6.4.3(1)]

1208.5.4.2(B) Service Head Adapters and Field-Assembled Anodeless Risers. Service head adapters and field-assembled anodeless risers incorporating service head adapters shall be recommended by the manufacturer for the gas used and shall be design-certified to be in accordance with the requirements of Category I of ASTM D 2513. The manufacturer shall provide the user qualified installation instructions. [NFPA 54:5.6.4.3(2)]

1208.5.4.2(C) Undiluted Liquefied Petroleum Gas Piping. The use of plastic pipe, tubing, and fittings in undiluted liquefied petroleum gas piping systems shall be in accordance with NFPA 58. [NFPA 54:5.6.4.3(3)]

1208.5.5 Workmanship and Defects. Gas pipe, tubing, and fittings shall be clear and free from cutting burrs and defects in structure or threading, and shall be thoroughly brushed and chip and scale blown. Defects in pipe, tubing, and fittings shall not be repaired. Defective pipe, tubing, and fittings shall be replaced. [NFPA 54:5.6.5]

1208.5.6 Protective Coating. Where in contact with material or atmosphere exerting a corrosive action, metallic piping and fittings coated with a corrosion-resistant material shall be used. External or internal coatings or linings used on piping or components shall not be considered as adding strength. [NFPA 54:5.6.6]

1208.5.7 Metallic Pipe Threads. Metallic pipe and fitting threads shall be taper pipe threads and shall comply with ASME B1.20.1. [NFPA 54:5.6.7.1]

1208.5.7.1 Damaged Threads. Pipe with threads that are stripped, chipped, corroded, or otherwise damaged shall not be used. Where a weld opens during the operation of cutting or threading, that portion of the pipe shall not be used. [NFPA 54:5.6.7.2]

1208.5.7.2 Number of Threads. Field threading of metallic pipe shall be in accordance with Table 1208.5.7.2. [NFPA 54:5.6.7.3]

**TABLE 1208.5.7.2
SPECIFICATIONS FOR THREADING METALLIC PIPE
[NFPA 54: TABLE 5.6.7.3]**

IRON PIPE SIZE (inches)	APPROXIMATE LENGTH OF THREADED PORTION (inches)	APPROXIMATE NUMBER OF THREADS TO BE CUT
1/2	3/4	10
3/4	3/4	10
1	7/8	10
1 1/4	1	11
1 1/2	1	11
2	1	11
2 1/2	1 1/2	12
3	1 1/2	12
4	1 5/8	13

For SI units: 1 inch = 25.4 mm

1208.5.7.3 Thread Joint Compounds. Thread joint compounds shall be resistant to the action of liquefied petroleum gas or to other chemical constituents of the gases to be conducted through the piping. [NFPA 54-12:5.6.7.4]

1208.5.8 Metallic Piping Joints and Fittings. The type of piping joint used shall be approved for the pressure-temperature conditions and shall be selected giving consideration to joint tightness and mechanical strength under the service conditions. The joint shall be able to sustain the maximum end force due to the internal pressure and additional forces due to temperature expansion or contraction, vibration, fatigue, or to the weight of the pipe and its contents. [NFPA 54:5.6.8]

1208.5.8.1 Pipe Joints. Pipe joints shall be threaded, flanged, brazed, or welded. Where nonferrous pipe is brazed, the brazing materials shall have a melting point in excess of 1000°F (538°C). Brazing alloys

shall not contain more than 0.05 percent phosphorus. [NFPA 54:5.6.8.1]

1208.5.8.2 Tubing Joints. Tubing joints shall either be made with approved gas tubing fittings, be brazed with a material having a melting point in excess of 1000°F (538°C), or made by press-connect fittings in accordance with CSA LC-4. Brazing alloys shall not contain more than 0.05 percent phosphorus. [NFPA 54:5.6.8.2]

1208.5.8.3 Flared Joints. Flared joints shall be used in systems constructed from nonferrous pipe and tubing where experience or tests have demonstrated that the joint is approved for the conditions and where provisions are made in the design to prevent separation of the joints. [NFPA 54:5.6.8.3]

1208.5.8.4 Metallic Pipe Fittings (Including Valves, Strainers, Filters). Metallic pipe fittings shall comply with the following:

- (1) Threaded fittings in sizes exceeding 4 inches (100 mm) shall not be used unless acceptable to the Authority Having Jurisdiction.
- (2) Fittings used with steel or wrought-iron pipe shall be steel, brass, bronze, malleable iron, or cast-iron.
- (3) Fittings used with copper or brass pipe shall be copper, brass, or bronze.
- (4) Fittings used with aluminum alloy pipe shall be of aluminum alloy.
- (5) Cast-iron fittings.
 - (a) Flanges shall be permitted.
 - (b) Bushings shall not be used.
 - (c) Fittings shall not be used in systems containing flammable gas-air mixtures.
 - (d) Fittings in sizes 4 inches (100 mm) and larger shall not be used indoors unless approved by the Authority Having Jurisdiction.
 - (e) Fittings in sizes 6 inches (150 mm) and larger shall not be used unless approved by the Authority Having Jurisdiction.
- (6) Aluminum alloy fitting threads shall not form the joint seal.
- (7) Zinc-aluminum alloy fittings shall not be used in systems containing flammable gas-air mixtures.
- (8) Special fittings such as couplings; proprietary-type joints; saddle tees; gland-type compression fittings; and flared, flareless, or compression-type tubing fittings shall be:
 - (a) Used within the fitting manufacturer's pressure-temperature recommendations.
 - (b) Used within the service conditions anticipated with respect to vibration, fatigue, thermal expansion, or contraction.

(c) Installed or braced to prevent separation of the joint by gas pressure or external physical damage.

(d) Acceptable to the Authority Having Jurisdiction. [NFPA 54:5.6.8.4]

1208.5.9 Plastic Piping, Joints, and Fittings. Plastic pipe, tubing, and fittings shall be installed in accordance with the manufacturer's installation instructions. Section 1208.5.9.1 through Section 1208.5.9.4 shall be observed where making such joints. [NFPA 54:5.6.9]

1208.5.9.1 Joint Design. The joint shall be designed and installed so that the longitudinal pullout resistance of the joint shall be equal to the tensile strength of the plastic piping material. [NFPA 54:5.6.9(1)]

1208.5.9.2 Heat-Fusion Joint. Heat-fusion joints shall be made in accordance with AWS B2.4. Joints shall be made with the joining method recommended by the pipe manufacturer. Heat-fusion fittings shall be marked "ASTM D 2513." [NFPA 54:5.6.9(2)]

1208.5.9.3 Compression-Type Mechanical Joints. Where compression-type mechanical joints are used, the gasket material in the fitting shall be compatible with the plastic piping and with the gas distributed by the system. An internal tubular rigid stiffener shall be used in conjunction with the fitting. The stiffener shall be flush with the end of the pipe or tubing, shall extend not less than the outside end of the pipe or tubing, and shall extend not less than to the outside end of the compression fitting where installed. The stiffener shall be free of rough or sharp edges and shall not be a forced fit in the plastic. Split tubular stiffeners shall not be used. [NFPA 54:5.6.9(3)]

1208.5.9.4 Liquefied Petroleum Gas Piping Systems. Plastic piping joints and fittings for use in liquefied petroleum gas piping systems shall be in accordance with NFPA 58. [NFPA 54:5.6.9(4)]

1208.5.10 Flanges. Flanges shall comply with ASME B16.1, ASME B16.20, or MSS SP-6. The pressure-temperature ratings shall equal or exceed that required by the application. [NFPA 54:5.6.10]

1208.5.10.1 Flange Facings. Standard facings shall be permitted for use under this code. Where 150 psi (1034 kPa) steel flanges are bolted to Class 125 cast-iron flanges, the raised face on the steel flange shall be removed. [NFPA 54:5.6.10.1]

1208.5.10.2 Lapped Flanges. Lapped flanges shall be used aboveground or in exposed locations accessible for inspection. [NFPA 54:5.6.10.2]

1208.5.11 Flange Gaskets. The material for gaskets shall be capable of withstanding the design temperature and pressure of the piping system and the chemical constituents of the gas being conducted without change to its chemical and physical properties. The effects of fire exposure to the joint shall be considered in choosing the material. [NFPA 54:5.6.11] Flange gaskets shall comply with the following requirements:

- (1) Acceptable materials include the following:
 - (a) Metal (plain or corrugated)
 - (b) Composition
 - (c) Aluminum "O" rings and spiral-wound metal gaskets [NFPA 54-12:5.6.11.1]
- (2) Where a flanged joint is opened, the gasket shall be replaced. [NFPA 54:5.6.11.2]
- (3) Full-face gaskets shall be used with bronze and cast-iron flanges. [NFPA 54:5.6.11.3]

1208.6 Gas Meters. Gas meters shall be selected for the maximum expected pressure and permissible pressure drop. [NFPA 54:5.7.1]

1208.6.1 Location. Gas meters shall be located in ventilated spaces readily accessible for examination, reading, replacement, or necessary maintenance. [NFPA 54:5.7.2.1]

1208.6.1.1 Subject to Damage. Gas meters shall not be placed where they will be subjected to damage, such as adjacent to a driveway; under a fire escape; in public passages, halls, or coal bins; or where they will be subject to excessive corrosion or vibration. [NFPA 54:5.7.2.2]

1208.6.1.2 Extreme Temperatures. Gas meters shall not be located where they will be subjected to extreme temperatures or sudden extreme changes in temperature. Meters shall not be located in areas where they are subjected to temperatures beyond those recommended by the manufacturer. [NFPA 54:5.7.2.3]

1208.6.2 Supports. Gas meters shall be supported or connected to rigid piping so as not to exert a strain on the meters. Where flexible connectors are used to connect a gas meter to downstream piping at mobile homes in mobile home parks, the meter shall be supported by a post or bracket placed in a firm footing or by other means providing equivalent support. [NFPA 54:5.7.3]

1208.6.3 Meter Protection. Meters shall be protected against overpressure, backpressure, and vacuum. [NFPA 54-12:5.7.4]

1208.6.4 Identification. Gas piping at multiple meter installations shall be marked by a metal tag or other permanent means attached by the installing agency, designating the building or the part of the building being supplied. [NFPA 54:5.7.5]

1208.7 Gas Pressure Regulators. A line gas pressure regulator shall be installed where the gas supply pressure exceeds that at which the appliance is designed to operate or varies beyond design pressure limits. [NFPA 54-12:5.8.1]

1208.7.1 Overpressure Protection. Where the gas supply design pressure in piping systems located indoors exceeds 2 psi (14 kPa) and line pressure regulators are installed to reduce the supply pressure to 14 inches water column (3.5 kPa) or less, the following shall apply:

- (1) Regulators shall be provided with factory installed overpressure protection devices.

- (2) Overpressure protection devices shall limit the pressure downstream of the line pressure regulator to 2 psi (14 kPa) in the event of failure of the line pressure regulator. [NFPA 54-12:5.8.3]

1208.7.2 Listing. Line gas pressure regulators shall be listed in accordance with CSA Z21.80. [NFPA 54:5.8.2]

1208.7.3 Location. The gas pressure regulator shall be accessible for servicing. [NFPA 54:5.8.3]

1208.7.4 Regulator Protection. Pressure regulators shall be protected against physical damage. [NFPA 54:5.8.4]

1208.7.5 Venting.

1208.7.5.1 Line Gas Pressure Regulators. Line gas pressure regulators shall be installed in accordance with the following requirements:

- (1) An independent vent to the exterior of the building, sized in accordance with the regulator manufacturer's instructions, shall be provided where the location of a regulator is such that a ruptured diaphragm will cause a hazard. Where more than one regulator is at a location, each regulator shall have a separate vent to the outdoors, or where approved by the Authority Having Jurisdiction, the vent lines shall be permitted to be manifolded in accordance with accepted engineering practices to minimize backpressure in the event of diaphragm failure. Materials for vent piping shall comply with Section 1208.5.

Exception: A regulator and vent limiting means combination listed in accordance with CSA Z21.80 shall be permitted to be used without a vent to the outdoors.

- (2) The vent shall be designed to prevent the entry of water, insects, or other foreign materials that will cause blockage.
- (3) The regulator vent shall terminate not less than 3 feet (914 mm) from a source of ignition.
- (4) At locations where regulators will be submerged during floods, a special antiflood-type breather vent fitting shall be installed, or the vent line shall be extended above the height of the expected flood waters.
- (5) A regulator shall not be vented to the appliance flue or exhaust system. [NFPA 54:5.8.5.1]

1208.7.5.2 Venting of Gas Appliance Pressure Regulators. Venting of gas appliance pressure regulators shall be in accordance with the following requirements:

- (1) Appliance pressure regulators requiring access to the atmosphere for successful operation shall be equipped with vent piping leading outdoors or, where the regulator vent is an integral part of the appliance, into the combustion chamber adjacent to a continuous pilot, unless constructed or equipped with a vent-limiting means to limit the escape of gas from the vent opening in the event of diaphragm failure.

- (2) Vent limiting means shall be employed on listed appliance pressure regulators.
- (3) In the case of vents leading outdoors, means shall be employed to prevent water from entering this piping and also to prevent blockage of vents by insects and foreign matter.
- (4) Under no circumstances shall a regulator be vented to the appliance flue or exhaust system.
- (5) In the case of vents entering the combustion chamber, the vent shall be located so the escaping gas will be readily ignited by the pilot and the heat liberated thereby will not adversely affect the normal operation of the safety shutoff system. The terminus of the vent shall be securely held in a fixed position relative to the pilot. For manufactured gas, the need for a flame arrester in the vent piping shall be determined.
- (6) Vent lines from a gas appliance pressure regulator and bleed lines from a diaphragm-type valve shall not be connected to a common manifold terminating in a combustion chamber. Vent lines shall not terminate in positive-pressure-type combustion chambers. [NFPA 54:9.1.19]

1208.7.5.3 Discharge of Vents. The discharge of vents shall be in accordance with the following requirements:

- (1) The discharge stacks, vents, or outlet parts of pressure-relieving and pressure-limiting devices shall be located so that gas is safely discharged into the outdoors.
- (2) Discharge stacks or vents shall be designed to prevent the entry of water, insects, or other foreign material that could cause blockage. The discharge stack or vent line shall be not less than the same size as the outlet of the pressure-relieving device. [NFPA 54:5.9.7]

1208.7.6 Bypass Piping. Valved and regulated bypasses shall be permitted to be placed around gas line pressure regulators where continuity of service is imperative. [NFPA 54:5.8.6]

1208.7.7 Identification. Line pressure regulators at multiple regulator installations shall be marked by a metal tag or other permanent means designating the building or the part of the building being supplied. [NFPA 54:5.8.7]

1208.8 Backpressure Protection. Protective devices shall be installed as close to the appliance as practical where the design of the appliance connected is such that air, oxygen, or standby gases are capable of being forced into the gas supply system. Gas and air combustion mixers incorporating double diaphragm "zero" or "atmosphere" governors or regulators shall require no further protection unless connected directly to compressed air or oxygen at pressures of 5 psi (34 kPa) or more. [NFPA 54:5.10.1]

1208.8.1 Protective Devices. Protective devices shall include, but not be limited to the following:

- (1) Check valves.
- (2) Three-way valves (of the type that completely closes one side before starting to open the other side).
- (3) Reverse flow indicators controlling positive shutoff valves.
- (4) Normally closed air-actuated positive shutoff pressure regulators. [NFPA 54:5.10.2]

1208.9 Low-Pressure Protection. A protective device shall be installed between the meter and the appliance or equipment where the operation of the appliance or equipment is such that it is capable of producing a vacuum or a dangerous reduction in gas pressure at the meter. Such protective devices include, but are not limited to, mechanical, diaphragm-operated, or electrically operated low-pressure shutoff valves. [NFPA 54-12:5.11]

1208.10 Shutoff Valves. Shutoff valves shall be approved and shall be selected giving consideration to pressure drop, service involved, emergency use, and reliability of operation. Shutoff valves of size 1 inch (25 mm) National Pipe Thread and smaller shall be listed. [NFPA 54:5.12]

1208.11 Expansion and Flexibility. Piping systems shall be designed to prevent failure from thermal expansion or contraction. [NFPA 54-12:5.14.1]

1208.11.1 Special Local Conditions. Where local conditions include earthquake, tornado, unstable ground, or flood hazards, special consideration shall be given to increased strength and flexibility of piping supports and connections. [NFPA 54:5.14.2]

1209.0 Excess Flow Valve.

1209.1 General. Where automatic excess flow valves are installed, they shall be listed, sized, and installed in accordance with the manufacturer's installation instructions. [NFPA 54:5.13]

1210.0 Gas Piping Installation.

1210.1 Piping Underground. Underground gas piping shall be installed with approved clearance from other underground structures to avoid contact therewith, to allow maintenance, and to protect against damage from proximity to other structures. In addition, underground plastic piping shall be installed with approved clearance or shall be insulated from sources of heat so as to prevent the heat from impairing the serviceability of the pipe. [NFPA 54:7.1.1]

1210.1.1 Cover Requirements. Underground piping systems shall be installed with a cover not less than 18 inches (457 mm). Where external damage to the pipe is not likely to result, the cover shall be not less than 12 inches (305 mm). Where a cover not less than 12 inches (305 mm) cannot be provided, the pipe shall be installed in conduit or bridged (shielded). [NFPA 54:7.1.2.1]

1210.1.2 Trenches. The trench shall be graded so that the pipe has a firm, substantially continuous bearing on the bottom of the trench. [NFPA 54:7.1.2.2]

1210.1.2.1 Backfilling. Where flooding of the trench is done to consolidate the backfill, care shall

be exercised to see that the pipe is not floated from its firm bearing on the trench bottom. [NFPA 54:7.1.2.3]

1210.1.3 Protection Against Corrosion. Gas piping in contact with earth or other material that is capable of corroding the piping shall be protected against corrosion in an approved manner. Where dissimilar metals are joined underground, an insulating coupling or fitting shall be used. Piping shall not be laid in contact with cinders. Uncoated threaded or socket-welded joints shall not be used in piping in contact with soil or where internal or external crevice corrosion is known to occur. [NFPA 54:7.1.3]

1210.1.4 Protection Against Freezing. Where the formation of hydrates or ice is known to occur, piping shall be protected against freezing. [NFPA 54:7.1.4]

1210.1.5 Piping Through Foundation Wall. Underground piping installed through the outer foundation or basement wall of a building shall be encased in a protective sleeve or protected by an approved device or method. The space between the gas piping and the sleeve and between the sleeve and the wall shall be sealed to prevent entry of gas and water. [NFPA 54-12:7.1.5]

1210.1.6 Piping Underground Beneath Buildings. Where gas piping is installed underground beneath buildings, the piping shall be either:

- (1) Encased in an approved conduit designed to withstand the imposed loads and installed in accordance with Section 1210.1.6.1 or Section 1210.1.6.2.
- (2) A piping or encasement system listed for installation beneath buildings. [NFPA 54-12:7.1.6]

1210.1.6.1 Conduit with One End Terminating Outdoors. The conduit shall extend into a normally usable and accessible portion of the building and, at the point where the conduit terminates in the building, the space between the conduit and the gas piping shall be sealed to prevent the possible entrance of a gas leakage. Where the end sealing is of a type that will retain the full pressure of the pipe, the conduit shall be designed for the same pressure as the pipe. The conduit shall extend not less than 4 inches (102 mm) outside the building, be vented outdoors above finished ground level, and be installed so as to prevent the entrance of water and insects. [NFPA 54:7.1.6.1]

1210.1.6.2 Conduit with Both Ends Terminating Indoors. Where the conduit originates and terminates within the same building, the conduit shall originate and terminate in an accessible portion of the building and shall not be sealed. [NFPA 54:7.1.6.2]

1210.1.7 Plastic Piping. Plastic piping shall be installed outdoors, underground only.

Exceptions:

- (1) Plastic piping shall be permitted to terminate above-ground where an anodeless riser is used.

- (2) Plastic piping shall be permitted to terminate with a wall head adapter aboveground in buildings, including basements, where the plastic piping is inserted in a piping material permitted for use in buildings. [NFPA 54-12:7.1.7.1]

1210.1.7.1 Connections Between Metallic and Plastic Piping. Connections made between metallic and plastic piping shall be made with fittings that are in accordance with one of the following:

- (1) ASTM D 2513
- (2) ASTM F 1973
- (3) ASTM F 2509 [NFPA 54:7.1.7.2]

1210.1.7.2 Tracer Wire. An electrically continuous corrosion-resistant tracer wire (not less than AWG 14) or tape shall be buried with the plastic pipe to facilitate locating. One end shall be brought above-ground at a building wall or riser. [NFPA 54:7.1.7.3]

1210.2 Installation of Piping. Piping installed aboveground shall be securely supported and located where it will be protected from physical damage. Where passing through an exterior wall, the piping shall be protected against corrosion by coating or wrapping with an inert material approved for such applications. The piping shall be sealed around its circumference at the point of the exterior penetration to prevent the entry of water, insects, and rodents. Where piping is encased in a protective pipe sleeve, the annular spaces between the gas piping and the sleeve and between the sleeve and the wall opening shall be sealed. [NFPA 54-12:7.2.1]

1210.2.1 Building Structure. The installation of gas piping shall not cause structural stresses within building components to exceed allowable design limits. Approval shall be obtained before beams or joists are cut or notched. [NFPA 54:7.2.2]

Permission shall be obtained from the Authority Having Jurisdiction.

1210.2.2 Gas Piping to be Sloped. Piping for other than dry gas conditions shall be sloped not less than 1/4 inch in 15 feet (1.4 mm/m) to prevent traps. [NFPA 54:7.2.4]

1210.2.2.1 Ceiling Locations. Gas piping shall be permitted to be installed in accessible spaces between a fixed ceiling and a dropped ceiling, whether or not such spaces are used as a plenum. Valves shall not be located in such spaces.

Exception: Appliance shutoff valves required by this code shall be permitted to be installed in accessible spaces containing vented appliances.

1210.2.3 Prohibited Locations. Gas piping inside a building shall not be installed in or through a clothes chute, chimney or gas vent, dumbwaiter, elevator shaft, or air duct, other than combustion air ducts. [NFPA 54:7.2.5]

Exception: Ducts used to provide ventilation air in accordance with Section 506.0 or to above-ceiling spaces in accordance with Section 1210.2.2.1.

1210.2.4 Hangers, Supports, and Anchors. Piping shall be supported with metal pipe hooks, metal pipe straps, metal bands, metal brackets, metal hangers, or building structural components; approved for the size of piping; of adequate strength and quality; and located at intervals so as to prevent or damp out excessive vibration. Piping shall be anchored to prevent undue strains on connected appliances and equipment and shall not be supported by other piping. Pipe hangers and supports shall comply with the requirements of MSS SP-58. [NFPA 54:7.2.6.1]

1210.2.4.1 Spacing. Spacing of supports in gas piping installations shall not exceed the distance shown in Table 1210.2.4.1. Spacing of supports for CSST shall be in accordance with the CSST manufacturer's instructions. [NFPA 54:7.2.6.2]

**TABLE 1210.2.4.1
SUPPORT OF PIPING
[NFPA 54: TABLE 7.2.6.2]**

STEEL PIPE, NOMINAL SIZE OF PIPE (inches)	SPACING OF SUPPORTS (feet)	NOMINAL SIZE OF TUBING SMOOTH-WALL (inches O.D.)	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 (horizontal)	8
1 1/4 or larger (vertical)	Every floor level	1 or larger (vertical)	Every floor level

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm

1210.2.4.2 Expansion and Contraction. Supports, hangers, and anchors shall be installed so as not to interfere with the free expansion and contraction of the piping between anchors. Parts of the supporting system shall be designed and installed so they are not disengaged by movement of the supported piping. [NFPA 54:7.2.6.3]

1210.2.5 Removal of Piping. Where piping containing gas is to be removed, the line shall be first disconnected from sources of gas and then thoroughly purged with air, water, or inert gas before cutting or welding is done. [NFPA 54-12:7.2.6]

1210.3 Concealed Piping in Buildings. Gas piping in concealed locations shall be installed in accordance with this section. [NFPA 54:7.3.1]

1210.3.1 Connections. Where gas piping is to be concealed, connections shall be of the following type:

- (1) Pipe fittings such as elbows, tees, couplings, and right/left nipple/couplings.
- (2) Joining tubing by brazing (see Section 1208.5.8.2). [NFPA 54:7.3.2(2)]
- (3) Fittings listed for use in concealed spaces or that have been demonstrated to sustain, without leakage, forces due to temperature expansion or contraction, vibration, or fatigue based on their geographic location, application, or operation. [NFPA 54:7.3.2(3)]

- (4) Where necessary to insert fittings in gas pipe that has been installed in a concealed location, the pipe shall be reconnected by welding, flanges, or the use of a right/left nipple/coupling.

1210.3.2 Piping in Partitions. Concealed gas piping shall not be located in solid partitions. [NFPA 54:7.3.3]

1210.3.3 Tubing in Partitions. This provision shall not apply to tubing that pierces walls, floors, or partitions. Tubing installed vertically and horizontally inside hollow walls or partitions without protection along its entire concealed length shall be in accordance with the following requirements:

- (1) A steel striker barrier not less than 0.0508 of an inch (1.3 mm) thick, or equivalent, shall be installed between the tubing and the finished wall and extend not less than 4 inches (102 mm) beyond concealed penetrations of plates, firestops, wall studs, and similar construction features.
- (2) The tubing shall be installed in single runs and shall not be rigidly secured. [NFPA 54:7.3.4]

1210.3.4 Piping in Floors. In industrial occupancies, gas piping in solid floors such as concrete shall be laid in channels in the floor and covered to permit access to the piping with minimum damage to the building. Where piping in floor channels is exposed to excessive moisture or corrosive substances, the piping shall be protected in an approved manner. [NFPA 54:7.3.5.1]

Exception: In other than industrial occupancies and where approved by the Authority Having Jurisdiction, gas piping embedded in concrete floor slabs constructed with portland cement shall be surrounded with not less than 1 1/2 inches (38 mm) of concrete and shall not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Piping, fittings, and risers shall be protected against corrosion in accordance with Section 1208.5.6. Piping shall not be embedded in concrete slabs containing quick-set additives or cinder aggregate. [NFPA 54:7.3.5.2]

1210.4 Piping in Vertical Chases. Where gas piping exceeding 5 psi (34 kPa) is located within vertical chases in accordance with Section 1210.5(2), the requirements of Section 1210.4.1 through Section 1210.4.3 shall apply. [NFPA 54:7.4]

1210.4.1 Pressure Reduction. Where pressure reduction is required in branch connections in accordance with Section 1210.5, such reduction shall take place either inside the chase or immediately adjacent to the outside wall of the chase. Regulator venting and downstream overpressure protection shall comply with Section 1208.7.1 and Section 1208.7.5. The regulator shall be accessible for service and repair, and vented in accordance with one of the following:

- (1) Where the fuel gas is lighter than air, regulators equipped with a vent limiting means shall be permitted to be vented into the chase. Regulators not equipped with a vent limiting means shall be permitted to be vented either directly to the outdoors or to a point within the top 1 foot (305 mm) of the chase.

- (2) Where the fuel gas is heavier than air, the regulator vent shall be vented directly to the outdoors. [NFPA 54:7.4.1]

1210.4.2 Construction. Chase construction shall comply with local building codes with respect to fire resistance and protection of horizontal and vertical openings. [NFPA 54:7.4.2]

1210.4.3 Ventilation. A chase shall be ventilated to the outdoors and at the top. The openings shall have a minimum free area [in square inches (m²)] equal to the product of one-half of the maximum pressure in the piping [in psi (kPa)] times the largest nominal diameter of that piping [in inches (mm)], or the cross-sectional area of the chase, whichever is smaller. Where more than one fuel gas piping system is present, the free area for each system shall be calculated and the largest area used. [NFPA 54:7.4.3]

1210.5 Maximum Design Operating Pressure. The maximum design operating pressure for piping systems located inside buildings shall not exceed 5 psi (34 kPa) unless one or more of the following conditions are met:

- (1) The piping system is welded.
- (2) The piping is located in a ventilated chase or otherwise enclosed for protection against accidental gas accumulation.
- (3) The piping is located inside buildings or separate areas of buildings used exclusively for one of the following:
 - (a) Industrial processing or heating
 - (b) Research
 - (c) Warehousing
 - (d) Boiler or mechanical equipment rooms
- (4) The piping is a temporary installation for buildings under construction.
- (5) The piping serves appliances or equipment used for agricultural purposes.
- (6) The piping system is an LP-Gas piping system with a design operating pressure exceeding 20 psi (138 kPa) and in accordance with NFPA 58. LP-Gas systems designed to operate below -5°F (-21°C) or with butane or a propane-butane mix shall be designed to either accommodate liquid LP-Gas or to prevent LP-Gas vapor from condensing back into liquid. [NFPA 54:5.5]

1210.5.1 Liquefied Petroleum Gas Systems. The maximum operating pressure of LP-Gas piping systems shall be:

- (1) In accordance with Section 1210.4.1.
- (2) In accordance with NFPA 58, where the pressure exceeds 20 psi (138 kPa).
- (3) Designed to either accommodate liquid LP-Gas or prevent LP-Gas vapor from condensing back into a liquid in buildings having systems designed to operate below -5°F (-21°C) or with butane or a propane-butane mix.

1210.6 Appliance Overpressure Protection. The maximum operating pressure for piping systems serving appliances de-

signed to operate at 14 inches water column (3.5 kPa) inlet pressure or less shall be 2 pounds-force per square inch gauge (psig) (14 kPa) unless an over-pressure protection device designed to limit pressure at the appliance to 2 psig (14 kPa) upon failure of the line gas pressure regulator is installed.

1210.7 Gas Pipe Turns. Changes in direction of gas pipe shall be made by the use of fittings, factory bends, or field bends. [NFPA 54:7.5]

1210.7.1 Metallic Pipe. Metallic pipe bends shall comply with the following:

- (1) Bends shall be made with bending equipment and procedures intended for that purpose.
- (2) Bends shall be smooth and free from buckling, cracks, or other evidence of mechanical damage.
- (3) The longitudinal weld of the pipe shall be near the neutral axis of the bend.
- (4) The pipe shall not be bent through an arc of more than 90 degrees (1.57 rad).
- (5) The inside radius of a bend shall be not less than six times the outside diameter of the pipe. [NFPA 54:7.5.1]

1210.7.2 Plastic Pipe. Plastic pipe bends shall comply with the following:

- (1) The pipe shall not be damaged, and the internal diameter of the pipe shall not be effectively reduced.
- (2) Joints shall not be located in pipe bends.
- (3) The radius of the inner curve of such bends shall be not less than 25 times the inside diameter of the pipe.
- (4) Where the piping manufacturer specifies the use of special bending equipment or procedures, such equipment or procedures shall be used. [NFPA 54:7.5.2]

1210.7.3 Elbows. Factory-made welding elbows or transverse segments cut therefrom shall have an arc length measured along the crotch of not less than 1 inch (25.4 mm) for pipe sizes 2 inches (50 mm) and larger. [NFPA 54:7.5.3]

1210.8 Drips and Sediment Traps.

1210.8.1 Provide Drips Where Necessary. For other than dry gas conditions, a drip shall be provided at a point in the line of pipe where condensate is capable of collecting. Where required by the Authority Having Jurisdiction or the serving gas supplier, a drip shall also be provided at the outlet of the meter. This drip shall be so installed as to constitute a trap wherein an accumulation of condensate will shut off the flow of gas before it will run back into the meter. [NFPA 54:7.6.1]

1210.8.2 Location of Drips. Drips shall be installed in such locations that they will be readily accessible to permit cleaning or emptying. A drip shall not be located where the condensate is likely to freeze. [NFPA 54:7.6.2]

1210.8.3 Sediment Traps. The installation of sediment traps shall comply with Section 1211.8. [NFPA 54-12:7.6.3]

1210.9 Outlets. Outlets shall be located and installed in accordance with the following requirements:

- (1) The outlet fittings or piping shall be securely fastened in place.
- (2) Outlets shall not be located behind doors.
- (3) Outlets shall be located far enough from floors, walls, patios, slabs, and ceilings to permit the use of wrenches without straining, bending, or damaging the piping.
- (4) The unthreaded portion of gas piping outlets shall extend not less than 1 inch (25.4 mm) through finished ceilings or indoor or outdoor walls.
- (5) The unthreaded portion of gas piping outlets shall extend not less than 2 inches (51 mm) above the surface of floors or outdoor patios or slabs.
- (6) The provisions of Section 1210.9(4) and Section 1210.9(5) shall not apply to listed quick-disconnect devices of the flush-mounted type or listed gas convenience outlets. Such devices shall be installed in accordance with the manufacturer's installation instructions. [NFPA 54:7.7.1]

1210.9.1 Cap Outlets. Each outlet, including a valve, shall be closed gastight with a threaded plug or cap immediately after installation and shall be left closed until the appliance is connected thereto. Where an appliance is disconnected from an outlet, and the outlet is not to be used again immediately, it shall be closed gastight.

Exceptions:

- (1) Laboratory equipment installed in accordance with Section 1211.3.1 shall be permitted.
- (2) The use of a listed quick-disconnect device with integral shutoff or listed gas convenience outlet shall be permitted. [NFPA 54:7.7.2.1]

1210.9.1.1 Appliance Shutoff Valves. Appliance shutoff valves installed in fireplaces shall be removed and the piping capped gastight where the fireplace is used for solid-fuel burning. [NFPA 54:7.7.2.2]

1210.10 Branch Pipe Connection. Where a branch outlet is placed on a main supply line before it is known what size pipe will be connected to it, the outlet shall be of the same size as the line that supplies it. [NFPA 54:7.8]

1210.11 Manual Gas Shutoff Valves. An accessible gas shutoff valve shall be provided upstream of each gas pressure regulator. Where two gas pressure regulators are installed in series in a single gas line, a manual valve shall not be required at the second regulator. [NFPA 54:7.9.1]

1210.11.1 Valves Controlling Multiple Systems. Main gas shutoff valves controlling several gas piping systems shall be readily accessible for operation and installed so as to be protected from physical damage. They shall be marked with a metal tag or other permanent means attached by the installing agency so that the gas piping systems supplied through them are readily identified. [NFPA 54:7.9.2.1]

1210.11.1.1 Shutoff Valves for Multiple House Lines. In multiple-tenant buildings supplied through a master meter, or through one service regulator where a meter is not provided, or where meters or service regulators are not readily accessible from the equipment location, an individual shutoff valve for each apartment or tenant line shall be provided at a convenient point of general accessibility. In a common system serving a number of individual buildings, shutoff valves shall be installed at each building. [NFPA 54:7.9.2.2]

1210.11.2 Emergency Shutoff Valves. An exterior shutoff valve to permit turning off the gas supply to each building in an emergency shall be provided. The emergency shutoff valves shall be plainly marked as such and their locations posted as required by the Authority Having Jurisdiction. [NFPA 54:7.9.2.3]

1210.11.3 Shutoff Valve for Laboratories. Each laboratory space containing two or more gas outlets installed on tables, benches, or in hoods in educational, research, commercial and industrial occupancies shall have a single shutoff valve through which such gas outlets are supplied. The shutoff valve shall be accessible and shall be located within the laboratory or located adjacent to the laboratory's egress door and shall be identified. [NFPA 54:7.9.2.4]

1210.12 Prohibited Devices. No device shall be placed inside the gas piping or fittings that will reduce the cross-sectional area or otherwise obstruct the free flow of gas, except where an allowance in the piping system design has been made for such a device and where approved by the Authority Having Jurisdiction. [NFPA 54:7.10]

1210.13 Systems Containing Gas-Air Mixtures Outside the Flammable Range. Where gas-air mixing machines are employed to produce mixtures above or below the flammable range, they shall be provided with stops to prevent adjustment of the mixture to within or approaching the flammable range. [NFPA 54:7.11]

1210.14 Systems Containing Flammable Gas-Air Mixtures. Systems containing flammable gas-air mixtures shall be in accordance with NFPA 54.

1210.15 Electrical Bonding and Grounding.

1210.15.1 Pipe and Tubing other than CSST. Each aboveground portion of a gas piping system other than CSST that is likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path. Gas piping, other than CSST, shall be considered to be bonded where it is connected to appliances that are connected to the appliance grounding conductor of the circuit supplying that appliance. [NFPA 54:7.13.1]

1210.15.2 Bonding of CSST Gas Piping. CSST gas piping systems shall be bonded to the electrical service grounding electrode system. The bonding jumper shall connect to a metallic pipe or fitting between the point of delivery and the first downstream CSST fitting. The bonding jumper shall be not smaller than 6 AWG copper wire or equivalent. Gas piping systems that contain one or more segments of CSST shall be bonded in accordance with this section. [NFPA 54-12:7.13.2]

1210.15.3 Grounding Conductor or Electrode. Gas piping shall not be used as a grounding conductor or electrode. [NFPA 54-12:7.13.3]

1210.15.4 Lightning Protection System. Where a lightning protection system is installed, the bonding of the gas piping system shall be in accordance with NFPA 780. [NFPA 54:7.13.4]

1210.16 Electrical Circuits. Electrical circuits shall not utilize gas piping or components as conductors.

Exception: Low-voltage (50V or less) control circuits, ignition circuits, and electronic flame detection device circuits shall be permitted to make use of piping or components as a part of an electric circuit. [NFPA 54:7.14]

1210.17 Electrical Connections. Electrical connections between wiring and electrically operated control devices in a piping system shall comply with the requirements of *California Electrical Code*.

1210.17.1 Safety Control. An essential safety control depending on electric current as the operating medium shall be of a type that will shut off (fail safe) the flow of gas in the event of current failure. [NFPA 54:7.15.2]

1210.18 Earthquake-Actuated Gas Shutoff Valves. *Earthquake-actuated gas shutoff valves, certified by the State Architect as conforming to California Referenced Standards Code (CRSC), Standard 12-12-1, shall be provided for buildings when such installation is required by local ordinance. Earthquake-actuated gas shutoff valves which have not been certified by the State Architect shall be prohibited in buildings open to the public under mandatory installation by local ordinance.*

An earthquake-actuated gas shutoff valve is a valve for installation in a gas piping system and designed to automatically shut off the gas at the location of the valve in the event of a seismic disturbance.

1211.0 Appliance Connections to Building Piping.

1211.1 Connecting Gas Appliances. Appliances shall be connected to the building piping in accordance with Section 1211.5 through Section 1211.7 by one of the following [NFPA 54:9.6.1]:

- (1) Rigid metallic pipe and fittings. [NFPA 54:9.6.1(1)]
- (2) Semirigid metallic tubing and metallic fittings. Aluminum alloy tubing shall not be used in exterior locations. [NFPA 54:9.6.1(2)]
- (3) A listed connector installed in accordance with CSA Z21.24. The connector shall be installed in accordance with the manufacturer's installation instructions and shall be in the same room as the appliance. One connector shall be installed for each appliance. [NFPA 54:9.6.1(3)]
- (4) CSST where installed in accordance with the manufacturer's installation instructions. [NFPA 54:9.6.1(5)]
- (5) Listed nonmetallic gas hose connectors installed in accordance with Section 1211.3. [NFPA 54:9.6.1(6)]
- (6) Commercial cooking appliances that are moved for cleaning and sanitation purposes shall be installed in accordance with the connector manufacturer's installation instructions using a listed appliance connector in accordance with CSA Z21.69.

The commercial cooking appliance connector installation shall be configured in accordance with the manufacturer's installation instructions. [NFPA 54:9.6.1.1]

- (7) Movement of appliances with casters shall be limited by a restraining device installed in accordance with the connector and appliance manufacturer's installation instructions. [NFPA 54:9.6.1.2]
- (8) In Section 1211.1(2), Section 1211.1(3), and Section 1211.1(5), the connector or tubing shall be installed so as to be protected against physical and thermal damage. Aluminum alloy tubing and connectors shall be coated to protect against external corrosion where they are in contact with masonry, plaster, insulation, or are subject to repeated wettings by such liquids as water (except rainwater), detergents, or sewage. [NFPA 54:9.6.1(7)]

1211.2 Suspended Low-Intensity Infrared Tube Heaters. Suspended low-intensity infrared tube heaters shall be connected to the building piping system with a connector listed for the application in accordance with CSA Z21.24 and the following requirements:

- (1) The connector shall be installed in accordance with the tube heater installation instructions, and shall be in the same room as the appliance.
- (2) One connector shall be used per appliance. [NFPA 54:9.6.1.3]

1211.3 Use of Nonmetallic Gas Hose Connectors. Listed nonmetallic gas hose connectors shall be installed in accordance with the manufacturer's installation instructions and in accordance with Section 1211.3.1 and Section 1211.3.2. [NFPA 54:9.6.2]

1211.3.1 Indoor. Indoor gas hose connectors shall be used to connect laboratory, shop, and ironing equipment requiring mobility during operation. An appliance shutoff valve shall be installed where the connector is attached to the building piping. The connector shall be of minimum length and shall not exceed 6 feet (1829 mm). The connector shall not be concealed and shall not extend from one room to another or pass through wall partitions, ceilings, or floors. [NFPA 54:9.6.2(1)]

1211.3.2 Outdoor. Where outdoor gas hose connectors are used to connect portable outdoor appliances, the connector shall be listed in accordance with CSA Z21.54. An appliance shutoff valve, a listed quick-disconnect device, or a listed gas convenience outlet shall be installed where the connector is attached to the supply piping and in such a manner to prevent the accumulation of water or foreign matter. This connection shall be made only in the outdoor area where the appliance is to be used. [NFPA 54-12:9.6.2(2)]

The connector length shall not exceed 15 feet (4572 mm).

1211.4 Connection of Portable and Mobile Industrial Gas Appliances.

1211.4.1 Flexible Hose. Where portable industrial appliances, or appliances requiring mobility or subject to vibration, are connected to the building gas piping system

tem by the use of a flexible hose, the hose shall be approved and safe for the conditions under which it is used. [NFPA 54:9.6.3.1]

1211.4.2 Swivel Joints or Couplings. Where industrial appliances requiring mobility are connected to the rigid piping by the use of swivel joints or couplings, the swivel joints or couplings shall be approved for the service required, and only the minimum number required shall be installed. [NFPA 54:9.6.3.2]

1211.4.3 Metal Flexible Connectors. Where industrial appliances subject to vibration are connected to the building piping system by the use of metal flexible connectors, the connectors shall be approved for the service required. [NFPA 54:9.6.3.3]

1211.4.4 Flexible Connectors. Where flexible connections are used, they shall be of the minimum practical length and shall not extend from one room to another or pass through walls, partitions, ceilings, or floors. Flexible connections shall not be used in a concealed location. They shall be protected against physical or thermal damage and shall be provided with gas shutoff valves in readily accessible locations in rigid piping upstream from the flexible connections. [NFPA 54:9.6.3.4]

1211.5 Appliance Shutoff Valves and Connections. Appliances connected to a piping system shall have an accessible, approved manual shutoff valve with a nondisplaceable valve member, or a listed gas convenience outlet installed within 6 feet (1829 mm) of the appliance it serves. Where a connector is used, the valve shall be installed upstream of the connector. A union or flanged connection shall be provided downstream from this valve to permit removal of controls. Shutoff valves serving decorative gas appliances shall be permitted to be installed in fireplaces where listed for such use. [NFPA 54:9.6.4]

Exceptions:

- (1) Shutoff valves shall be permitted to be accessibly located inside or under an appliance where such appliance is removed without removal of the shutoff valve.
- (2) Shutoff valves shall be permitted to be accessibly located inside wall heaters and wall furnaces listed for recessed installation where necessary maintenance is performed without removal of the shutoff valve.

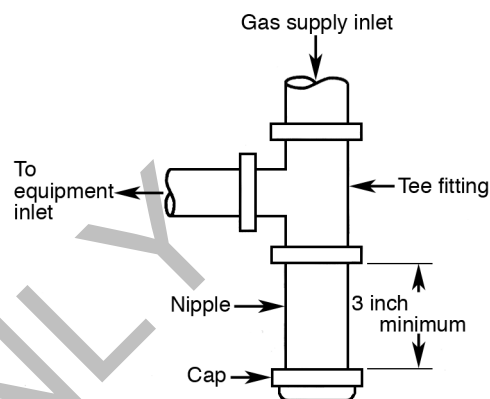
1211.6 Quick-Disconnect Devices. Quick-disconnect devices used to connect appliances to the building piping shall be listed. Where installed indoors, an approved manual shutoff valve with a non-displaceable valve member shall be installed upstream of the quick-disconnect device. [NFPA 54:9.6.5]

1211.7 Gas Convenience Outlets. Appliances shall be permitted to be connected to the building piping by means of a listed gas convenience outlet, in conjunction with a listed appliance connector, installed in accordance with the manufacturer's installation instructions.

Gas convenience outlets shall be listed in accordance with CSA Z21.90 and installed in accordance with the manufacturer's installation instructions. [NFPA 54:9.6.6]

1211.8 Sediment Trap. Where a sediment trap is not incorporated as a 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. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet, as illustrated in Figure 1211.8, or other device recognized as an effective sediment trap. Illuminating appliances, ranges, clothes dryers, decorative appliances for installation in vented fireplaces, gas fireplaces, and outdoor grills shall not be required to be so equipped. [NFPA 54:9.6.7]



For SI units: 1 inch = 25.4 mm

FIGURE 1211.8
METHOD OF INSTALLING A
TEE FITTING SEDIMENT TRAP
[NFPA 54: FIGURE 9.6.7]

1211.9 Installation of Piping. Piping shall be installed in a manner not to interfere with inspection, maintenance, or servicing of the appliance. [NFPA 54:9.6.8]

1212.0 Liquefied Petroleum Gas Facilities and Piping.

1212.1 General. Liquefied petroleum gas facilities shall comply with NFPA 58.

1213.0 Pressure Testing and Inspection.

1213.1 Piping Installations. Prior to acceptance and initial operation, piping installations shall be visually inspected and pressure-tested to determine that the materials, design, fabrication, and installation practices are in accordance with the requirements of this code. [NFPA 54-12:8.1.1.1]

1213.1.1 Inspection Requirements. Inspection shall consist of visual examination during or after manufacture, fabrication, assembly, or pressure tests. [NFPA 54-12:8.1.1.2]

1213.1.2 Repairs and Additions. Where repairs or additions are made following the pressure test, the affected piping shall be tested. Minor repairs and additions are not required to be pressure-tested provided that the work is inspected and connections are tested with a noncorrosive leak-detecting fluid or other leak-detecting methods approved by the Authority Having Jurisdiction. [NFPA 54:8.1.1.3]

1213.1.3 New Branches. Where new branches are installed from the point of delivery to new appliances, the

newly installed branches shall be required to be pressure-tested. Connections between the new piping and the existing piping shall be tested with a noncorrosive leak-detecting fluid or approved leak-detecting methods. [NFPA 54:8.1.1.4]

1213.1.4 Piping System. A piping system shall be tested as a complete unit or in sections. Under no circumstances shall a valve in a line be used as a bulkhead between gas in one section of the piping system and test medium in an adjacent section, unless two valves are installed in series with a valved "telltale" located between these valves. A valve shall not be subjected to the test pressure unless it is determined that the valve, including the valve-closing mechanism, is designed to safely withstand the pressure. [NFPA 54:8.1.1.5]

1213.1.5 Regulators and Valves. Regulator and valve assemblies fabricated independently of the piping system in which they are to be installed shall be permitted to be tested with inert gas or air at the time of fabrication. [NFPA 54:8.1.1.6]

1213.1.6 Test Medium. The test medium shall be air, nitrogen, carbon dioxide, or an inert gas. OXYGEN SHALL NEVER BE USED. [NFPA 54:8.1.2]

1213.2 Test Preparation.

1213.2.1 Pipe Joints. Pipe joints, including welds, shall be left exposed for examination during the test.

Exception: Covered or concealed pipe end joints that have been previously tested in accordance with this code. [NFPA 54:8.1.3.1]

1213.2.2 Expansion Joints. Expansion joints shall be provided with temporary restraints, where required, for the additional thrust load under test. [NFPA 54:8.1.3.2]

1213.2.3 Appliances and Equipment. Appliances and equipment that are not to be included in the test shall be either disconnected from the piping or isolated by blanks, blind flanges, or caps. Flanged joints at which blinds are inserted to blank off other equipment during the test shall not be required to be tested. [NFPA 54:8.1.3.3]

1213.2.4 Designed for (less than) Operating Pressures. Where the piping system is connected to appliances, equipment, or equipment components designed for operating pressures of less than the test pressure, such appliances, equipment, or equipment components shall be isolated from the piping system by disconnecting them and capping the outlets. [NFPA 54:8.1.3.4]

1213.2.5 Designed for (equal to or more than) Operating Pressures. Where the piping system is connected to appliances or equipment designed for operating pressures equal to or greater than the test pressure, such appliances and equipment shall be isolated from the piping system by closing the individual appliance or equipment shutoff valve(s). [NFPA 54:8.1.3.5]

1213.2.6 Safety. Testing of piping systems shall be performed in a manner that protects the safety of employees and the public during the test. [NFPA 54-12:8.1.3.6]

1213.3 Test Pressure. This inspection shall include an air, CO₂, or nitrogen pressure test, at which time the gas piping shall stand a pressure of not less than 10 psi (69 kPa) gauge pressure. Test pressures shall be held for a length of time satisfactory to the Authority Having Jurisdiction, but in no case less than 15 minutes with no perceptible drop in pressure. For welded piping, and for piping carrying gas at pressures in excess of 14 inches water column pressure (3.5 kPa), the test pressure shall be not less than 60 psi (414 kPa) and shall be continued for a length of time satisfactory to the Authority Having Jurisdiction, but in no case for less than 30 minutes. These tests shall be made using air, CO₂, or nitrogen pressure and shall be made in the presence of the Authority Having Jurisdiction. Necessary apparatus for conducting tests shall be furnished by the permit holder. Test gauges used in conducting tests shall be in accordance with Section 318.0.

1213.4 Detection of Leaks and Defects. The piping system shall withstand the test pressure specified without showing evidence of leakage or other defects. Reduction of test pressures as indicated by pressure gauges shall be deemed to indicate the presence of a leak unless such reduction is readily attributed to some other cause. [NFPA 54:8.1.5.1]

1213.4.1 Detecting Leaks. The leakage shall be located by means of an approved gas detector, a noncorrosive leak detection fluid, or other approved leak detection methods. Matches, candles, open flames, or other methods that provide a source of ignition shall not be used. [NFPA 54:8.1.5.2]

1213.4.2 Repair or Replace. Where leakage or other defects are located, the affected portion of the piping system shall be repaired or replaced and retested. [NFPA 54-12:8.1.5.3]

1213.5 Piping System Leak Test. Leak checks using fuel gas shall be permitted in piping systems that have been pressure-tested in accordance with Section 1213.0. [NFPA 54:8.2.1]

1213.5.1 Turning Gas On. During the process of turning gas on into a system of new gas piping, the entire system shall be inspected to determine that there are no open fittings or ends and that valves at unused outlets are closed and plugged or capped. [NFPA 54:8.2.2]

1213.5.2 Leak Check. Immediately after the gas is turned on into a new system or into a system that has been initially restored after an interruption of service, the piping system shall be checked for leakage. Where leakage is indicated, the gas supply shall be shut off until the necessary repairs have been made. [NFPA 54:8.2.3]

1213.5.3 Placing Appliances and Equipment in Operation. Appliances and equipment shall not be placed in operation until after the piping system has been checked in accordance with Section 1213.5.2; connections to the appliance are checked for leakage; and purged in accordance with Section 1213.6. [NFPA 54-12:8.2.4]

1213.6 Purging Requirements. The purging of piping shall be in accordance with Section 1213.6.1 through Section 1213.6.3. [NFPA 54-12:8.3]

1213.6.1 Piping Systems Required to be Purged Outdoors. The purging of piping systems shall be in accordance with the provisions of Section 1213.6.1.1 through Section 1213.6.1.4 where the piping system meets either of the following:

- (1) The design operating gas pressure exceeds 2 psig (14 kPa).
- (2) The piping being purged contains one or more sections of pipe or tubing meeting the size and length criteria of Table 1213.6.1. [NFPA 54-12:8.3.1]

**TABLE 1213.6.1
SIZE AND LENGTH OF PIPING
[NFPA 54-12: TABLE 8.3.1]***

NOMINAL PIPING SIZE (inches)	LENGTH OF PIPING (feet)
≥ 2½ < 3	> 50
≥ 3 < 4	> 30
≥ 4 < 6	> 15
≥ 6 < 8	> 10
≥ 8	Any length

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm

* CSST EHD size of 62 is equivalent to nominal 2 inches (50 mm) pipe or tubing size.

1213.6.1.1 Removal from Service. Where existing gas piping is opened, the section that is opened shall be isolated from the gas supply and the line pressure vented in accordance with Section 1213.6.1.3. Where gas piping meeting the criteria of Table 1213.6.1 is removed from service, the residual fuel gas in the piping shall be displaced with an inert gas. [NFPA 54-12:8.3.1.1]

1213.6.1.2 Placing in Operation. Where gas piping containing air and meeting the criteria of Table 1213.6.1 is placed in operation, the air in the piping shall first be displaced with an inert gas. The inert gas shall then be displaced with fuel gas in accordance with Section 1213.6.1.3. [NFPA 54-12:8.3.1.2]

1213.6.1.3 Outdoor Discharge of Purged Gases. The open end of a piping system being pressure vented or purged shall discharge directly to an outdoor location. Purging operations shall comply with the following requirements:

- (1) The point of discharge shall be controlled with a shutoff valve.
- (2) The point of discharge shall be located not less than 10 feet (3048 mm) from sources of ignition, not less than 10 feet (3048 mm) from building openings, and not less than 25 feet (7620 mm) from mechanical air intake openings.
- (3) During discharge, the open point of discharge shall be continuously attended and monitored with a combustible gas indicator that is in accordance with Section 1213.6.1.4.

- (4) Purging operations introducing fuel gas shall be stopped where 90 percent fuel gas by volume is detected within the pipe.
- (5) Persons not involved in the purging operations shall be evacuated from areas within 10 feet (3048 mm) of the point of discharge. [NFPA 54-12:8.3.1.3]

1213.6.1.4 Combustible Gas Indicator. Combustible gas indicators shall be listed and shall be calibrated in accordance with the manufacturer’s instructions. Combustible gas indicators shall numerically display a volume scale from 0 percent to 100 percent in 1 percent or smaller increments. [NFPA 54-12:8.3.1.4]

1213.6.2 Piping Systems Allowed to be Purged Indoors or Outdoors. The purging of piping systems shall be in accordance with the provisions of Section 1213.6.2.1 where the piping system meets both of the following:

- (1) The design operating pressure is 2 psig (14 kPa) or less.
- (2) The piping being purged is constructed entirely from pipe or tubing not meeting the size and length criteria of Table 1213.6.1. [NFPA 54-12:8.3.2]

1213.6.2.1 Purging Procedure. The piping system shall be purged in accordance with one or more of the following:

- (1) The piping shall be purged with fuel gas and shall discharge to the outdoors.
- (2) The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through an appliance burner not located in a combustion chamber. Such burner shall be provided with a continuous source of ignition.
- (3) The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through a burner that has a continuous source of ignition and that is designed for such purpose.
- (4) The piping shall be purged with fuel gas that is discharge to the indoors or outdoors, and the point of discharge shall be monitored with a listed combustible gas detector in accordance with Section 1213.6.2.2. Purging shall be stopped where fuel gas is detected.
- (5) The piping shall be purged by the gas supplier in accordance with written procedures. [NFPA 54-12:8.3.2.1]

1213.6.2.2 Combustible Gas Detector. Combustible gas detectors shall be listed and shall be calibrated or tested in accordance with the manufacturer’s instructions. Combustible gas detectors shall be capable of indicating the presence of fuel gas. [NFPA 54-12:8.3.2.2]

1213.6.3 Purging Appliances and Equipment. After the piping system has been placed in operation, appli-

ances and equipment shall be purged before being placed into operation. [NFPA 54-12:8.3.3]

1214.0 Interconnections Between Gas Piping Systems.

1214.1 Interconnections Supplying Separate Users. Where two or more meters, or two or more service regulators where meters are not provided, are located on the same premises and supply separate users, the gas piping systems shall not be interconnected on the outlet side of the meters or service regulators. [NFPA 54:5.3.1]

1214.2 Interconnections for Standby Fuels. Where supplementary gas for standby use is connected downstream from a meter or a service regulator where a meter is not provided, a device to prevent backflow shall be installed. A three-way valve installed to admit the standby supply and at the same time shut off the regular supply shall be permitted to be used for this purpose. [NFPA 54:5.3.2]

1215.0 Required Gas Supply.

1215.1 General. The following regulations, shall comply with this section and Section 1216.0, shall be the standard for the installation of gas piping. Natural gas regulations and tables are based on the use of gas having a specific gravity of 0.60, supplied at 6 to 8 inches water column (1.5 kPa to 1.9 kPa) pressure at the outlet of the meter or regulator. For undiluted liquefied petroleum gas, gas piping shall be permitted to be sized at 11 inches water column (2.7 kPa) pressure at the outlet of the meter or regulator and specific gravity of 1.50. Where gas of a different specific gravity is to be delivered, the specific gravity conversion factors provided by the serving gas supplier shall be used in sizing piping systems from the pipe sizing tables in this chapter.

1215.2 Volume. The hourly volume of gas required at each piping outlet shall be taken as not less than the maximum hourly rating as specified by the manufacturer of the appliance or appliances to be connected to each such outlet.

1215.3 Gas Appliances. Where the gas appliances to be installed have not been definitely specified, Table 1208.4.1 shall be permitted to be used as a reference to estimate requirements of typical appliances.

To obtain the cubic feet per hour (m³/h) of gas required, divide the input of the appliances by the average Btu (kW•h) heating value per cubic foot (m³) of the gas. The average Btu (kW•h) per cubic foot (m³) of the gas in the area of the installation shall be permitted to be obtained from the serving gas supplier.

1215.4 Size of Piping Outlets. The size of the supply piping outlet for a gas appliance shall be not less than 1/2 of an inch (15 mm).

The size of a piping outlet for a mobile home shall be not less than 3/4 of an inch (20 mm).

1216.0 Required Gas Piping Size.

1216.1 Pipe Sizing Methods. Where the pipe size is to be determined using a method in Section 1216.1.1 through Sec-

tion 1216.1.3, the diameter of each pipe segment shall be obtained from the pipe sizing tables in Section 1216.2 or from the sizing equations in Section 1216.3. [NFPA 54:6.1]

1216.1.1 Longest Length Method. The pipe size of each section of gas piping shall be determined using the longest length of piping from the point of delivery to the most remote outlet and the load of the section (see calculation example in Figure 1216.1.1). [NFPA 54:6.1.1]

1216.1.2 Branch Length Method. Pipe shall be sized as follows:

- (1) The pipe size of each section of the longest pipe run from the point of delivery to the most remote outlet shall be determined using the longest run of piping and the load of the section.
- (2) The pipe size of each section of branch piping not previously sized shall be determined using the length of piping from the point of delivery to the most remote outlet in each branch and the load of the section. [NFPA 54:6.1.2]

1216.1.3 Hybrid Pressure. The pipe size for each section of higher pressure gas piping shall be determined using the longest length of piping from the point of delivery to the most remote line pressure regulator. The pipe size from the line pressure regulator to each outlet shall be determined using the length of piping from the regulator to the most remote outlet served by the regulator. [NFPA 54:6.1.3]

1216.2 Tables for Sizing Gas Piping Systems. Table 1216.2(1) through Table 1216.2(36) shall be used to size gas piping in conjunction with one of the methods described in Section 1216.1.1 through Section 1216.1.3. [NFPA 54:6.2]

1216.3 Sizing Equations. The inside diameter of smooth-wall pipe or tubing shall be determined by Equation 1216.3(1), Equation 1216.3(2), Table 1216.3, and using the equivalent pipe length determined by Section 1216.1.1 through Section 1216.1.3. [NFPA 54:6.4]

EQUATION 1216.3(1)
LOW-PRESSURE GAS FORMULA (LESS THAN 1.5 psi)
[NFPA 54:6.4.1]

$$D = \frac{Q^{0.381}}{19.17 \left(\frac{\Delta H}{Cr \times L} \right)^{0.206}}$$

Where:

- D* = inside diameter of pipe, inches
- Q* = input rate appliance(s), cubic feet per hour at 60°F and 30 inch mercury column
- L* = equivalent length of pipe, feet
- ΔH* = pressure drop, inches water column
- Cr* = in accordance with Table 1216.3

**EQUATION 1216.3(2)
HIGH-PRESSURE GAS FORMULA (1.5 psi AND ABOVE)
[NFPA 54:6.4.2]**

$$D = \frac{Q^{0.381}}{18.93 \left[\frac{(P_1^2 - P_2^2) \cdot Y}{Cr \times L} \right]^{0.206}}$$

Where:

- D* = inside diameter of pipe, inches
- Q* = input rate appliance(s), cubic feet per hour at 60°F and 30 inch mercury column
- P₁* = upstream pressure, psia (*P₁* + 14.7)
- P₂* = downstream pressure, psia (*P₂* + 14.7)
- L* = equivalent length of pipe, feet
- Cr* = in accordance with Table 1216.3
- Y* = in accordance with Table 1216.3

For SI units: 1 cubic foot = 0.0283 m³, 1000 British thermal units per hour = 0.293 kW, 1 inch = 25 mm, 1 foot = 304.8 mm, 1 pound-force per square inch = 6.8947 kPa, °C = (°F-32)/1.8, 1 inch mercury column = 3.39 kPa, 1 inch water column = 0.249 kPa

**TABLE 1216.3
Cr AND Y FOR NATURAL GAS AND UNDILUTED PROPANE
AT STANDARD CONDITIONS
[NFPA 54: TABLE 6.4.2]**

GAS	FORMULA FACTORS	
	<i>Cr</i>	<i>Y</i>
Natural Gas	0.6094	0.9992
Undiluted Propane	1.2462	0.9910

1216.4 Sizing of Piping Sections. To determine the size of each section of pipe in a system within the range of Table 1216.2(1) through Table 1216.2(36), proceed as follows:

- (1) Measure the length of the pipe from the gas meter location to the most remote outlet on the system.
- (2) Select the length in feet column and row showing the distance, or the next longer distance where the table does not give the exact length.
- (3) Starting at the most remote outlet, find in the row just selected the gas demand for that outlet. Where the exact figure of demand is not shown, choose the next larger figure in the row.
- (4) At the top of this column will be found the correct size of pipe.
- (5) Using this same row, proceed in a similar manner for each section of pipe serving this outlet. For each section of pipe, determine the total gas demand supplied by that section. Where gas piping sections serve both heating and cooling appliances and the installation prevents both units from operating simultaneously, the larger of the two demand loads needs to be used in sizing these sections.

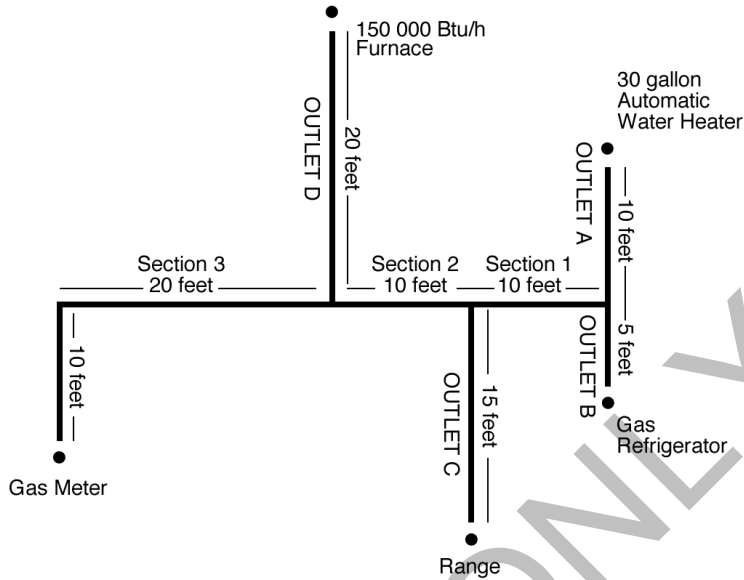
- (6) Size each section of branch piping not previously sized by measuring the distance from the gas meter location to the most remote outlet in that branch and follow the procedures of steps 2, 3, 4, and 5 above. Size branch piping in the order of their distance from the meter location, beginning with the most distant outlet not previously sized.

1216.5 Engineering Methods. For conditions other than those covered by Section 1216.1, such as longer runs or greater gas demands, the size of each gas piping system shall be determined by standard engineering methods acceptable to the Authority Having Jurisdiction, and each such system shall be so designed that the total pressure drop between the meter or other point of supply and an outlet where full demand is being supplied to all outlets, shall be in accordance with the requirements of Section 1208.4.

1216.6 Variable Gas Pressure. Where the gas pressure exceeds 14 inches (3.5 kPa) or less than 6 inches (1.5 kPa) of water column, or where diversity demand factors are used, the design, pipe, sizing, materials, location, and use of such systems first shall be approved by the Authority Having Jurisdiction. Piping systems designed for pressures exceeding the serving gas supplier’s standard delivery pressure shall have prior verification from the gas supplier of the availability of the design pressure.

FIGURE 1216.1.1 EXAMPLE ILLUSTRATING USE OF TABLES 1208.4.1 AND 1216.2(1)

Problem: Determine the required pipe size of each section and outlet of the piping system shown in Figure 1216.1.1. Gas to be used has a specific gravity of 0.60 and 1100 British thermal units (Btu) per cubic foot (0.0114 kW•h/L), delivered at 8 inch water column (1.9 kPa) pressure.



For SI units: 1 foot = 304.8 mm, 1 gallon = 3.785 L, 1000 British thermal units per hour = 0.293 kW, 1 cubic foot per hour = 0.0283 m³/h

Solution:

- (1) Maximum gas demand of Outlet A — 32 cubic feet per hour (0.91 m³/h) (from Table 1208.4.1).
 Maximum gas demand of Outlet B — 3 cubic feet per hour (0.08 m³/h) (from Table 1208.4.1).
 Maximum gas demand of Outlet C — 59 cubic feet per hour (1.67 m³/h) (from Table 1208.4.1).
 Maximum gas demand of Outlet D — 136 cubic feet per hour (3.85 m³/h) [150 000 Btu/hour (44 kW) divided by 1100 Btu per cubic foot (0.0114 kW•h/L)].
- (2) The length of pipe from the gas meter to the most remote outlet (Outlet A) is 60 feet (18 288 mm).
- (3) Using the length in feet column row marked 60 feet (18 288 mm) in Table 1216.2(1):
 Outlet A, supplying 32 cubic feet per hour (0.91 m³/h), requires ½ of an inch (15 mm) pipe.
 Section 1, supplying Outlets A and B, or 35 cubic feet per hour (0.99 m³/h) requires ½ of an inch (15 mm) pipe.
 Section 2, supplying Outlets A, B, and C, or 94 cubic feet per hour (2.66 m³/h) requires ¾ of an inch (20 mm) pipe.
 Section 3, supplying Outlets A, B, C, and D, or 230 cubic feet per hour (6.51 m³/h), requires 1 inch (25 mm) pipe.
- (4) Using the column marked 60 feet (18 288 mm) in Table 1216.2(1) [no column for actual length of 55 feet (16 764 mm)]:
 Outlet B supplying 3 cubic feet per hour (0.08 m³/h), requires ½ of an inch (15 mm) pipe.
 Outlet C, supplying 59 cubic feet per hour (1.67 m³/h), requires ½ of an inch (15 mm) pipe.
- (5) Using the column marked 60 feet (18 288 mm) in Table 1216.2(1):
 Outlet D, supplying 136 cubic feet per hour (3.85 m³/h), requires ¾ of an inch (20 mm) pipe.

TABLE 1216.2(1)
SCHEDULE 40 METALLIC PIPE [NFPA 54: TABLE 6.2(b)]^{1, 2}

														GAS: NATURAL	
														INLET PRESSURE: LESS THAN 2 psi	
														PRESSURE DROP: 0.5 in. w.c.	
														SPECIFIC GRAVITY: 0.60	
PIPE SIZE (inch)															
NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4	5	6	8	10	12	
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026	5.047	6.065	7.981	10.020	11.938	
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR														
10	172	360	678	1390	2090	4020	6400	11 300	23 100	41 800	67 600	139 000	252 000	399 000	
20	118	247	466	957	1430	2760	4400	7780	15 900	28 700	46 500	95 500	173 000	275 000	
30	95	199	374	768	1150	2220	3530	6250	12 700	23 000	37 300	76 700	139 000	220 000	
40	81	170	320	657	985	1900	3020	5350	10 900	19 700	31 900	65 600	119 000	189 000	
50	72	151	284	583	873	1680	2680	4740	9660	17 500	28 300	58 200	106 000	167 000	
60	65	137	257	528	791	1520	2430	4290	8760	15 800	25 600	52 700	95 700	152 000	
70	60	126	237	486	728	1400	2230	3950	8050	14 600	23 600	48 500	88 100	139 000	
80	56	117	220	452	677	1300	2080	3670	7490	13 600	22 000	45 100	81 900	130 000	
90	52	110	207	424	635	1220	1950	3450	7030	12 700	20 600	42 300	76 900	122 000	
100	50	104	195	400	600	1160	1840	3260	6640	12 000	19 500	40 000	72 600	115 000	
125	44	92	173	355	532	1020	1630	2890	5890	10 600	17 200	35 400	64 300	102 000	
150	40	83	157	322	482	928	1480	2610	5330	9650	15 600	32 100	58 300	92 300	
175	37	77	144	296	443	854	1360	2410	4910	8880	14 400	29 500	53 600	84 900	
200	34	71	134	275	412	794	1270	2240	4560	8260	13 400	27 500	49 900	79 000	
250	30	63	119	244	366	704	1120	1980	4050	7320	11 900	24 300	44 200	70 000	
300	27	57	108	221	331	638	1020	1800	3670	6630	10 700	22 100	40 100	63 400	
350	25	53	99	203	305	587	935	1650	3370	6100	9880	20 300	36 900	58 400	
400	23	49	92	189	283	546	870	1540	3140	5680	9190	18 900	34 300	54 300	
450	22	46	86	177	266	512	816	1440	2940	5330	8620	17 700	32 200	50 900	
500	21	43	82	168	251	484	771	1360	2780	5030	8150	16 700	30 400	48 100	
550	20	41	78	159	239	459	732	1290	2640	4780	7740	15 900	28 900	45 700	
600	19	39	74	152	228	438	699	1240	2520	4560	7380	15 200	27 500	43 600	
650	18	38	71	145	218	420	669	1180	2410	4360	7070	14 500	26 400	41 800	
700	17	36	68	140	209	403	643	1140	2320	4190	6790	14 000	25 300	40 100	
750	17	35	66	135	202	389	619	1090	2230	4040	6540	13 400	24 400	38 600	
800	16	34	63	130	195	375	598	1060	2160	3900	6320	13 000	23 600	37 300	
850	16	33	61	126	189	363	579	1020	2090	3780	6110	12 600	22 800	36 100	
900	15	32	59	122	183	352	561	992	2020	3660	5930	12 200	22 100	35 000	
950	15	31	58	118	178	342	545	963	1960	3550	5760	11 800	21 500	34 000	
1000	14	30	56	115	173	333	530	937	1910	3460	5600	11 500	20 900	33 100	
1100	14	28	53	109	164	316	503	890	1810	3280	5320	10 900	19 800	31 400	
1200	13	27	51	104	156	301	480	849	1730	3130	5070	10 400	18 900	30 000	
1300	12	26	49	100	150	289	460	813	1660	3000	4860	9980	18 100	28 700	
1400	12	25	47	96	144	277	442	781	1590	2880	4670	9590	17 400	27 600	
1500	11	24	45	93	139	267	426	752	1530	2780	4500	9240	16 800	26 600	
1600	11	23	44	89	134	258	411	727	1480	2680	4340	8920	16 200	25 600	
1700	11	22	42	86	130	250	398	703	1430	2590	4200	8630	15 700	24 800	
1800	10	22	41	84	126	242	386	682	1390	2520	4070	8370	15 200	24 100	
1900	10	21	40	81	122	235	375	662	1350	2440	3960	8130	14 800	23 400	
2000	NA	20	39	79	119	229	364	644	1310	2380	3850	7910	14 400	22 700	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

¹ Table entries are rounded to 3 significant digits.

² NA means a flow of less than 10 ft³/h (0.283 m³/h).

FUEL GAS PIPING

TABLE 1216.2(2)
SCHEDULE 40 METALLIC PIPE [NFPA 54-12: TABLE 6.2(c)]*

										GAS: NATURAL	
										INLET PRESSURE: LESS THAN 2 psi	
										PRESSURE DROP: 3.0 in. w.c.	
										SPECIFIC GRAVITY: 0.60	
INTENDED USE: INITIAL SUPPLY PRESSURE OF 8.0 IN. W.C. OR GREATER											
PIPE SIZE (inch)											
NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4		
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR										
10	454	949	1787	3669	5497	10 588	16 875	29 832	43 678		
20	312	652	1228	2522	3778	7277	11 598	20 503	30 020		
30	250	524	986	2025	3034	5844	9314	16 465	24 107		
40	214	448	844	1733	2597	5001	7971	14 092	20 632		
50	190	397	748	1536	2302	4433	7065	12 489	18 286		
60	172	360	678	1392	2085	4016	6401	11 316	16 569		
70	158	331	624	1280	1919	3695	5889	10 411	15 243		
80	147	308	580	1191	1785	3437	5479	9685	14 181		
90	138	289	544	1118	1675	3225	5140	9087	13 305		
100	131	273	514	1056	1582	3046	4856	8584	12 568		
125	116	242	456	936	1402	2700	4303	7608	11 139		
150	105	219	413	848	1270	2446	3899	6893	10 093		
175	96	202	380	780	1169	2251	3587	6342	9285		
200	90	188	353	726	1087	2094	3337	5900	8638		
250	80	166	313	643	964	1856	2958	5229	7656		
300	72	151	284	583	873	1681	2680	4738	6937		
350	66	139	261	536	803	1547	2465	4359	6382		
400	62	129	243	499	747	1439	2294	4055	5937		
450	58	121	228	468	701	1350	2152	3804	5570		
500	55	114	215	442	662	1275	2033	3594	5262		
550	52	109	204	420	629	1211	1931	3413	4997		
600	50	104	195	400	600	1156	1842	3256	4767		
650	47	99	187	384	575	1107	1764	3118	4565		
700	46	95	179	368	552	1063	1695	2996	4386		
750	44	92	173	355	532	1024	1632	2886	4225		
800	42	89	167	343	514	989	1576	2787	4080		
850	41	86	162	332	497	957	1526	2697	3949		
900	40	83	157	322	482	928	1479	2615	3828		
950	39	81	152	312	468	901	1436	2539	3718		
1000	38	79	148	304	455	877	1397	2470	3616		
1100	36	75	141	289	432	833	1327	2346	3435		
1200	34	71	134	275	412	794	1266	2238	3277		
1300	33	68	128	264	395	761	1212	2143	3138		
1400	31	65	123	253	379	731	1165	2059	3014		
1500	30	63	119	244	366	704	1122	1983	2904		
1600	29	61	115	236	353	680	1083	1915	2804		
1700	28	59	111	228	342	658	1048	1854	2714		
1800	27	57	108	221	331	638	1017	1797	2631		
1900	27	56	105	215	322	619	987	1745	2555		
2000	26	54	102	209	313	602	960	1698	2485		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

* Table entries are rounded to 3 significant digits.

**TABLE 1216.2(3)
SCHEDULE 40 METALLIC PIPE [NFPA 54-12: TABLE 6.2(d)]***

										GAS: NATURAL	
										INLET PRESSURE: LESS THAN 2 psi	
										PRESSURE DROP: 6.0 in. w.c.	
										SPECIFIC GRAVITY: 0.60	
INTENDED USE: INITIAL SUPPLY PRESSURE OF 11.0 IN. W.C. OR GREATER											
PIPE SIZE (inch)											
NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4		
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR										
10	660	1380	2600	5338	7999	15 405	24 553	43 405	63 551		
20	454	949	1787	3669	5497	10 588	16 875	29 832	43 678		
30	364	762	1435	2946	4415	8502	13 551	23 956	35 075		
40	312	652	1228	2522	3778	7277	11 598	20 503	30 020		
50	276	578	1089	2235	3349	6449	10 279	18 172	26 606		
60	250	524	986	2025	3034	5844	9314	16 465	24 107		
70	230	482	907	1863	2791	5376	8568	15 147	22 178		
80	214	448	844	1733	2597	5001	7971	14 092	20 632		
90	201	420	792	1626	2437	4693	7479	13 222	19 359		
100	190	397	748	1536	2302	4433	7065	12 489	18 286		
125	168	352	663	1361	2040	3928	6261	11 069	16 207		
150	153	319	601	1234	1848	3559	5673	10 029	14 684		
175	140	293	553	1135	1700	3275	5219	9227	13 509		
200	131	273	514	1056	1582	3046	4856	8584	12 568		
250	116	242	456	936	1402	2700	4303	7608	11 139		
300	105	219	413	848	1270	2446	3899	6893	10 093		
350	96	202	380	780	1169	2251	3587	6342	9285		
400	90	188	353	726	1087	2094	3337	5900	8638		
450	84	176	332	681	1020	1965	3131	5535	8105		
500	80	166	313	643	964	1856	2958	5229	7656		
550	76	158	297	611	915	1762	2809	4966	7271		
600	72	151	284	583	873	1681	2680	4738	6937		
650	69	144	272	558	836	1610	2566	4537	6643		
700	66	139	261	536	803	1547	2465	4359	6382		
750	64	134	252	516	774	1490	2375	4199	6148		
800	62	129	243	499	747	1439	2294	4055	5937		
850	60	125	235	483	723	1393	2220	3924	5745		
900	58	121	228	468	701	1350	2152	3804	5570		
950	56	118	221	454	681	1311	2090	3695	5410		
1000	55	114	215	442	662	1275	2033	3594	5262		
1100	52	109	204	420	629	1211	1931	3413	4997		
1200	50	104	195	400	600	1156	1842	3256	4767		
1300	47	99	187	384	575	1107	1764	3118	4565		
1400	46	95	179	368	552	1063	1695	2996	4386		
1500	44	92	173	355	532	1024	1632	2886	4225		
1600	42	89	167	343	514	989	1576	2787	4080		
1700	41	86	162	332	497	957	1526	2697	3949		
1800	40	83	157	322	482	928	1479	2615	3828		
1900	39	81	152	312	468	901	1436	2539	3718		
2000	38	79	148	304	455	877	1397	2470	3616		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa
 * Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(4)
SCHEDULE 40 METALLIC PIPE [NFPA 54-12: TABLE 6.2(e)]*

										GAS: NATURAL	
										INLET PRESSURE: 2.0 psi	
										PRESSURE DROP: 1.0 psi	
										SPECIFIC GRAVITY: 0.60	
PIPE SIZE (inch)											
NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4		
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR										
10	1510	3040	5560	11 400	17 100	32 900	52 500	92 800	189 000		
20	1070	2150	3930	8070	12 100	23 300	37 100	65 600	134 000		
30	869	1760	3210	6590	9880	19 000	30 300	53 600	109 000		
40	753	1520	2780	5710	8550	16 500	26 300	46 400	94 700		
50	673	1360	2490	5110	7650	14 700	23 500	41 500	84 700		
60	615	1240	2270	4660	6980	13 500	21 400	37 900	77 300		
70	569	1150	2100	4320	6470	12 500	19 900	35 100	71 600		
80	532	1080	1970	4040	6050	11 700	18 600	32 800	67 000		
90	502	1010	1850	3810	5700	11 000	17 500	30 900	63 100		
100	462	934	1710	3510	5260	10 100	16 100	28 500	58 200		
125	414	836	1530	3140	4700	9060	14 400	25 500	52 100		
150	372	751	1370	2820	4220	8130	13 000	22 900	46 700		
175	344	695	1270	2601	3910	7530	12 000	21 200	43 300		
200	318	642	1170	2410	3610	6960	11 100	19 600	40 000		
250	279	583	1040	2140	3210	6180	9850	17 400	35 500		
300	253	528	945	1940	2910	5600	8920	15 800	32 200		
350	232	486	869	1790	2670	5150	8210	14 500	29 600		
400	216	452	809	1660	2490	4790	7640	13 500	27 500		
450	203	424	759	1560	2330	4500	7170	12 700	25 800		
500	192	401	717	1470	2210	4250	6770	12 000	24 400		
550	182	381	681	1400	2090	4030	6430	11 400	23 200		
600	174	363	650	1330	2000	3850	6130	10 800	22 100		
650	166	348	622	1280	1910	3680	5870	10 400	21 200		
700	160	334	598	1230	1840	3540	5640	9970	20 300		
750	154	322	576	1180	1770	3410	5440	9610	19 600		
800	149	311	556	1140	1710	3290	5250	9280	18 900		
850	144	301	538	1100	1650	3190	5080	8980	18 300		
900	139	292	522	1070	1600	3090	4930	8710	17 800		
950	135	283	507	1040	1560	3000	4780	8460	17 200		
1000	132	275	493	1010	1520	2920	4650	8220	16 800		
1100	125	262	468	960	1440	2770	4420	7810	15 900		
1200	119	250	446	917	1370	2640	4220	7450	15 200		
1300	114	239	427	878	1320	2530	4040	7140	14 600		
1400	110	230	411	843	1260	2430	3880	6860	14 000		
1500	106	221	396	812	1220	2340	3740	6600	13 500		
1600	102	214	382	784	1180	2260	3610	6380	13 000		
1700	99	207	370	759	1140	2190	3490	6170	12 600		
1800	96	200	358	736	1100	2120	3390	5980	12 200		
1900	93	195	348	715	1070	2060	3290	5810	11 900		
2000	91	189	339	695	1040	2010	3200	5650	11 500		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa

* Table entries are rounded to 3 significant digits.

**TABLE 1216.2(5)
SCHEDULE 40 METALLIC PIPE [NFPA 54-12: TABLE 6.2(f)]***

										GAS: NATURAL	
										INLET PRESSURE: 3.0 psi	
										PRESSURE DROP: 2.0 psi	
										SPECIFIC GRAVITY: 0.60	
PIPE SIZE (inch)											
NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4		
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR										
10	2350	4920	9270	19 000	28 500	54 900	87 500	155 000	316 000		
20	1620	3380	6370	13 100	19 600	37 700	60 100	106 000	217 000		
30	1300	2720	5110	10 500	15 700	30 300	48 300	85 400	174 000		
40	1110	2320	4380	8990	13 500	25 900	41 300	73 100	149 000		
50	985	2060	3880	7970	11 900	23 000	36 600	64 800	132 000		
60	892	1870	3520	7220	10 800	20 800	33 200	58 700	120 000		
70	821	1720	3230	6640	9950	19 200	30 500	54 000	110 000		
80	764	1600	3010	6180	9260	17 800	28 400	50 200	102 000		
90	717	1500	2820	5800	8680	16 700	26 700	47 100	96 100		
100	677	1420	2670	5470	8200	15 800	25 200	44 500	90 800		
125	600	1250	2360	4850	7270	14 000	22 300	39 500	80 500		
150	544	1140	2140	4400	6590	12 700	20 200	35 700	72 900		
175	500	1050	1970	4040	6060	11 700	18 600	32 900	67 100		
200	465	973	1830	3760	5640	10 900	17 300	30 600	62 400		
250	412	862	1620	3330	5000	9620	15 300	27 100	55 300		
300	374	781	1470	3020	4530	8720	13 900	24 600	50 100		
350	344	719	1350	2780	4170	8020	12 800	22 600	46 100		
400	320	669	1260	2590	3870	7460	11 900	21 000	42 900		
450	300	627	1180	2430	3640	7000	11 200	19 700	40 200		
500	283	593	1120	2290	3430	6610	10 500	18 600	38 000		
550	269	563	1060	2180	3260	6280	10 000	17 700	36 100		
600	257	537	1010	2080	3110	5990	9550	16 900	34 400		
650	246	514	969	1990	2980	5740	9150	16 200	33 000		
700	236	494	931	1910	2860	5510	8790	15 500	31 700		
750	228	476	897	1840	2760	5310	8470	15 000	30 500		
800	220	460	866	1780	2660	5130	8180	14 500	29 500		
850	213	445	838	1720	2580	4960	7910	14 000	28 500		
900	206	431	812	1670	2500	4810	7670	13 600	27 700		
950	200	419	789	1620	2430	4670	7450	13 200	26 900		
1000	195	407	767	1580	2360	4550	7240	12 800	26 100		
1100	185	387	729	1500	2240	4320	6890	12 200	24 800		
1200	177	369	695	1430	2140	4120	6570	11 600	23 700		
1300	169	353	666	1370	2050	3940	6290	11 100	22 700		
1400	162	340	640	1310	1970	3790	6040	10 700	21 800		
1500	156	327	616	1270	1900	3650	5820	10 300	21 000		
1600	151	316	595	1220	1830	3530	5620	10 000	20 300		
1700	146	306	576	1180	1770	3410	5440	9610	19 600		
1800	142	296	558	1150	1720	3310	5270	9320	19 000		
1900	138	288	542	1110	1670	3210	5120	9050	18 400		
2000	134	280	527	1080	1620	3120	4980	8800	18 000		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa

* Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(6)
SCHEDULE 40 METALLIC PIPE [NFPA 54-12: TABLE 6.2(g)]*

										GAS: NATURAL	
										INLET PRESSURE: 5.0 psi	
										PRESSURE DROP: 3.5 psi	
										SPECIFIC GRAVITY: 0.60	
PIPE SIZE (inch)											
NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4		
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR										
10	3190	6430	11 800	24 200	36 200	69 700	111 000	196 000	401 000		
20	2250	4550	8320	17 100	25 600	49 300	78 600	139 000	283 000		
30	1840	3720	6790	14 000	20 900	40 300	64 200	113 000	231 000		
40	1590	3220	5880	12 100	18 100	34 900	55 600	98 200	200 000		
50	1430	2880	5260	10 800	16 200	31 200	49 700	87 900	179 000		
60	1300	2630	4800	9860	14 800	28 500	45 400	80 200	164 000		
70	1200	2430	4450	9130	13 700	26 400	42 000	74 300	151 000		
80	1150	2330	4260	8540	12 800	24 700	39 300	69 500	142 000		
90	1060	2150	3920	8050	12 100	23 200	37 000	65 500	134 000		
100	979	1980	3620	7430	11 100	21 400	34 200	60 400	123 000		
125	876	1770	3240	6640	9950	19 200	30 600	54 000	110 000		
150	786	1590	2910	5960	8940	17 200	27 400	48 500	98 900		
175	728	1470	2690	5520	8270	15 900	25 400	44 900	91 600		
200	673	1360	2490	5100	7650	14 700	23 500	41 500	84 700		
250	558	1170	2200	4510	6760	13 000	20 800	36 700	74 900		
300	506	1060	1990	4090	6130	11 800	18 800	33 300	67 800		
350	465	973	1830	3760	5640	10 900	17 300	30 600	62 400		
400	433	905	1710	3500	5250	10 100	16 100	28 500	58 100		
450	406	849	1600	3290	4920	9480	15 100	26 700	54 500		
500	384	802	1510	3100	4650	8950	14 300	25 200	51 500		
550	364	762	1440	2950	4420	8500	13 600	24 000	48 900		
600	348	727	1370	2810	4210	8110	12 900	22 900	46 600		
650	333	696	1310	2690	4030	7770	12 400	21 900	44 600		
700	320	669	1260	2590	3880	7460	11 900	21 000	42 900		
750	308	644	1210	2490	3730	7190	11 500	20 300	41 300		
800	298	622	1170	2410	3610	6940	11 100	19 600	39 900		
850	288	602	1130	2330	3490	6720	10 700	18 900	38 600		
900	279	584	1100	2260	3380	6520	10 400	18 400	37 400		
950	271	567	1070	2190	3290	6330	10 100	17 800	36 400		
1000	264	551	1040	2130	3200	6150	9810	17 300	35 400		
1100	250	524	987	2030	3030	5840	9320	16 500	33 600		
1200	239	500	941	1930	2900	5580	8890	15 700	32 000		
1300	229	478	901	1850	2770	5340	8510	15 000	30 700		
1400	220	460	866	1780	2660	5130	8180	14 500	29 500		
1500	212	443	834	1710	2570	4940	7880	13 900	28 400		
1600	205	428	806	1650	2480	4770	7610	13 400	27 400		
1700	198	414	780	1600	2400	4620	7360	13 000	26 500		
1800	192	401	756	1550	2330	4480	7140	12 600	25 700		
1900	186	390	734	1510	2260	4350	6930	12 300	25 000		
2000	181	379	714	1470	2200	4230	6740	11 900	24 300		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa

* Table entries are rounded to 3 significant digits.

TABLE 1216.2(7)
SEMI-RIGID COPPER TUBING [NFPA 54-12: TABLE 6.2(h)]^{1, 2}

							GAS: NATURAL			
							INLET PRESSURE:		LESS THAN 2 psi	
							PRESSURE DROP:		0.3 in. w.c.	
							SPECIFIC GRAVITY:		0.60	
TUBE SIZE (inch)										
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	7⁄8	1½	1¾	–	–
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ³		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN CUBIC FEET OF GAS PER HOUR								
10	20	42	85	148	210	448	806	1270	2650	
20	14	29	58	102	144	308	554	873	1820	
30	11	23	47	82	116	247	445	701	1460	
40	10	20	40	70	99	211	381	600	1250	
50	NA	17	35	62	88	187	337	532	1110	
60	NA	16	32	56	79	170	306	482	1000	
70	NA	14	29	52	73	156	281	443	924	
80	NA	13	27	48	68	145	262	413	859	
90	NA	13	26	45	64	136	245	387	806	
100	NA	12	24	43	60	129	232	366	761	
125	NA	11	22	38	53	114	206	324	675	
150	NA	10	20	34	48	103	186	294	612	
175	NA	NA	18	31	45	95	171	270	563	
200	NA	NA	17	29	41	89	159	251	523	
250	NA	NA	15	26	37	78	141	223	464	
300	NA	NA	13	23	33	71	128	202	420	
350	NA	NA	12	22	31	65	118	186	387	
400	NA	NA	11	20	28	61	110	173	360	
450	NA	NA	11	19	27	57	103	162	338	
500	NA	NA	10	18	25	54	97	153	319	
550	NA	NA	NA	17	24	51	92	145	303	
600	NA	NA	NA	16	23	49	88	139	289	
650	NA	NA	NA	15	22	47	84	133	277	
700	NA	NA	NA	15	21	45	81	128	266	
750	NA	NA	NA	14	20	43	78	123	256	
800	NA	NA	NA	14	20	42	75	119	247	
850	NA	NA	NA	13	19	40	73	115	239	
900	NA	NA	NA	13	18	39	71	111	232	
950	NA	NA	NA	13	18	38	69	108	225	
1000	NA	NA	NA	12	17	37	67	105	219	
1100	NA	NA	NA	12	16	35	63	100	208	
1200	NA	NA	NA	11	16	34	60	95	199	
1300	NA	NA	NA	11	15	32	58	91	190	
1400	NA	NA	NA	10	14	31	56	88	183	
1500	NA	NA	NA	NA	14	30	54	84	176	
1600	NA	NA	NA	NA	13	29	52	82	170	
1700	NA	NA	NA	NA	13	28	50	79	164	
1800	NA	NA	NA	NA	13	27	49	77	159	
1900	NA	NA	NA	NA	12	26	47	74	155	
2000	NA	NA	NA	NA	12	25	46	72	151	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

¹ Table entries are rounded to 3 significant digits.

² NA means a flow of less than 10 ft³/h (0.283 m³/h).

³ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.

FUEL GAS PIPING

TABLE 1216.2(8)
SEMI-RIGID COPPER TUBING [NFPA 54-12: TABLE 6.2(i)]^{1, 2}

		GAS: NATURAL								
		INLET PRESSURE: LESS THAN 2 psi								
		PRESSURE DROP: 0.5 in. w.c.								
		SPECIFIC GRAVITY: 0.60								
		TUBE SIZE (inch)								
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	7⁄8	1½	1¾	–	–
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ³		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN CUBIC FEET OF GAS PER HOUR								
10	27	55	111	195	276	590	1060	1680	3490	
20	18	38	77	134	190	406	730	1150	2400	
30	15	30	61	107	152	326	586	925	1930	
40	13	26	53	92	131	279	502	791	1650	
50	11	23	47	82	116	247	445	701	1460	
60	10	21	42	74	105	224	403	635	1320	
70	NA	19	39	68	96	206	371	585	1220	
80	NA	18	36	63	90	192	345	544	1130	
90	NA	17	34	59	84	180	324	510	1060	
100	NA	16	32	56	79	170	306	482	1000	
125	NA	14	28	50	70	151	271	427	890	
150	NA	13	26	45	64	136	245	387	806	
175	NA	12	24	41	59	125	226	356	742	
200	NA	11	22	39	55	117	210	331	690	
250	NA	NA	20	34	48	103	186	294	612	
300	NA	NA	18	31	44	94	169	266	554	
350	NA	NA	16	28	40	86	155	245	510	
400	NA	NA	15	26	38	80	144	228	474	
450	NA	NA	14	25	35	75	135	214	445	
500	NA	NA	13	23	33	71	128	202	420	
550	NA	NA	13	22	32	68	122	192	399	
600	NA	NA	12	21	30	64	116	183	381	
650	NA	NA	12	20	29	62	111	175	365	
700	NA	NA	11	20	28	59	107	168	350	
750	NA	NA	11	19	27	57	103	162	338	
800	NA	NA	10	18	26	55	99	156	326	
850	NA	NA	10	18	25	53	96	151	315	
900	NA	NA	NA	17	24	52	93	147	306	
950	NA	NA	NA	17	24	50	90	143	297	
1000	NA	NA	NA	16	23	49	88	139	289	
1100	NA	NA	NA	15	22	46	84	132	274	
1200	NA	NA	NA	15	21	44	80	126	262	
1300	NA	NA	NA	14	20	42	76	120	251	
1400	NA	NA	NA	13	19	41	73	116	241	
1500	NA	NA	NA	13	18	39	71	111	232	
1600	NA	NA	NA	13	18	38	68	108	224	
1700	NA	NA	NA	12	17	37	66	104	217	
1800	NA	NA	NA	12	17	36	64	101	210	
1900	NA	NA	NA	11	16	35	62	98	204	
2000	NA	NA	NA	11	16	34	60	95	199	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

- ¹ Table entries are rounded to 3 significant digits.
- ² NA means a flow of less than 10 ft³/h (0.283 m³/h).
- ³ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.

TABLE 1216.2(9)
SEMI-RIGID COPPER TUBING [NFPA 54-12: TABLE 6.2(j)]^{1, 2}

		GAS: NATURAL								
		INLET PRESSURE: LESS THAN 2 psi								
		PRESSURE DROP: 1.0 in. w.c.								
		SPECIFIC GRAVITY: 0.60								
INTENDED USE: TUBE SIZING BETWEEN HOUSE LINE REGULATOR AND THE APPLIANCE										
		TUBE SIZE (inch)								
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	7⁄8	1½	1¾	–	–
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ³		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN CUBIC FEET OF GAS PER HOUR								
10	39	80	162	283	402	859	1550	2440	5080	
20	27	55	111	195	276	590	1060	1680	3490	
30	21	44	89	156	222	474	853	1350	2800	
40	18	38	77	134	190	406	730	1150	2400	
50	16	33	68	119	168	359	647	1020	2130	
60	15	30	61	107	152	326	586	925	1930	
70	13	28	57	99	140	300	539	851	1770	
80	13	26	53	92	131	279	502	791	1650	
90	12	24	49	86	122	262	471	742	1550	
100	11	23	47	82	116	247	445	701	1460	
125	NA	20	41	72	103	219	394	622	1290	
150	NA	18	37	65	93	198	357	563	1170	
175	NA	17	34	60	85	183	329	518	1080	
200	NA	16	32	56	79	170	306	482	1000	
250	NA	14	28	50	70	151	271	427	890	
300	NA	13	26	45	64	136	245	387	806	
350	NA	12	24	41	59	125	226	356	742	
400	NA	11	22	39	55	117	210	331	690	
450	NA	10	21	36	51	110	197	311	647	
500	NA	NA	20	34	48	103	186	294	612	
550	NA	NA	19	32	46	98	177	279	581	
600	NA	NA	18	31	44	94	169	266	554	
650	NA	NA	17	30	42	90	162	255	531	
700	NA	NA	16	28	40	86	155	245	510	
750	NA	NA	16	27	39	83	150	236	491	
800	NA	NA	15	26	38	80	144	228	474	
850	NA	NA	15	26	36	78	140	220	459	
900	NA	NA	14	25	35	75	135	214	445	
950	NA	NA	14	24	34	73	132	207	432	
1000	NA	NA	13	23	33	71	128	202	420	
1100	NA	NA	13	22	32	68	122	192	399	
1200	NA	NA	12	21	30	64	116	183	381	
1300	NA	NA	12	20	29	62	111	175	365	
1400	NA	NA	11	20	28	59	107	168	350	
1500	NA	NA	11	19	27	57	103	162	338	
1600	NA	NA	10	18	26	55	99	156	326	
1700	NA	NA	10	18	25	53	96	151	315	
1800	NA	NA	NA	17	24	52	93	147	306	
1900	NA	NA	NA	17	24	50	90	143	297	
2000	NA	NA	NA	16	23	49	88	139	289	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

¹ Table entries are rounded to 3 significant digits.

² NA means a flow of less than 10 ft³/h (0.283 m³/h).

³ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.

FUEL GAS PIPING

**TABLE 1216.2(10)
SEMI-RIGID COPPER TUBING [NFPA 54-12: TABLE 6.2(k)]²**

		GAS: NATURAL								
		INLET PRESSURE: LESS THAN 2 psi								
		PRESSURE DROP: 17.0 in. w.c.								
		SPECIFIC GRAVITY: 0.60								
		TUBE SIZE (inch)								
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	⅞	1½	1¾	–	–
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ¹		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN CUBIC FEET OF GAS PER HOUR								
10	190	391	796	1390	1970	4220	7590	12 000	24 900	
20	130	269	547	956	1360	2900	5220	8230	17 100	
30	105	216	439	768	1090	2330	4190	6610	13 800	
40	90	185	376	657	932	1990	3590	5650	11 800	
50	79	164	333	582	826	1770	3180	5010	10 400	
60	72	148	302	528	749	1600	2880	4540	9460	
70	66	137	278	486	689	1470	2650	4180	8700	
80	62	127	258	452	641	1370	2460	3890	8090	
90	58	119	243	424	601	1280	2310	3650	7590	
100	55	113	229	400	568	1210	2180	3440	7170	
125	48	100	203	355	503	1080	1940	3050	6360	
150	44	90	184	321	456	974	1750	2770	5760	
175	40	83	169	296	420	896	1610	2540	5300	
200	38	77	157	275	390	834	1500	2370	4930	
250	33	69	140	244	346	739	1330	2100	4370	
300	30	62	126	221	313	670	1210	1900	3960	
350	28	57	116	203	288	616	1110	1750	3640	
400	26	53	108	189	268	573	1030	1630	3390	
450	24	50	102	177	252	538	968	1530	3180	
500	23	47	96	168	238	508	914	1440	3000	
550	22	45	91	159	226	482	868	1370	2850	
600	21	43	87	152	215	460	829	1310	2720	
650	20	41	83	145	206	441	793	1250	2610	
700	19	39	80	140	198	423	762	1200	2500	
750	18	38	77	135	191	408	734	1160	2410	
800	18	37	74	130	184	394	709	1120	2330	
850	17	35	72	126	178	381	686	1080	2250	
900	17	34	70	122	173	370	665	1050	2180	
950	16	33	68	118	168	359	646	1020	2120	
1000	16	32	66	115	163	349	628	991	2060	
1100	15	31	63	109	155	332	597	941	1960	
1200	14	29	60	104	148	316	569	898	1870	
1300	14	28	57	100	142	303	545	860	1790	
1400	13	27	55	96	136	291	524	826	1720	
1500	13	26	53	93	131	280	505	796	1660	
1600	12	25	51	89	127	271	487	768	1600	
1700	12	24	49	86	123	262	472	744	1550	
1800	11	24	48	84	119	254	457	721	1500	
1900	11	23	47	81	115	247	444	700	1460	
2000	11	22	45	79	112	240	432	681	1420	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

¹ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.

² Table entries are rounded to 3 significant digits.

TABLE 1216.2(11)
SEMI-RIGID COPPER TUBING [NFPA 54-12: TABLE 6.2(I)]²

		GAS: NATURAL								
		INLET PRESSURE: 2.0 psi								
		PRESSURE DROP: 1.0 psi								
		SPECIFIC GRAVITY: 0.60								
		TUBE SIZE (inch)								
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	7⁄8	1½	1¾	–	–
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ¹		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN CUBIC FEET OF GAS PER HOUR								
10	245	506	1030	1800	2550	5450	9820	15 500	32 200	
20	169	348	708	1240	1760	3750	6750	10 600	22 200	
30	135	279	568	993	1410	3010	5420	8550	17 800	
40	116	239	486	850	1210	2580	4640	7310	15 200	
50	103	212	431	754	1070	2280	4110	6480	13 500	
60	93	192	391	683	969	2070	3730	5870	12 200	
70	86	177	359	628	891	1900	3430	5400	11 300	
80	80	164	334	584	829	1770	3190	5030	10 500	
90	75	154	314	548	778	1660	2990	4720	9820	
100	71	146	296	518	735	1570	2830	4450	9280	
125	63	129	263	459	651	1390	2500	3950	8220	
150	57	117	238	416	590	1260	2270	3580	7450	
175	52	108	219	383	543	1160	2090	3290	6850	
200	49	100	204	356	505	1080	1940	3060	6380	
250	43	89	181	315	448	956	1720	2710	5650	
300	39	80	164	286	406	866	1560	2460	5120	
350	36	74	150	263	373	797	1430	2260	4710	
400	33	69	140	245	347	741	1330	2100	4380	
450	31	65	131	230	326	696	1250	1970	4110	
500	30	61	124	217	308	657	1180	1870	3880	
550	28	58	118	206	292	624	1120	1770	3690	
600	27	55	112	196	279	595	1070	1690	3520	
650	26	53	108	188	267	570	1030	1620	3370	
700	25	51	103	181	256	548	986	1550	3240	
750	24	49	100	174	247	528	950	1500	3120	
800	23	47	96	168	239	510	917	1450	3010	
850	22	46	93	163	231	493	888	1400	2920	
900	22	44	90	158	224	478	861	1360	2830	
950	21	43	88	153	217	464	836	1320	2740	
1000	20	42	85	149	211	452	813	1280	2670	
1100	19	40	81	142	201	429	772	1220	2540	
1200	18	38	77	135	192	409	737	1160	2420	
1300	18	36	74	129	183	392	705	1110	2320	
1400	17	35	71	124	176	376	678	1070	2230	
1500	16	34	68	120	170	363	653	1030	2140	
1600	16	33	66	116	164	350	630	994	2070	
1700	15	31	64	112	159	339	610	962	2000	
1800	15	30	62	108	154	329	592	933	1940	
1900	14	30	60	105	149	319	575	906	1890	
2000	14	29	59	102	145	310	559	881	1830	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa

Notes:

¹ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.

² Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(12)
SEMI-RIGID COPPER TUBING [NFPA 54-12: TABLE 6.2(m)]³

		GAS: NATURAL								
		INLET PRESSURE: 2.0 psi								
		PRESSURE DROP: 1.5 psi								
		SPECIFIC GRAVITY: 0.60								
INTENDED USE: PIPE SIZING BETWEEN POINT OF DELIVERY AND THE HOUSE LINE REGULATOR. TOTAL LOAD SUPPLIED BY A SINGLE HOUSE LINE REGULATOR NOT EXCEEDING 150 CUBIC FEET PER HOUR. ²										
		TUBE SIZE (inch)								
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	⅞	1½	1¾	—	—
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ¹		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN CUBIC FEET OF GAS PER HOUR								
10	303	625	1270	2220	3150	6740	12 100	19 100	39 800	
20	208	430	874	1530	2170	4630	8330	13 100	27 400	
30	167	345	702	1230	1740	3720	6690	10 600	22 000	
40	143	295	601	1050	1490	3180	5730	9030	18 800	
50	127	262	532	931	1320	2820	5080	8000	16 700	
60	115	237	482	843	1200	2560	4600	7250	15 100	
70	106	218	444	776	1100	2350	4230	6670	13 900	
80	98	203	413	722	1020	2190	3940	6210	12 900	
90	92	190	387	677	961	2050	3690	5820	12 100	
100	87	180	366	640	907	1940	3490	5500	11 500	
125	77	159	324	567	804	1720	3090	4880	10 200	
150	70	144	294	514	729	1560	2800	4420	9200	
175	64	133	270	472	670	1430	2580	4060	8460	
200	60	124	252	440	624	1330	2400	3780	7870	
250	53	110	223	390	553	1180	2130	3350	6980	
300	48	99	202	353	501	1070	1930	3040	6320	
350	44	91	186	325	461	984	1770	2790	5820	
400	41	85	173	302	429	916	1650	2600	5410	
450	39	80	162	283	402	859	1550	2440	5080	
500	36	75	153	268	380	811	1460	2300	4800	
550	35	72	146	254	361	771	1390	2190	4560	
600	33	68	139	243	344	735	1320	2090	4350	
650	32	65	133	232	330	704	1270	2000	4160	
700	30	63	128	223	317	676	1220	1920	4000	
750	29	60	123	215	305	652	1170	1850	3850	
800	28	58	119	208	295	629	1130	1790	3720	
850	27	57	115	201	285	609	1100	1730	3600	
900	27	55	111	195	276	590	1060	1680	3490	
950	26	53	108	189	268	573	1030	1630	3390	
1000	25	52	105	184	261	558	1000	1580	3300	
1100	24	49	100	175	248	530	954	1500	3130	
1200	23	47	95	167	237	505	910	1430	2990	
1300	22	45	91	160	227	484	871	1370	2860	
1400	21	43	88	153	218	465	837	1320	2750	
1500	20	42	85	148	210	448	806	1270	2650	
1600	19	40	82	143	202	432	779	1230	2560	
1700	19	39	79	138	196	419	753	1190	2470	
1800	18	38	77	134	190	406	731	1150	2400	
1900	18	37	74	130	184	394	709	1120	2330	
2000	17	36	72	126	179	383	690	1090	2270	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa

Notes:

- ¹ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.
- ² Where this table is used to size the tubing upstream of a line pressure regulator, the pipe or tubing downstream of the line pressure regulator shall be sized using a pressure drop no greater than 1 inch water column (0.249 kPa).
- ³ Table entries are rounded to 3 significant digits.

TABLE 1216.2(13)
SEMI-RIGID COPPER TUBING [NFPA 54-12: TABLE 6.2(n)]²

		GAS: NATURAL								
		INLET PRESSURE: 5.0 psi								
		PRESSURE DROP: 3.5 psi								
		SPECIFIC GRAVITY: 0.60								
		TUBE SIZE (inch)								
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	7⁄8	1½	1¾	–	–
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ¹		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN CUBIC FEET OF GAS PER HOUR								
10	511	1050	2140	3750	5320	11 400	20 400	32 200	67 100	
20	351	724	1470	2580	3650	7800	14 000	22 200	46 100	
30	282	582	1180	2070	2930	6270	11 300	17 800	37 000	
40	241	498	1010	1770	2510	5360	9660	15 200	31 700	
50	214	441	898	1570	2230	4750	8560	13 500	28 100	
60	194	400	813	1420	2020	4310	7750	12 200	25 500	
70	178	368	748	1310	1860	3960	7130	11 200	23 400	
80	166	342	696	1220	1730	3690	6640	10 500	21 800	
90	156	321	653	1140	1620	3460	6230	9820	20 400	
100	147	303	617	1080	1530	3270	5880	9270	19 300	
125	130	269	547	955	1360	2900	5210	8220	17 100	
150	118	243	495	866	1230	2620	4720	7450	15 500	
175	109	224	456	796	1130	2410	4350	6850	14 300	
200	101	208	424	741	1050	2250	4040	6370	13 300	
250	90	185	376	657	932	1990	3580	5650	11 800	
300	81	167	340	595	844	1800	3250	5120	10 700	
350	75	154	313	547	777	1660	2990	4710	9810	
400	69	143	291	509	722	1540	2780	4380	9120	
450	65	134	273	478	678	1450	2610	4110	8560	
500	62	127	258	451	640	1370	2460	3880	8090	
550	58	121	245	429	608	1300	2340	3690	7680	
600	56	115	234	409	580	1240	2230	3520	7330	
650	53	110	224	392	556	1190	2140	3370	7020	
700	51	106	215	376	534	1140	2050	3240	6740	
750	49	102	207	362	514	1100	1980	3120	6490	
800	48	98	200	350	497	1060	1910	3010	6270	
850	46	95	194	339	481	1030	1850	2910	6070	
900	45	92	188	328	466	1000	1790	2820	5880	
950	43	90	182	319	452	967	1740	2740	5710	
1000	42	87	177	310	440	940	1690	2670	5560	
1100	40	83	169	295	418	893	1610	2530	5280	
1200	38	79	161	281	399	852	1530	2420	5040	
1300	37	76	154	269	382	816	1470	2320	4820	
1400	35	73	148	259	367	784	1410	2220	4630	
1500	34	70	143	249	353	755	1360	2140	4460	
1600	33	68	138	241	341	729	1310	2070	4310	
1700	32	65	133	233	330	705	1270	2000	4170	
1800	31	63	129	226	320	684	1230	1940	4040	
1900	30	62	125	219	311	664	1200	1890	3930	
2000	29	60	122	213	302	646	1160	1830	3820	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa

Notes:

¹ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.

² Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(14)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54-12: TABLE 6.2(o)]^{1, 2}

														GAS: NATURAL													
														INLET PRESSURE: LESS THAN 2 psi													
														PRESSURE DROP: 0.5 in. w.c.													
														SPECIFIC GRAVITY: 0.60													
														TUBE SIZE (EHD) ³													
FLOW DESIGNATION:	13	15	18	19	23	25	30	31	37	39	46	48	60	62													
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR																										
5	46	63	115	134	225	270	471	546	895	1037	1790	2070	3660	4140													
10	32	44	82	95	161	192	330	383	639	746	1260	1470	2600	2930													
15	25	35	66	77	132	157	267	310	524	615	1030	1200	2140	2400													
20	22	31	58	67	116	137	231	269	456	536	888	1050	1850	2080													
25	19	27	52	60	104	122	206	240	409	482	793	936	1660	1860													
30	18	25	47	55	96	112	188	218	374	442	723	856	1520	1700													
40	15	21	41	47	83	97	162	188	325	386	625	742	1320	1470													
50	13	19	37	42	75	87	144	168	292	347	559	665	1180	1320													
60	12	17	34	38	68	80	131	153	267	318	509	608	1080	1200													
70	11	16	31	36	63	74	121	141	248	295	471	563	1000	1110													
80	10	15	29	33	60	69	113	132	232	277	440	527	940	1040													
90	10	14	28	32	57	65	107	125	219	262	415	498	887	983													
100	9	13	26	30	54	62	101	118	208	249	393	472	843	933													
150	7	10	20	23	42	48	78	91	171	205	320	387	691	762													
200	6	9	18	21	38	44	71	82	148	179	277	336	600	661													
250	5	8	16	19	34	39	63	74	133	161	247	301	538	591													
300	5	7	15	17	32	36	57	67	95	148	226	275	492	540													

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

- ¹ Table entries are rounded to 3 significant digits.
- ² Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing to the following equation: $L = 1.3 n$, where L is additional length (ft) of tubing and n is the number of additional fittings, bends, or both.
- ³ EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

TABLE 1216.2(15)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54-12: TABLE 6.2(p)]^{1,2}

													GAS: NATURAL	
													INLET PRESSURE: LESS THAN 2 psi	
													PRESSURE DROP: 3.0 in. w.c.	
													SPECIFIC GRAVITY: 0.60	
INTENDED USE: INITIAL SUPPLY PRESSURE OF 8.0 INCH WATER COLUMN OR GREATER														
TUBE SIZE (EHD) ³														
FLOW DESIGNATION:	13	15	18	19	23	25	30	31	37	46	48	60	62	
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR													
5	120	160	277	327	529	649	1180	1370	2140	4430	5010	8800	10 100	
10	83	112	197	231	380	462	828	958	1530	3200	3560	6270	7160	
15	67	90	161	189	313	379	673	778	1250	2540	2910	5140	5850	
20	57	78	140	164	273	329	580	672	1090	2200	2530	4460	5070	
25	51	69	125	147	245	295	518	599	978	1960	2270	4000	4540	
30	46	63	115	134	225	270	471	546	895	1790	2070	3660	4140	
40	39	54	100	116	196	234	407	471	778	1550	1800	3180	3590	
50	35	48	89	104	176	210	363	421	698	1380	1610	2850	3210	
60	32	44	82	95	161	192	330	383	639	1260	1470	2600	2930	
70	29	41	76	88	150	178	306	355	593	1170	1360	2420	2720	
80	27	38	71	82	141	167	285	331	555	1090	1280	2260	2540	
90	26	36	67	77	133	157	268	311	524	1030	1200	2140	2400	
100	24	34	63	73	126	149	254	295	498	974	1140	2030	2280	
150	19	27	52	60	104	122	206	240	409	793	936	1660	1860	
200	17	23	45	52	91	106	178	207	355	686	812	1440	1610	
250	15	21	40	46	82	95	159	184	319	613	728	1290	1440	
300	13	19	37	42	75	87	144	168	234	559	665	1180	1320	

For SI units: 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

- ¹ Table entries are rounded to 3 significant digits.
- ² Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing to the following equation: $L = 1.3 n$, where L is additional length (ft) of tubing and n is the number of additional fittings, bends, or both.
- ³ EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

FUEL GAS PIPING

TABLE 1216.2(16)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54-12: TABLE 6.2(q)]^{1, 2}

													GAS: NATURAL	
													INLET PRESSURE: LESS THAN 2 psi	
													PRESSURE DROP: 6.0 in. w.c.	
													SPECIFIC GRAVITY: 0.60	
INTENDED USE: INITIAL SUPPLY PRESSURE OF 11.0 INCH WATER COLUMN OR GREATER														
TUBE SIZE (EHD) ³														
FLOW DESIGNATION:	13	15	18	19	23	25	30	31	37	46	48	60	62	
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR													
5	173	229	389	461	737	911	1690	1950	3000	6280	7050	12 400	14 260	
10	120	160	277	327	529	649	1180	1370	2140	4430	5010	8800	10 100	
15	96	130	227	267	436	532	960	1110	1760	3610	4100	7210	8260	
20	83	112	197	231	380	462	828	958	1530	3120	3560	6270	7160	
25	74	99	176	207	342	414	739	855	1370	2790	3190	5620	6400	
30	67	90	161	189	313	379	673	778	1250	2540	2910	5140	5850	
40	57	78	140	164	273	329	580	672	1090	2200	2530	4460	5070	
50	51	69	125	147	245	295	518	599	978	1960	2270	4000	4540	
60	46	63	115	134	225	270	471	546	895	1790	2070	3660	4140	
70	42	58	106	124	209	250	435	505	830	1660	1920	3390	3840	
80	39	54	100	116	196	234	407	471	778	1550	1800	3180	3590	
90	37	51	94	109	185	221	383	444	735	1460	1700	3000	3390	
100	35	48	89	104	176	210	363	421	698	1380	1610	2850	3210	
150	28	39	73	85	145	172	294	342	573	1130	1320	2340	2630	
200	24	34	63	73	126	149	254	295	498	974	1140	2030	2280	
250	21	30	57	66	114	134	226	263	447	870	1020	1820	2040	
300	19	27	52	60	104	122	206	240	409	793	936	1660	1860	

For SI units: 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

- ¹ Table entries are rounded to 3 significant digits.
- ² Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing to the following equation: $L = 1.3 n$, where L is additional length (ft) of tubing and n is the number of additional fittings, bends, or both.
- ³ EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

TABLE 1216.2(17)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54-12: TABLE 6.2(r)]^{1, 2, 3, 4}

													GAS: NATURAL										
													INLET PRESSURE: 2.0 psi										
													PRESSURE DROP: 1.0 psi										
													SPECIFIC GRAVITY: 0.60										
													TUBE SIZE (EHD) ⁵										
FLOW DESIGNATION:	13	15	18	19	23	25	30	31	37	39	46	48	60	62									
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR																						
10	270	353	587	700	1100	1370	2590	2990	4510	5037	9600	10 700	18 600	21 600									
25	166	220	374	444	709	876	1620	1870	2890	3258	6040	6780	11 900	13 700									
30	151	200	342	405	650	801	1480	1700	2640	2987	5510	6200	10 900	12 500									
40	129	172	297	351	567	696	1270	1470	2300	2605	4760	5380	9440	10 900									
50	115	154	266	314	510	624	1140	1310	2060	2343	4260	4820	8470	9720									
75	93	124	218	257	420	512	922	1070	1690	1932	3470	3950	6940	7940									
80	89	120	211	249	407	496	892	1030	1640	1874	3360	3820	6730	7690									
100	79	107	189	222	366	445	795	920	1470	1685	3000	3420	6030	6880									
150	64	87	155	182	302	364	646	748	1210	1389	2440	2800	4940	5620									
200	55	75	135	157	263	317	557	645	1050	1212	2110	2430	4290	4870									
250	49	67	121	141	236	284	497	576	941	1090	1890	2180	3850	4360									
300	44	61	110	129	217	260	453	525	862	999	1720	1990	3520	3980									
400	38	52	96	111	189	225	390	453	749	871	1490	1730	3060	3450									
500	34	46	86	100	170	202	348	404	552	783	1330	1550	2740	3090									

For SI units: 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa

Notes:

- ¹ Table does not include effect of pressure drop across the line regulator. Where regulator loss exceeds 0.75 psi (5.17 kPa), DO NOT USE THIS TABLE. Consult with regulator manufacturer for pressure drops and capacity factors. Pressure drops across a regulator are capable of varying with flow rate.
- ² CAUTION: Capacities shown in table are capable of exceeding maximum capacity for a selected regulator. Consult with regulator or tubing manufacturer for guidance.
- ³ Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing according to the following equation: $L = 1.3 n$, where L is additional length (ft) of tubing and n is the number of additional fittings, bends, or both.
- ⁴ Table entries are rounded to 3 significant digits.
- ⁵ EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

FUEL GAS PIPING

TABLE 1216.2(18)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54-12: TABLE 6.2(s)]^{1, 2, 3, 4}

														GAS: NATURAL														
														INLET PRESSURE: 5.0 psi														
														PRESSURE DROP: 3.5 psi														
														SPECIFIC GRAVITY: 0.60														
														TUBE SIZE (EHD) ⁵														
FLOW DESIGNATION:	13	15	18	19	23	25	30	31	37	39	46	48	60	62														
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR																											
10	523	674	1080	1300	2000	2530	4920	5660	8300	9140	18 100	19 800	34 400	40 400														
25	322	420	691	827	1290	1620	3080	3540	5310	5911	11 400	12 600	22 000	25 600														
30	292	382	632	755	1180	1480	2800	3230	4860	5420	10 400	11 500	20 100	23 400														
40	251	329	549	654	1030	1280	2420	2790	4230	4727	8970	10 000	17 400	20 200														
50	223	293	492	586	926	1150	2160	2490	3790	4251	8020	8930	15 600	18 100														
75	180	238	403	479	763	944	1750	2020	3110	3506	6530	7320	12 800	14 800														
80	174	230	391	463	740	915	1690	1960	3020	3400	6320	7090	12 400	14 300														
100	154	205	350	415	665	820	1510	1740	2710	3057	5650	6350	11 100	12 800														
150	124	166	287	339	548	672	1230	1420	2220	2521	4600	5200	9130	10 500														
200	107	143	249	294	478	584	1060	1220	1930	2199	3980	4510	7930	9090														
250	95	128	223	263	430	524	945	1090	1730	1977	3550	4040	7110	8140														
300	86	116	204	240	394	479	860	995	1590	1813	3240	3690	6500	7430														
400	74	100	177	208	343	416	742	858	1380	1581	2800	3210	5650	6440														
500	66	89	159	186	309	373	662	766	1040	1422	2500	2870	5060	5760														

For SI units: 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa

Notes:

- ¹ Table does not include effect of pressure drop across the line regulator. Where regulator loss exceeds 1 psi (7 kPa), DO NOT USE THIS TABLE. Consult with regulator manufacturer for pressure drops and capacity factors. Pressure drops across regulator are capable of varying with the flow rate.
- ² CAUTION: Capacities shown in table are capable of exceeding the maximum capacity of selected regulator. Consult tubing manufacturer for guidance.
- ³ Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing to the following equation: $L = 1.3 n$, where L is additional length (feet) of tubing and n is the number of additional fittings, bends, or both.
- ⁴ Table entries are rounded to 3 significant digits.
- ⁵ EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

TABLE 1216.2(19)
POLYETHYLENE PLASTIC PIPE [NFPA 54-12: TABLE 6.2(t)]*

		GAS: NATURAL						
		INLET PRESSURE: LESS THAN 2 psi						
		PRESSURE DROP: 0.3 in. w.c.						
		SPECIFIC GRAVITY: 0.60						
		PIPE SIZE (inch)						
NOMINAL OD:	½	¾	1	1 ¼	1 ½	2	3	4
DESIGNATION:	SDR 9.3	SDR 11	SDR 11	SDR 10	SDR 11	SDR 11	SDR 11	SDR 11
ACTUAL ID:	0.660	0.860	1.077	1.328	1.554	1.943	2.864	3.682
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR							
10	153	305	551	955	1440	2590	7170	13 900
20	105	210	379	656	991	1780	4920	9520
30	84	169	304	527	796	1430	3950	7640
40	72	144	260	451	681	1220	3380	6540
50	64	128	231	400	604	1080	3000	5800
60	58	116	209	362	547	983	2720	5250
70	53	107	192	333	503	904	2500	4830
80	50	99	179	310	468	841	2330	4500
90	46	93	168	291	439	789	2180	4220
100	44	88	159	275	415	745	2060	3990
125	39	78	141	243	368	661	1830	3530
150	35	71	127	221	333	598	1660	3200
175	32	65	117	203	306	551	1520	2940
200	30	60	109	189	285	512	1420	2740
250	27	54	97	167	253	454	1260	2430
300	24	48	88	152	229	411	1140	2200
350	22	45	81	139	211	378	1050	2020
400	21	42	75	130	196	352	974	1880
450	19	39	70	122	184	330	914	1770
500	18	37	66	115	174	312	863	1670

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa
 * Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(20)
POLYETHYLENE PLASTIC PIPE [NFPA 54-12: TABLE 6.2(u)]*

									GAS: NATURAL									
									INLET PRESSURE: LESS THAN 2 psi									
									PRESSURE DROP: 0.5 in. w.c.									
									SPECIFIC GRAVITY: 0.60									
									PIPE SIZE (inch)									
NOMINAL OD:	1/2	3/4	1	1 1/4	1 1/2	2	3	4										
DESIGNATION:	SDR 9.3	SDR 11	SDR 11	SDR 10	SDR 11	SDR 11	SDR 11	SDR 11	SDR 11									
ACTUAL ID:	0.660	0.860	1.077	1.328	1.554	1.943	2.864	3.682										
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR																	
10	201	403	726	1260	1900	3410	9450	18 260										
20	138	277	499	865	1310	2350	6490	12 550										
30	111	222	401	695	1050	1880	5210	10 080										
40	95	190	343	594	898	1610	4460	8630										
50	84	169	304	527	796	1430	3950	7640										
60	76	153	276	477	721	1300	3580	6930										
70	70	140	254	439	663	1190	3300	6370										
80	65	131	236	409	617	1110	3070	5930										
90	61	123	221	383	579	1040	2880	5560										
100	58	116	209	362	547	983	2720	5250										
125	51	103	185	321	485	871	2410	4660										
150	46	93	168	291	439	789	2180	4220										
175	43	86	154	268	404	726	2010	3880										
200	40	80	144	249	376	675	1870	3610										
250	35	71	127	221	333	598	1660	3200										
300	32	64	115	200	302	542	1500	2900										
350	29	59	106	184	278	499	1380	2670										
400	27	55	99	171	258	464	1280	2480										
450	26	51	93	160	242	435	1200	2330										
500	24	48	88	152	229	411	1140	2200										

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa
* Table entries are rounded to 3 significant digits.

**TABLE 1216.2(21)
POLYETHYLENE PLASTIC PIPE [NFPA 54-12: TABLE 6.2(v)]***

									GAS: NATURAL	
									INLET PRESSURE: 2.0 psi	
									PRESSURE DROP: 1.0 psi	
									SPECIFIC GRAVITY: 0.60	
PIPE SIZE (inch)										
NOMINAL OD:	½	¾	1	1 ¼	1 ½	2	3	4		
DESIGNATION:	SDR 9.3	SDR 11	SDR 11	SDR 10	SDR 11	SDR 11	SDR 11	SDR 11		
ACTUAL ID:	0.660	0.860	1.077	1.328	1.554	1.943	2.864	3.682		
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR									
10	1860	3720	6710	11 600	17 600	31 600	87 300	169 000		
20	1280	2560	4610	7990	12 100	21 700	60 000	116 000		
30	1030	2050	3710	6420	9690	17 400	48 200	93 200		
40	878	1760	3170	5490	8300	14 900	41 200	79 700		
50	778	1560	2810	4870	7350	13 200	36 600	70 700		
60	705	1410	2550	4410	6660	12 000	33 100	64 000		
70	649	1300	2340	4060	6130	11 000	30 500	58 900		
80	603	1210	2180	3780	5700	10 200	28 300	54 800		
90	566	1130	2050	3540	5350	9610	26 600	51 400		
100	535	1070	1930	3350	5050	9080	25 100	48 600		
125	474	949	1710	2970	4480	8050	22 300	43 000		
150	429	860	1550	2690	4060	7290	20 200	39 000		
175	395	791	1430	2470	3730	6710	18 600	35 900		
200	368	736	1330	2300	3470	6240	17 300	33 400		
250	326	652	1180	2040	3080	5530	15 300	29 600		
300	295	591	1070	1850	2790	5010	13 900	26 800		
350	272	544	981	1700	2570	4610	12 800	24 700		
400	253	506	913	1580	2390	4290	11 900	22 900		
450	237	475	856	1480	2240	4020	11 100	21 500		
500	224	448	809	1400	2120	3800	10 500	20 300		
550	213	426	768	1330	2010	3610	9990	19 300		
600	203	406	733	1270	1920	3440	9530	18 400		
650	194	389	702	1220	1840	3300	9130	17 600		
700	187	374	674	1170	1760	3170	8770	16 900		
750	180	360	649	1130	1700	3050	8450	16 300		
800	174	348	627	1090	1640	2950	8160	15 800		
850	168	336	607	1050	1590	2850	7890	15 300		
900	163	326	588	1020	1540	2770	7650	14 800		
950	158	317	572	990	1500	2690	7430	14 400		
1000	154	308	556	963	1450	2610	7230	14 000		
1100	146	293	528	915	1380	2480	6870	13 300		
1200	139	279	504	873	1320	2370	6550	12 700		
1300	134	267	482	836	1260	2270	6270	12 100		
1400	128	257	463	803	1210	2180	6030	11 600		
1500	124	247	446	773	1170	2100	5810	11 200		
1600	119	239	431	747	1130	2030	5610	10 800		
1700	115	231	417	723	1090	1960	5430	10 500		
1800	112	224	404	701	1060	1900	5260	10 200		
1900	109	218	393	680	1030	1850	5110	9900		
2000	106	212	382	662	1000	1800	4970	9600		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283 m³/h, 1 pound-force per square inch = 6.8947 kPa

* Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(22)
POLYETHYLENE PLASTIC TUBING [NFPA 54-12: TABLE 6.2(w)]^{2, 3}

	GAS: NATURAL	
	INLET PRESSURE: LESS THAN 2.0 psi	
	PRESSURE DROP: 0.3 in. w.c.	
	SPECIFIC GRAVITY: 0.60	
	PLASTIC TUBING SIZE (CTS) ¹ (inch)	
NOMINAL OD:	½	1
DESIGNATION:	SDR 7	SDR 11
ACTUAL ID:	0.445	0.927
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR	
10	54	372
20	37	256
30	30	205
40	26	176
50	23	156
60	21	141
70	19	130
80	18	121
90	17	113
100	16	107
125	14	95
150	13	86
175	12	79
200	11	74
225	10	69
250	NA	65
275	NA	62
300	NA	59
350	NA	54
400	NA	51
450	NA	47
500	NA	45

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

- ¹ CTS = Copper tube size.
- ² Table entries are rounded to 3 significant digits.
- ³ NA means a flow of less than 10 ft³/h (0.283 m³/h).

TABLE 1216.2(23)
POLYETHYLENE PLASTIC TUBING [NFPA 54-12: TABLE 6.2(x)]^{2, 3}

	GAS: NATURAL	
	INLET PRESSURE: LESS THAN 2.0 psi	
	PRESSURE DROP: 0.5 in. w.c.	
	SPECIFIC GRAVITY: 0.60	
	PLASTIC TUBING SIZE (CTS) ¹ (inch)	
NOMINAL OD:	½	1
DESIGNATION:	SDR 7	SDR 11
ACTUAL ID:	0.445	0.927
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR	
10	72	490
20	49	337
30	39	271
40	34	232
50	30	205
60	27	186
70	25	171
80	23	159
90	22	149
100	21	141
125	18	125
150	17	113
175	15	104
200	14	97
225	13	91
250	12	86
275	11	82
300	11	78
350	10	72
400	NA	67
450	NA	63
500	NA	59

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1 cubic foot per hour = 0.0283m³/h, 1 pound-force per square inch = 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

- ¹ CTS = Copper tube size.
- ² Table entries are rounded to 3 significant digits.
- ³ NA means a flow of less than 10 ft³/h (0.283 m³/h).

TABLE 1216.2(24)
SCHEDULE 40 METALLIC PIPE [NFPA 54: TABLE 6.3(a)]*

										GAS: UNDILUTED PROPANE	
										INLET PRESSURE: 10.0 psi	
										PRESSURE DROP: 1.0 psi	
										SPECIFIC GRAVITY: 1.50	
INTENDED USE: PIPE SIZING BETWEEN FIRST STAGE (HIGH PRESSURE) REGULATOR AND SECOND STAGE (LOW PRESSURE) REGULATOR											
PIPE SIZE (inch)											
NOMINAL INSIDE:	½	¾	1	1¼	1½	2	2½	3	4		
ACTUAL:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR										
10	3320	6950	13 100	26 900	40 300	77 600	124 000	219 000	446 000		
20	2280	4780	9000	18 500	27 700	53 300	85 000	150 000	306 000		
30	1830	3840	7220	14 800	22 200	42 800	68 200	121 000	246 000		
40	1570	3280	6180	12 700	19 000	36 600	58 400	103 000	211 000		
50	1390	2910	5480	11 300	16 900	32 500	51 700	91 500	187 000		
60	1260	2640	4970	10 200	15 300	29 400	46 900	82 900	169 000		
70	1160	2430	4570	9380	14 100	27 100	43 100	76 300	156 000		
80	1080	2260	4250	8730	13 100	25 200	40 100	70 900	145 000		
90	1010	2120	3990	8190	12 300	23 600	37 700	66 600	136 000		
100	956	2000	3770	7730	11 600	22 300	35 600	62 900	128 000		
125	848	1770	3340	6850	10 300	19 800	31 500	55 700	114 000		
150	768	1610	3020	6210	9300	17 900	28 600	50 500	103 000		
175	706	1480	2780	5710	8560	16 500	26 300	46 500	94 700		
200	657	1370	2590	5320	7960	15 300	24 400	43 200	88 100		
250	582	1220	2290	4710	7060	13 600	21 700	38 300	78 100		
300	528	1100	2080	4270	6400	12 300	19 600	34 700	70 800		
350	486	1020	1910	3930	5880	11 300	18 100	31 900	65 100		
400	452	945	1780	3650	5470	10 500	16 800	29 700	60 600		
450	424	886	1670	3430	5140	9890	15 800	27 900	56 800		
500	400	837	1580	3240	4850	9340	14 900	26 300	53 700		
550	380	795	1500	3070	4610	8870	14 100	25 000	51 000		
600	363	759	1430	2930	4400	8460	13 500	23 900	48 600		
650	347	726	1370	2810	4210	8110	12 900	22 800	46 600		
700	334	698	1310	2700	4040	7790	12 400	21 900	44 800		
750	321	672	1270	2600	3900	7500	12 000	21 100	43 100		
800	310	649	1220	2510	3760	7240	11 500	20 400	41 600		
850	300	628	1180	2430	3640	7010	11 200	19 800	40 300		
900	291	609	1150	2360	3530	6800	10 800	19 200	39 100		
950	283	592	1110	2290	3430	6600	10 500	18 600	37 900		
1000	275	575	1080	2230	3330	6420	10 200	18 100	36 900		
1100	261	546	1030	2110	3170	6100	9720	17 200	35 000		
1200	249	521	982	2020	3020	5820	9270	16 400	33 400		
1300	239	499	940	1930	2890	5570	8880	15 700	32 000		
1400	229	480	903	1850	2780	5350	8530	15 100	30 800		
1500	221	462	870	1790	2680	5160	8220	14 500	29 600		
1600	213	446	840	1730	2590	4980	7940	14 000	28 600		
1700	206	432	813	1670	2500	4820	7680	13 600	27 700		
1800	200	419	789	1620	2430	4670	7450	13 200	26 900		
1900	194	407	766	1570	2360	4540	7230	12 800	26 100		
2000	189	395	745	1530	2290	4410	7030	12 400	25 400		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 pound-force per square inch = 6.8947 kPa

* Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(25)
SCHEDULE 40 METALLIC PIPE [NFPA 54: TABLE 6.3(b)]*

										GAS: UNDILUTED PROPANE	
										INLET PRESSURE: 10.0 psi	
										PRESSURE DROP: 3.0 psi	
										SPECIFIC GRAVITY: 1.50	
INTENDED USE: PIPE SIZING BETWEEN FIRST STAGE (HIGH PRESSURE) REGULATOR AND SECOND STAGE (LOW PRESSURE) REGULATOR											
PIPE SIZE (inch)											
NOMINAL INSIDE:	½	¾	1	1¼	1½	2	2½	3	4		
ACTUAL:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR										
10	5890	12 300	23 200	47 600	71 300	137 000	219 000	387 000	789 000		
20	4050	8460	15 900	32 700	49 000	94 400	150 000	266 000	543 000		
30	3250	6790	12 800	26 300	39 400	75 800	121 000	214 000	436 000		
40	2780	5810	11 000	22 500	33 700	64 900	103 000	183 000	373 000		
50	2460	5150	9710	19 900	29 900	57 500	91 600	162 000	330 000		
60	2230	4670	8790	18 100	27 100	52 100	83 000	147 000	299 000		
70	2050	4300	8090	16 600	24 900	47 900	76 400	135 000	275 000		
80	1910	4000	7530	15 500	23 200	44 600	71 100	126 000	256 000		
90	1790	3750	7060	14 500	21 700	41 800	66 700	118 000	240 000		
100	1690	3540	6670	13 700	20 500	39 500	63 000	111 000	227 000		
125	1500	3140	5910	12 100	18 200	35 000	55 800	98 700	201 000		
150	1360	2840	5360	11 000	16 500	31 700	50 600	89 400	182 000		
175	1250	2620	4930	10 100	15 200	29 200	46 500	82 300	167 800		
200	1160	2430	4580	9410	14 100	27 200	43 300	76 500	156 100		
250	1030	2160	4060	8340	12 500	24 100	38 400	67 800	138 400		
300	935	1950	3680	7560	11 300	21 800	34 800	61 500	125 400		
350	860	1800	3390	6950	10 400	20 100	32 000	56 500	115 300		
400	800	1670	3150	6470	9690	18 700	29 800	52 600	107 300		
450	751	1570	2960	6070	9090	17 500	27 900	49 400	100 700		
500	709	1480	2790	5730	8590	16 500	26 400	46 600	95 100		
550	673	1410	2650	5450	8160	15 700	25 000	44 300	90 300		
600	642	1340	2530	5200	7780	15 000	23 900	42 200	86 200		
650	615	1290	2420	4980	7450	14 400	22 900	40 500	82 500		
700	591	1240	2330	4780	7160	13 800	22 000	38 900	79 300		
750	569	1190	2240	4600	6900	13 300	21 200	37 400	76 400		
800	550	1150	2170	4450	6660	12 800	20 500	36 200	73 700		
850	532	1110	2100	4300	6450	12 400	19 800	35 000	71 400		
900	516	1080	2030	4170	6250	12 000	19 200	33 900	69 200		
950	501	1050	1970	4050	6070	11 700	18 600	32 900	67 200		
1000	487	1020	1920	3940	5900	11 400	18 100	32 000	65 400		
1100	463	968	1820	3740	5610	10 800	17 200	30 400	62 100		
1200	442	923	1740	3570	5350	10 300	16 400	29 000	59 200		
1300	423	884	1670	3420	5120	9870	15 700	27 800	56 700		
1400	406	849	1600	3280	4920	9480	15 100	26 700	54 500		
1500	391	818	1540	3160	4740	9130	14 600	25 700	52 500		
1600	378	790	1490	3060	4580	8820	14 100	24 800	50 700		
1700	366	765	1440	2960	4430	8530	13 600	24 000	49 000		
1800	355	741	1400	2870	4300	8270	13 200	23 300	47 600		
1900	344	720	1360	2780	4170	8040	12 800	22 600	46 200		
2000	335	700	1320	2710	4060	7820	12 500	22 000	44 900		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 pound-force per square inch = 6.8947 kPa

* Table entries are rounded to 3 significant digits.

TABLE 1216.2(26)
SCHEDULE 40 METALLIC PIPE [NFPA 54: TABLE 6.3(c)]*

										GAS: UNDILUTED PROPANE	
										INLET PRESSURE: 2.0 psi	
										PRESSURE DROP: 1.0 psi	
										SPECIFIC GRAVITY: 1.50	
INTENDED USE: PIPE SIZING BETWEEN 2 PSI SERVICE AND LINE PRESSURE REGULATOR											
PIPE SIZE (inch)											
NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4		
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR										
10	2680	5590	10 500	21 600	32 400	62 400	99 500	176 000	359 000		
20	1840	3850	7240	14 900	22 300	42 900	68 400	121 000	247 000		
30	1480	3090	5820	11 900	17 900	34 500	54 900	97 100	198 000		
40	1260	2640	4980	10 200	15 300	29 500	47 000	83 100	170 000		
50	1120	2340	4410	9060	13 600	26 100	41 700	73 700	150 000		
60	1010	2120	4000	8210	12 300	23 700	37 700	66 700	136 000		
70	934	1950	3680	7550	11 300	21 800	34 700	61 400	125 000		
80	869	1820	3420	7020	10 500	20 300	32 300	57 100	116 000		
90	815	1700	3210	6590	9880	19 000	30 300	53 600	109 000		
100	770	1610	3030	6230	9330	18 000	28 600	50 600	103 000		
125	682	1430	2690	5520	8270	15 900	25 400	44 900	91 500		
150	618	1290	2440	5000	7490	14 400	23 000	40 700	82 900		
175	569	1190	2240	4600	6890	13 300	21 200	37 400	76 300		
200	529	1110	2080	4280	6410	12 300	19 700	34 800	71 000		
250	469	981	1850	3790	5680	10 900	17 400	30 800	62 900		
300	425	889	1670	3440	5150	9920	15 800	27 900	57 000		
350	391	817	1540	3160	4740	9120	14 500	25 700	52 400		
400	364	760	1430	2940	4410	8490	13 500	23 900	48 800		
450	341	714	1340	2760	4130	7960	12 700	22 400	45 800		
500	322	674	1270	2610	3910	7520	12 000	21 200	43 200		
550	306	640	1210	2480	3710	7140	11 400	20 100	41 100		
600	292	611	1150	2360	3540	6820	10 900	19 200	39 200		
650	280	585	1100	2260	3390	6530	10 400	18 400	37 500		
700	269	562	1060	2170	3260	6270	9990	17 700	36 000		
750	259	541	1020	2090	3140	6040	9630	17 000	34 700		
800	250	523	985	2020	3030	5830	9300	16 400	33 500		
850	242	506	953	1960	2930	5640	9000	15 900	32 400		
900	235	490	924	1900	2840	5470	8720	15 400	31 500		
950	228	476	897	1840	2760	5310	8470	15 000	30 500		
1000	222	463	873	1790	2680	5170	8240	14 600	29 700		
1100	210	440	829	1700	2550	4910	7830	13 800	28 200		
1200	201	420	791	1620	2430	4680	7470	13 200	26 900		
1300	192	402	757	1550	2330	4490	7150	12 600	25 800		
1400	185	386	727	1490	2240	4310	6870	12 100	24 800		
1500	178	372	701	1440	2160	4150	6620	11 700	23 900		
1600	172	359	677	1390	2080	4010	6390	11 300	23 000		
1700	166	348	655	1340	2010	3880	6180	10 900	22 300		
1800	161	337	635	1300	1950	3760	6000	10 600	21 600		
1900	157	327	617	1270	1900	3650	5820	10 300	21 000		
2000	152	318	600	1230	1840	3550	5660	10 000	20 400		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 pound-force per square inch = 6.8947 kPa

* Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(27)
SCHEDULE 40 METALLIC PIPE [NFPA 54: TABLE 6.3(d)]*

										GAS: UNDILUTED PROPANE	
										INLET PRESSURE: 11.0 in. w.c.	
										PRESSURE DROP: 0.5 in. w.c.	
										SPECIFIC GRAVITY: 1.50	
INTENDED USE: PIPE SIZING BETWEEN SINGLE OR SECOND STAGE (LOW PRESSURE) REGULATOR AND APPLIANCE											
PIPE SIZE (inch)											
NOMINAL INSIDE:	½	¾	1	1¼	1½	2	2½	3	4		
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR										
10	291	608	1150	2350	3520	6790	10 800	19 100	39 000		
20	200	418	787	1620	2420	4660	7430	13 100	26 800		
30	160	336	632	1300	1940	3750	5970	10 600	21 500		
40	137	287	541	1110	1660	3210	5110	9030	18 400		
50	122	255	480	985	1480	2840	4530	8000	16 300		
60	110	231	434	892	1340	2570	4100	7250	14 800		
80	101	212	400	821	1230	2370	3770	6670	13 600		
100	94	197	372	763	1140	2200	3510	6210	12 700		
125	89	185	349	716	1070	2070	3290	5820	11 900		
150	84	175	330	677	1010	1950	3110	5500	11 200		
175	74	155	292	600	899	1730	2760	4880	9950		
200	67	140	265	543	814	1570	2500	4420	9010		
250	62	129	243	500	749	1440	2300	4060	8290		
300	58	120	227	465	697	1340	2140	3780	7710		
350	51	107	201	412	618	1190	1900	3350	6840		
400	46	97	182	373	560	1080	1720	3040	6190		
450	42	89	167	344	515	991	1580	2790	5700		
500	40	83	156	320	479	922	1470	2600	5300		
550	37	78	146	300	449	865	1380	2440	4970		
600	35	73	138	283	424	817	1300	2300	4700		
650	33	70	131	269	403	776	1240	2190	4460		
700	32	66	125	257	385	741	1180	2090	4260		
750	30	64	120	246	368	709	1130	2000	4080		
800	29	61	115	236	354	681	1090	1920	3920		
850	28	59	111	227	341	656	1050	1850	3770		
900	27	57	107	220	329	634	1010	1790	3640		
950	26	55	104	213	319	613	978	1730	3530		
1000	25	53	100	206	309	595	948	1680	3420		
1100	25	52	97	200	300	578	921	1630	3320		
1200	24	50	95	195	292	562	895	1580	3230		
1300	23	48	90	185	277	534	850	1500	3070		
1400	22	46	86	176	264	509	811	1430	2930		
1500	21	44	82	169	253	487	777	1370	2800		
1600	20	42	79	162	243	468	746	1320	2690		
1700	19	40	76	156	234	451	719	1270	2590		
1800	19	39	74	151	226	436	694	1230	2500		
1900	18	38	71	146	219	422	672	1190	2420		
2000	18	37	69	142	212	409	652	1150	2350		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 inch water column = 0.249 kPa

* Table entries are rounded to 3 significant digits.

TABLE 1216.2(28)
SEMI-RIGID COPPER TUBING [NFPA 54: TABLE 6.3(e)]²

		GAS: UNDILUTED PROPANE								
		INLET PRESSURE: 10.0 psi								
		PRESSURE DROP: 1.0 psi								
		SPECIFIC GRAVITY: 1.50								
INTENDED USE: TUBE SIZING BETWEEN FIRST STAGE (HIGH PRESSURE) REGULATOR AND SECOND STAGE (LOW PRESSURE) REGULATOR										
		TUBE SIZE (inch)								
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	7⁄8	1½	1¾	–	–
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ¹		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN THOUSANDS OF BTU PER HOUR								
10	513	1060	2150	3760	5330	11 400	20 500	32 300	67 400	
20	352	727	1480	2580	3670	7830	14 100	22 200	46 300	
30	283	584	1190	2080	2940	6290	11 300	17 900	37 200	
40	242	500	1020	1780	2520	5380	9690	15 300	31 800	
50	215	443	901	1570	2230	4770	8590	13 500	28 200	
60	194	401	816	1430	2020	4320	7780	12 300	25 600	
70	179	369	751	1310	1860	3980	7160	11 300	23 500	
80	166	343	699	1220	1730	3700	6660	10 500	21 900	
90	156	322	655	1150	1630	3470	6250	9850	20 500	
100	147	304	619	1080	1540	3280	5900	9310	19 400	
125	131	270	549	959	1360	2910	5230	8250	17 200	
150	118	244	497	869	1230	2630	4740	7470	15 600	
175	109	225	457	799	1130	2420	4360	6880	14 300	
200	101	209	426	744	1060	2250	4060	6400	13 300	
250	90	185	377	659	935	2000	3600	5670	11 800	
300	81	168	342	597	847	1810	3260	5140	10 700	
350	75	155	314	549	779	1660	3000	4730	9840	
400	70	144	292	511	725	1550	2790	4400	9160	
450	65	135	274	480	680	1450	2620	4130	8590	
500	62	127	259	453	643	1370	2470	3900	8120	
550	59	121	246	430	610	1300	2350	3700	7710	
600	56	115	235	410	582	1240	2240	3530	7350	
650	54	111	225	393	558	1190	2140	3380	7040	
700	51	106	216	378	536	1140	2060	3250	6770	
750	50	102	208	364	516	1100	1980	3130	6520	
800	48	99	201	351	498	1060	1920	3020	6290	
850	46	96	195	340	482	1030	1850	2920	6090	
900	45	93	189	330	468	1000	1800	2840	5910	
950	44	90	183	320	454	970	1750	2750	5730	
1000	42	88	178	311	442	944	1700	2680	5580	
1100	40	83	169	296	420	896	1610	2540	5300	
1200	38	79	161	282	400	855	1540	2430	5050	
1300	37	76	155	270	383	819	1470	2320	4840	
1400	35	73	148	260	368	787	1420	2230	4650	
1500	34	70	143	250	355	758	1360	2150	4480	
1600	33	68	138	241	343	732	1320	2080	4330	
1700	32	66	134	234	331	708	1270	2010	4190	
1800	31	64	130	227	321	687	1240	1950	4060	
1900	30	62	126	220	312	667	1200	1890	3940	
2000	29	60	122	214	304	648	1170	1840	3830	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 pound-force per square inch = 6.8947 kPa

Notes:

¹ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.

² Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(29)
SEMI-RIGID COPPER TUBING [NFPA 54: TABLE 6.3(f)]^{2, 3}

		GAS: UNDILUTED PROPANE								
		INLET PRESSURE: 11.0 in. w.c.								
		PRESSURE DROP: 0.5 in. w.c.								
		SPECIFIC GRAVITY: 1.50								
INTENDED USE: TUBE SIZING BETWEEN SINGLE OR SECOND STAGE (LOW PRESSURE) REGULATOR AND APPLIANCE										
		TUBE SIZE (inch)								
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	7⁄8	1½	1¾	–	–
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ¹		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN THOUSANDS OF BTU PER HOUR								
10	45	93	188	329	467	997	1800	2830	5890	
20	31	64	129	226	321	685	1230	1950	4050	
30	25	51	104	182	258	550	991	1560	3250	
40	21	44	89	155	220	471	848	1340	2780	
50	19	39	79	138	195	417	752	1180	2470	
60	17	35	71	125	177	378	681	1070	2240	
70	16	32	66	115	163	348	626	988	2060	
80	15	30	61	107	152	324	583	919	1910	
90	14	28	57	100	142	304	547	862	1800	
100	13	27	54	95	134	287	517	814	1700	
125	11	24	48	84	119	254	458	722	1500	
150	10	21	44	76	108	230	415	654	1360	
175	NA	20	40	70	99	212	382	602	1250	
200	NA	18	37	65	92	197	355	560	1170	
250	NA	16	33	58	82	175	315	496	1030	
300	NA	15	30	52	74	158	285	449	936	
350	NA	14	28	48	68	146	262	414	861	
400	NA	13	26	45	63	136	244	385	801	
450	NA	12	24	42	60	127	229	361	752	
500	NA	11	23	40	56	120	216	341	710	
550	NA	11	22	38	53	114	205	324	674	
600	NA	10	21	36	51	109	196	309	643	
650	NA	NA	20	34	49	104	188	296	616	
700	NA	NA	19	33	47	100	180	284	592	
750	NA	NA	18	32	45	96	174	274	570	
800	NA	NA	18	31	44	93	168	264	551	
850	NA	NA	17	30	42	90	162	256	533	
900	NA	NA	17	29	41	87	157	248	517	
950	NA	NA	16	28	40	85	153	241	502	
1000	NA	NA	16	27	39	83	149	234	488	
1100	NA	NA	15	26	37	78	141	223	464	
1200	NA	NA	14	25	35	75	135	212	442	
1300	NA	NA	14	24	34	72	129	203	423	
1400	NA	NA	13	23	32	69	124	195	407	
1500	NA	NA	13	22	31	66	119	188	392	
1600	NA	NA	12	21	30	64	115	182	378	
1700	NA	NA	12	20	29	62	112	176	366	
1800	NA	NA	11	20	28	60	108	170	355	
1900	NA	NA	11	19	27	58	105	166	345	
2000	NA	NA	11	19	27	57	102	161	335	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 inch water column = 0.249 kPa

Notes:

¹ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.

² Table entries are rounded to 3 significant digits.

³ NA means a flow of less than 10 000 Btu/h (2.93 kW).

TABLE 1216.2(30)
SEMI-RIGID COPPER TUBING [NFPA 54: TABLE 6.3(g)]²

		GAS: UNDILUTED PROPANE								
		INLET PRESSURE: 2.0 psi								
		PRESSURE DROP: 1.0 psi								
		SPECIFIC GRAVITY: 1.50								
INTENDED USE: TUBE SIZING BETWEEN 2 PSIG SERVICE AND LINE PRESSURE REGULATOR										
		TUBE SIZE (inch)								
NOMINAL:	K & L:	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR:	⅜	½	⅝	¾	7⁄8	1½	1¾	–	–
OUTSIDE:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
INSIDE: ¹		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
LENGTH (feet)		CAPACITY IN THOUSANDS OF BTU PER HOUR								
10	413	852	1730	3030	4300	9170	16 500	26 000	54 200	
20	284	585	1190	2080	2950	6310	11 400	17 900	37 300	
30	228	470	956	1670	2370	5060	9120	14 400	29 900	
40	195	402	818	1430	2030	4330	7800	12 300	25 600	
50	173	356	725	1270	1800	3840	6920	10 900	22 700	
60	157	323	657	1150	1630	3480	6270	9880	20 600	
70	144	297	605	1060	1500	3200	5760	9090	18 900	
80	134	276	562	983	1390	2980	5360	8450	17 600	
90	126	259	528	922	1310	2790	5030	7930	16 500	
100	119	245	498	871	1240	2640	4750	7490	15 600	
125	105	217	442	772	1100	2340	4210	6640	13 800	
150	95	197	400	700	992	2120	3820	6020	12 500	
175	88	181	368	644	913	1950	3510	5540	11 500	
200	82	168	343	599	849	1810	3270	5150	10 700	
250	72	149	304	531	753	1610	2900	4560	9510	
300	66	135	275	481	682	1460	2620	4140	8610	
350	60	124	253	442	628	1340	2410	3800	7920	
400	56	116	235	411	584	1250	2250	3540	7370	
450	53	109	221	386	548	1170	2110	3320	6920	
500	50	103	209	365	517	1110	1990	3140	6530	
550	47	97	198	346	491	1050	1890	2980	6210	
600	45	93	189	330	469	1000	1800	2840	5920	
650	43	89	181	316	449	959	1730	2720	5670	
700	41	86	174	304	431	921	1660	2620	5450	
750	40	82	168	293	415	888	1600	2520	5250	
800	39	80	162	283	401	857	1540	2430	5070	
850	37	77	157	274	388	829	1490	2350	4900	
900	36	75	152	265	376	804	1450	2280	4750	
950	35	72	147	258	366	781	1410	2220	4620	
1000	34	71	143	251	356	760	1370	2160	4490	
1100	32	67	136	238	338	721	1300	2050	4270	
1200	31	64	130	227	322	688	1240	1950	4070	
1300	30	61	124	217	309	659	1190	1870	3900	
1400	28	59	120	209	296	633	1140	1800	3740	
1500	27	57	115	201	286	610	1100	1730	3610	
1600	26	55	111	194	276	589	1060	1670	3480	
1700	26	53	108	188	267	570	1030	1620	3370	
1800	25	51	104	182	259	553	1000	1570	3270	
1900	24	50	101	177	251	537	966	1520	3170	
2000	23	48	99	172	244	522	940	1480	3090	

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 pound-force per square inch = 6.8947 kPa

Notes:

- ¹ Table capacities are based on Type K copper tubing inside diameter (shown), which has the smallest inside diameter of the copper tubing products.
- ² Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(31)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54: TABLE 6.3(h)]^{1, 2}

														GAS: UNDILUTED PROPANE	
														INLET PRESSURE: 11.0 in. w.c.	
														PRESSURE DROP: 0.5 in. w.c.	
														SPECIFIC GRAVITY: 1.50	
INTENDED USE: CSST SIZING BETWEEN SINGLE OR SECOND STAGE (LOW PRESSURE) REGULATOR AND APPLIANCE SHUTOFF VALVE															
TUBE SIZE (EHD) ³															
FLOW DESIGNATION:	13	15	18	19	23	25	30	31	37	39	46	48	60	62	
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR														
5	72	99	181	211	355	426	744	863	1420	1638	2830	3270	5780	6550	
10	50	69	129	150	254	303	521	605	971	1179	1990	2320	4110	4640	
15	39	55	104	121	208	248	422	490	775	972	1620	1900	3370	3790	
20	34	49	91	106	183	216	365	425	661	847	1400	1650	2930	3290	
25	30	42	82	94	164	192	325	379	583	762	1250	1480	2630	2940	
30	28	39	74	87	151	177	297	344	528	698	1140	1350	2400	2680	
40	23	33	64	74	131	153	256	297	449	610	988	1170	2090	2330	
50	20	30	58	66	118	137	227	265	397	548	884	1050	1870	2080	
60	19	26	53	60	107	126	207	241	359	502	805	961	1710	1900	
70	17	25	49	57	99	117	191	222	330	466	745	890	1590	1760	
80	15	23	45	52	94	109	178	208	307	438	696	833	1490	1650	
90	15	22	44	50	90	102	169	197	286	414	656	787	1400	1550	
100	14	20	41	47	85	98	159	186	270	393	621	746	1330	1480	
150	11	15	31	36	66	75	123	143	217	324	506	611	1090	1210	
200	9	14	28	33	60	69	112	129	183	283	438	531	948	1050	
250	8	12	25	30	53	61	99	117	163	254	390	476	850	934	
300	8	11	23	26	50	57	90	107	147	234	357	434	777	854	

For SI units: 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 inch water column = 0.249 kPa

Notes:

- ¹ Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing to the following equation: $L = 1.3 n$, where L is additional length (ft) of tubing and n is the number of additional fittings, bends, or both.
- ² Table entries are rounded to 3 significant digits.
- ³ EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

TABLE 1216.2(32)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54: TABLE 6.3(i)]^{1, 2, 3, 4}

														GAS: UNDILUTED PROPANE		
														INLET PRESSURE: 2.0 psi		
														PRESSURE DROP: 1.0 psi		
														SPECIFIC GRAVITY: 1.50		
INTENDED USE: CSST SIZING BETWEEN 2 PSI SERVICE AND LINE PRESSURE REGULATOR																
														TUBE SIZE (EHD) ⁵		
FLOW DESIGNATION:	13	15	18	19	23	25	30	31	37	39	46	48	60	62		
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR															
10	426	558	927	1110	1740	2170	4100	4720	7130	7958	15 200	16 800	29 400	34 200		
25	262	347	591	701	1120	1380	2560	2950	4560	5147	9550	10 700	18 800	21 700		
30	238	316	540	640	1030	1270	2330	2690	4180	4719	8710	9790	17 200	19 800		
40	203	271	469	554	896	1100	2010	2320	3630	4116	7530	8500	14 900	17 200		
50	181	243	420	496	806	986	1790	2070	3260	3702	6730	7610	13 400	15 400		
75	147	196	344	406	663	809	1460	1690	2680	3053	5480	6230	11 000	12 600		
80	140	189	333	393	643	768	1410	1630	2590	2961	5300	6040	10 600	12 200		
100	124	169	298	350	578	703	1260	1450	2330	2662	4740	5410	9530	10 900		
150	101	137	245	287	477	575	1020	1180	1910	2195	3860	4430	7810	8890		
200	86	118	213	248	415	501	880	1020	1660	1915	3340	3840	6780	7710		
250	77	105	191	222	373	448	785	910	1490	1722	2980	3440	6080	6900		
300	69	96	173	203	343	411	716	829	1360	1578	2720	3150	5560	6300		
400	60	82	151	175	298	355	616	716	1160	1376	2350	2730	4830	5460		
500	53	72	135	158	268	319	550	638	1030	1237	2100	2450	4330	4880		

For SI units: 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 pound-force per square inch = 6.8947 kPa

Notes:

- ¹ Table does not include effect of pressure drop across the line regulator. Where regulator loss exceeds 0.5 psi (3.4 kPa) [based on 13 inch water column (3.2 kPa) outlet pressure], DO NOT USE THIS TABLE. Consult with regulator manufacturer for pressure drops and capacity factors. Pressure drops across a regulator are capable of varying with flow rate.
- ² CAUTION: Capacities shown in table are capable of exceeding the maximum capacity for a selected regulator. Consult with regulator or tubing manufacturer for guidance.
- ³ Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing to the following equation: $L = 1.3 n$, where L is additional length (ft) of tubing and n is the number of additional fittings, bends, or both.
- ⁴ Table entries are rounded to 3 significant digits.
- ⁵ EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

FUEL GAS PIPING

TABLE 1216.2(33)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54: TABLE 6.3(j)]^{1, 2, 3, 4}

														GAS: UNDILUTED PROPANE															
														INLET PRESSURE: 5.0 psi															
														PRESSURE DROP: 3.5 psi															
														SPECIFIC GRAVITY: 1.50															
														TUBE SIZE (EHD) ⁵															
FLOW DESIGNATION:	13	15	18	19	23	25	30	31	37	39	46	48	60	62															
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR																												
10	826	1070	1710	2060	3150	4000	7830	8950	13 100	14 441	28 600	31 200	54 400	63 800															
25	509	664	1090	1310	2040	2550	4860	5600	8400	9339	18 000	19 900	34 700	40 400															
30	461	603	999	1190	1870	2340	4430	5100	7680	8564	16 400	18 200	31 700	36 900															
40	396	520	867	1030	1630	2030	3820	4400	6680	7469	14 200	15 800	27 600	32 000															
50	352	463	777	926	1460	1820	3410	3930	5990	6717	12 700	14 100	24 700	28 600															
75	284	376	637	757	1210	1490	2770	3190	4920	5539	10 300	11 600	20 300	23 400															
80	275	363	618	731	1170	1450	2680	3090	4770	5372	9990	11 200	19 600	22 700															
100	243	324	553	656	1050	1300	2390	2760	4280	4830	8930	10 000	17 600	20 300															
150	196	262	453	535	866	1060	1940	2240	3510	3983	7270	8210	14 400	16 600															
200	169	226	393	464	755	923	1680	1930	3050	3474	6290	7130	12 500	14 400															
250	150	202	352	415	679	828	1490	1730	2740	3124	5620	6390	11 200	12 900															
300	136	183	322	379	622	757	1360	1570	2510	2865	5120	5840	10 300	11 700															
400	117	158	279	328	542	657	1170	1360	2180	2498	4430	5070	8920	10 200															
500	104	140	251	294	488	589	1050	1210	1950	2247	3960	4540	8000	9110															

For SI units: 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 pound-force per square inch = 6.8947 kPa

Notes:

- ¹ Table does not include effect of pressure drop across the line regulator. Where regulator loss exceeds 0.5 psi (3.4 kPa) [based on 13 inch water column (3.2 kPa) outlet pressure], DO NOT USE THIS TABLE. Consult with regulator manufacturer for pressure drops and capacity factors. Pressure drops across a regulator are capable of varying with flow rate.
- ² CAUTION: Capacities shown in table are capable of exceeding the maximum capacity for a selected regulator. Consult with regulator or tubing manufacturer for guidance.
- ³ Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing to the following equation: $L = 1.3 n$, where L is additional length (ft) of tubing and n is the number of additional fittings, bends, or both.
- ⁴ Table entries are rounded to 3 significant digits.
- ⁵ EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

**TABLE 1216.2(34)
POLYETHYLENE PLASTIC PIPE [NFPA 54-12: TABLE 6.3(k)]***

									GAS: UNDILUTED PROPANE	
									INLET PRESSURE: 11.0 in. w.c.	
									PRESSURE DROP: 0.5 in. w.c.	
									SPECIFIC GRAVITY: 1.50	
INTENDED USE: PE SIZING BETWEEN INTEGRAL SECOND-STAGE REGULATOR AT TANK OR SECOND-STAGE (LOW PRESSURE) REGULATOR AND BUILDING										
PIPE SIZE (inch)										
NOMINAL OD:	½	¾	1	1¼	1½	2	3	4		
DESIGNATION:	SDR 9.3	SDR 11	SDR 11	SDR 10	SDR 11	SDR 11	SDR 11	SDR 11		
ACTUAL ID:	0.660	0.860	1.077	1.328	1.554	1.943	2.864	3.682		
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR									
10	340	680	1230	2130	3210	5770	16 000	30 900		
20	233	468	844	1460	2210	3970	11 000	21 200		
30	187	375	677	1170	1770	3180	8810	17 000		
40	160	321	580	1000	1520	2730	7540	14 600		
50	142	285	514	890	1340	2420	6680	12 900		
60	129	258	466	807	1220	2190	6050	11 700		
70	119	237	428	742	1120	2010	5570	10 800		
80	110	221	398	690	1040	1870	5180	10 000		
90	103	207	374	648	978	1760	4860	9400		
100	98	196	353	612	924	1660	4590	8900		
125	87	173	313	542	819	1470	4070	7900		
150	78	157	284	491	742	1330	3690	7130		
175	72	145	261	452	683	1230	3390	6560		
200	67	135	243	420	635	1140	3160	6100		
250	60	119	215	373	563	1010	2800	5410		
300	54	108	195	338	510	916	2530	4900		
350	50	99	179	311	469	843	2330	4510		
400	46	92	167	289	436	784	2170	4190		
450	43	87	157	271	409	736	2040	3930		
500	41	82	148	256	387	695	1920	3720		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 inch water column = 0.249 kPa

* Table entries are rounded to 3 significant digits.

FUEL GAS PIPING

TABLE 1216.2(35)
POLYETHYLENE PLASTIC PIPE [NFPA 54-12: TABLE 6.3(I)]*

									GAS: UNDILUTED PROPANE	
									INLET PRESSURE: 2.0 psi	
									PRESSURE DROP: 1.0 psi	
									SPECIFIC GRAVITY: 1.50	
INTENDED USE: PE PIPE SIZING BETWEEN 2 PSI SERVICE REGULATOR AND LINE PRESSURE REGULATOR										
PIPE SIZE (inch)										
NOMINAL OD:	½	¾	1	1¼	1½	2	3	4		
DESIGNATION:	SDR 9.3	SDR 11	SDR 11	SDR 10	SDR 11	SDR 11	SDR 11	SDR 11		
ACTUAL ID:	0.660	0.860	1.077	1.328	1.554	1.943	2.864	3.682		
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR									
10	3130	6260	11 300	19 600	29 500	53 100	147 000	284 000		
20	2150	4300	7760	13 400	20 300	36 500	101 000	195 000		
30	1730	3450	6230	10 800	16 300	29 300	81 100	157 000		
40	1480	2960	5330	9240	14 000	25 100	69 400	134 100		
50	1310	2620	4730	8190	12 400	22 200	61 500	119 000		
60	1190	2370	4280	7420	11 200	20 100	55 700	108 000		
70	1090	2180	3940	6830	10 300	18 500	51 300	99 100		
80	1010	2030	3670	6350	9590	17 200	47 700	92 200		
90	952	1910	3440	5960	9000	16 200	44 700	86 500		
100	899	1800	3250	5630	8500	15 300	42 300	81 700		
125	797	1600	2880	4990	7530	13 500	37 500	72 400		
150	722	1450	2610	4520	6830	12 300	33 900	65 600		
175	664	1330	2400	4160	6280	11 300	31 200	60 300		
200	618	1240	2230	3870	5840	10 500	29 000	56 100		
250	548	1100	1980	3430	5180	9300	25 700	49 800		
300	496	994	1790	3110	4690	8430	23 300	45 100		
350	457	914	1650	2860	4320	7760	21 500	41 500		
400	425	851	1530	2660	4020	7220	12 000	38 600		
450	399	798	1440	2500	3770	6770	18 700	36 200		
500	377	754	1360	2360	3560	6390	17 700	34 200		
550	358	716	1290	2240	3380	6070	16 800	32 500		
600	341	683	1230	2140	3220	5790	16 000	31 000		
650	327	654	1180	2040	3090	5550	15 400	29 700		
700	314	628	1130	1960	2970	5330	14 700	28 500		
750	302	605	1090	1890	2860	5140	14 200	27 500		
800	292	585	1050	1830	2760	4960	13 700	26 500		
850	283	566	1020	1770	2670	4800	13 300	25 700		
900	274	549	990	1710	2590	4650	12 900	24 900		
950	266	533	961	1670	2520	4520	12 500	24 200		
1000	259	518	935	1620	2450	4400	12 200	23 500		
1100	246	492	888	1540	2320	4170	11 500	22 300		
1200	234	470	847	1470	2220	3980	11 000	21 300		
1300	225	450	811	1410	2120	3810	10 600	20 400		
1400	216	432	779	1350	2040	3660	10 100	19 600		
1500	208	416	751	1300	1960	3530	9760	18 900		
1600	201	402	725	1260	1900	3410	9430	18 200		
1700	194	389	702	1220	1840	3300	9130	17 600		
1800	188	377	680	1180	1780	3200	8850	17 100		
1900	183	366	661	1140	1730	3110	8590	16 600		
2000	178	356	643	1110	1680	3020	8360	16 200		

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 pound-force per square inch = 6.8947 kPa

* Table entries are rounded to 3 significant digits.

TABLE 1216.2(36)
POLYETHYLENE PLASTIC TUBING [NFPA 54-12: TABLE 6.3(m)]²

	GAS: UNDILUTED PROPANE	
	INLET PRESSURE: 11.0 in. w.c.	
	PRESSURE DROP: 0.5 in. w.c.	
	SPECIFIC GRAVITY: 1.50	
INTENDED USE: PE TUBE SIZING BETWEEN INTEGRAL SECOND-STAGE REGULATOR AT TANK OR SECOND-STAGE (LOW PRESSURE) REGULATOR AND BUILDING		
	PLASTIC TUBING SIZE (CTS)¹ (inch)	
NOMINAL OD:	½	1
DESIGNATION:	SDR 7	SDR 11
ACTUAL ID:	0.445	0.927
LENGTH (feet)	CAPACITY IN THOUSANDS OF BTU PER HOUR	
10	121	828
20	83	569
30	67	457
40	57	391
50	51	347
60	46	314
70	42	289
80	39	269
90	37	252
100	35	238
125	31	211
150	28	191
175	26	176
200	24	164
225	22	154
250	21	145
275	20	138
300	19	132
350	18	121
400	16	113
450	15	106
500	15	100

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 inch water column = 0.249 kPa

Notes:

¹ CTS = Copper tube size.

² Table entries are rounded to 3 significant digits.

READ ONLY