Chapter 3: General Regulations

General Comments

A fundamental principle of the code is its dependence on the listing and labeling method of approval for appliances and equipment. Section 301.3 prohibits the installation of unlisted appliances except where approved in accordance with Section 105.

Purpose

Chapter 3 contains requirements for the safe and proper installation of gas-fired equipment and appliances to help ensure protection of life and property.

SECTION 301 (IFGC) GENERAL

301.1 Scope. This chapter shall govern the approval and installation of all *equipment* and *appliances* that comprise parts of the installations regulated by this code in accordance with Section 101.2.

❖ This section states that this chapter governs the approval and installation of all gas-fired equipment and appliances that are regulated by the code. Section 101.2 establishes the scope of application of the code (see commentary, Section 101.2).

301.1.1 Other fuels. The requirements for combustion and dilution air for gas-fired *appliances* shall be governed by Section 304. The requirements for combustion and dilution air for appliances operating with fuels other than fuel gas shall be regulated by the *International Mechanical Code*.

❖ This code and the *International Mechanical Code*® (IMC®) each have a combustion air chapter that is specific to the fuels addressed in the respective code.

301.2 Energy utilization. Heating, ventilating and air-conditioning systems of all structures shall be designed and installed for efficient utilization of energy in accordance with the *International Energy Conservation Code*.

❖ This section states that all appliances and equipment must be designed and installed to use depletable energy sources efficiently. The *International Energy Conservation Code*® (IECC®) is the applicable document for regulating the efficiency and performance of appliances and heating, ventilating and air-conditioning (HVAC) systems. Special applications such as process heating or cooling should be designed for the maximum energy efficiency attainable. Note that the *International Green Construction Code*® (IgCC®) also addresses energy conservation and efficiency for high-performance green buildings.

301.3 Listed and labeled. *Appliances* regulated by this code shall be *listed* and *labeled* for the application in which they are used unless otherwise *approved* in accordance with Section 105. The approval of unlisted appliances in accordance with Section 105 shall be based on *approved* engineering evaluation.

❖ Gas-fired appliances must be listed and labeled by an approved agency to show that they comply with the applicable national standards. The code requires listing and labeling for appliances, such as boilers, furnaces, space heaters, direct-fired heaters, cooking appliances, clothes dryers, rooftop HVAC units, etc. The code also requires listing for system components as specifically stated in the text addressing those components. The label is the primary, if not the only, assurance to the installer, the inspector and the end user that a representative sample of an appliance model has been tested and evaluated by an approved agency and has been determined to perform safely and efficiently when installed and operated in accordance with its listing.

Appliances must be listed and labeled for the application in which they are used, otherwise the installation would be a misapplication of the appliance. For example, if an appliance is listed for indoor use only and is installed outdoors, this installation is a misapplication of the appliance and serious malfunctions and/or conditions could result. An appliance might be marketed and installed for a particular purpose for which it was not tested and listed and this is what this section intends to prohibit. Verifying that an appliance has a testing agency label is only part of the code official's responsibility. He or she must also verify that the listing from the testing agency includes the application at hand. The bottom line is the use of an appliance must match the use for which the appliance was tested.

The presence of a label is part of the information that the code official considers when approving appliances. The only exception to the labeling requirement occurs when the code official approves a specific appliance in accordance with the authority granted in Section 105.2.

Approval of unlabeled appliances must be based on documentation that demonstrates compliance with applicable standards or, where no product standards exist, that the appliance is appropriate for the intended use and will provide the same level of performance as

would be provided by listed and labeled appliances. A fundamental principle of the code is the reliance on the listing and labeling process to help ensure appliance performance; approvals granted in accordance with Section 105.2 must be well justified with supporting documentation. To the code official, the installer and the end-user, very little is known about the performance of an appliance that is not tested and built to an appliance standard.

301.4 Labeling. Labeling shall be in accordance with the procedures set forth in Sections 301.4.1 through 301.4.2.3.

❖ This section establishes the requirements for testing and labeling appliances by an approved agency. Included within this section are the requirements for testing the product and for approval of the testing agency, the testing equipment and the personnel who conduct the test. Also included is the information that must appear on a label.

301.4.1 Testing. An *approved* agency shall test a representative sample of the *appliances* being *labeled* to the relevant standard or standards. The *approved* agency shall maintain a record of all of the tests performed. The record shall provide sufficient detail to verify compliance with the test standard.

❖ When an approved agency labels an appliance, the agency is ensuring that a representative sample of the appliance has been tested in accordance with an appropriate standard and has been determined to perform acceptably when installed and operated in accordance with the appliance's listing.

The basis for a label is the requirement for testing a representative, perhaps identical, sample of the appliance to indicate conformance to a required standard. This is an important premise in the code because a code official will consider the presence of a label in the approval of an appliance. For this reason, the appliance must meet the requirements of the standard. Because the appliance tested is installed and operated in accordance with the manufacturer's instructions, these instructions must provide for proper installation and operation. This is important because the code requires that the labeled appliance be installed in accordance with the manufacturer's instructions, and operating instructions must be either attached to or shipped with each appliance.

There are numerous standards, not all of which are specifically referenced in the code, applicable to various appliances and equipment. For this reason, the approved agency determines the applicable standards to be used for testing and then as the basis for labeling. Each standard contains safety requirements for a given appliance or piece of equipment and specifies tests that must be performed. The labeling agency is required to maintain sufficient documentation to demonstrate compliance with the test standard. The code official may require that copies of the test reports be submitted to determine the validity of the label.

Examples of standards that are used as a basis for testing and labeling include:

- ANSI Z21.47, *Gas-fired Central Furnaces*.
- ANSI Z83.8, *Gas Unit Heaters*.
- UL 795, *Commercial—Industrial Gas Heating Equipment*.

301.4.2 Inspection and identification. The *approved* agency shall periodically perform an inspection, which shall be in-plant if necessary, of the *appliances* to be *labeled*. The inspection shall verify that the *labeled* appliances are representative of the appliances tested.

❖ The approved agency whose identification insignia appears on the label must perform periodic in-plant inspections. The primary objective of these inspections is to determine that the manufactured product is equivalent to the sample that was tested. Because the label is good only for the products that were tested, the in-plant inspections are intended to discover any design changes or production quality control problems. If any discrepancies are found, the labeling agency would discontinue labeling of that particular product, and the manufacturer would be required to resolve the problem and, if necessary, have the redesigned product retested before the labeling process is resumed.

301.4.2.1 Independent. The agency to be *approved* shall be objective and competent. To confirm its objectivity, the agency shall disclose all possible conflicts of interest.

❖ As a part of the basis for a code official's approval of a particular labeling agency, the agency must demonstrate both its independence from the manufacturer of the product and its competence to perform the required tests. The judgment of objectivity is linked to the financial and fiduciary independence of the agency. The competence of the agency is judged by its experience, organization and the experience of its personnel. As a hypothetical example, the Acme Inspection Agency is performing testing for gas-fired furnaces for the Real Hot Furnace Company. After some investigation, both Acme and Real Hot are found to be the subsidiaries of the same parent company. The inspection agency and the manufacturer clearly have a relationship that presents the potential for conflict of interest. The objectivity of the inspection agency is sufficiently questionable for the code official to justify not approving Acme as a testing and labeling agency for equipment produced by the Real Hot Furnace Company.

301.4.2.2 Equipment. An *approved* agency shall have adequate *equipment* to perform all required tests. The *equipment* shall be periodically calibrated.

❖ Referring to the example in the commentary for Section 301.4.2.1, if the Acme Inspection Agency had only the facilities to test and label fire doors, the agency would not be qualified to test and label a gas-fired furnace. Although this example is oversimplified, the point is that the inspection agency must have all of the necessary equipment to perform the testing required by the applicable standard.

In addition to having the proper equipment, the agency must maintain records of the maintenance and calibration of its equipment to demonstrate that the equipment can be relied on to produce accurate, consistent and reproducible results. Testing apparatus, instruments and equipment must often be capable of measurements using very small units of measure within

a specified tolerance. To produce accurate, dependable readings and reliable test results, testing apparatus, equipment and instruments must be routinely calibrated to a fixed reference. Having the proper testing equipment can be just as important as the competence of the testing personnel.

301.4.2.3 Personnel. An *approved* agency shall employ experienced personnel educated in conducting, supervising and evaluating tests.

❖ The competence of an inspection agency is based on the agency having the proper equipment to perform the test, as stated in Section 301.4.2.2, and also on the experience and abilities of its personnel. The best calibrated equipment can produce accurate results only when operated by experienced personnel who are trained to conduct, supervise and evaluate tests. For example, consider a newly formed agency that has employed individuals who do not have experience related to the testing to be conducted and have not been adequately trained. The capabilities and experience of supervisory personnel overseeing the work is also important.

301.5 Label information. A permanent factory-applied nameplate(s) shall be affixed to appliances on which shall appear in legible lettering, the manufacturer's name or trademark, the model number, serial number and, for *listed* appliances, the seal or mark of the testing agency. A label shall include the hourly rating in British thermal units per hour (Btu/h) (W); the type of fuel *approved* for use with the *appliance*; and the minimum *clearance* requirements.

❖ This section requires that the label be a metal plate, tag or other permanent label. In general, label materials, other than metal tags or plates, usually consist of material that is similar in appearance to a decal. The label, its adhesive and the printed information must be durable and water resistant. Because of the important information provided by a label, the label is intended to be permanent, not susceptible to damage and legible for the life of the appliance to which it is attached. The standards that appliances are tested to usually specify the required label performance criteria, the method of attachment and the required label information. The code requires that the label be affixed permanently and prominently on the appliance or equipment and specifies, the information that must appear on the label. The manufacturer may be required by the relevant standard or may voluntarily provide additional information on the label. Commentary Figures 301.5(1) and 301.5(2) show typical appliance labels.

AMERICAN STANDARD INC.
THE TRANE COMPANY
TRENTON, N.J. 08619
MADE IN U.S.A.

FORCED AIR FURNACE CATEGORY I

ANS Z21.47 - 1990 CENTRAL FURN

FOR INDOOR INSTALLATION IN A BUILDING CONSTRUCTED ON SITE.

NRTL

MODEL NO. TUD080R936A1	SERIAL NO. G36519785	EQUIPPED FOR NAT. GAS
INPUT 80,000 BTU/HR.	LIMIT SETTING 190 °F	MFRD. 09/92
TEMP. RISE °F FROM 30 TO 60	MAX. EXT. STATIC PRESS .50 INCHES WATER	MAX. DESIGN AIR TEMP. 100 °F
VOLTS/PHASE/HERTZ 115/1/60	TOTAL AMPS 8.5	SERVICE CODE 1

FLAME ROLLOUT SWITCH - REPLACE IF BLOWN WITH CATALOG NO. WG09X033 (333 F CUTOFF TEMP.) ONE TIME THERMAL FUSE.

MANIFOLD PRESSURE (IN INCHES OF WATER) NAT. 3.5 L P 10.5
SUPPLY PRESSURE (IN INCHES OF WATER) MAX. NAT. 10.5, L P 13.0
MIN. NAT. 4.5L P 11.0 FOR PURPOSE OF INPUT ADJUSTMENT.

LOW INPUT 52,000 BTU/HR

MINIMUM CLEARANCE COMBUSTIBLE MATERIALS:

FOR	CLOSET	INSTALLATION AS FOLLOWS:					
SIDES	0	IN. W/SINGLE WALL VENT					
FLUE	6	IN. W/SINGLE WALL VENT	1	IN.w/TYPE	B-1	VENT	
FRONT	6	IN. BACK	0	IN. TOP	1	IN.	

UPFLOW UNITS. FOR INSTALLATION COMBUSTIBLE FLOORING. 21D340159 P01

Commentary Figure 301.5(1)
TYPCIAL LABEL FOR A CATEGORY I GAS-FIRED FURNACE
(Figure courtesy of the Trane U.S. Inc., an Ingersoll Rand Company)

301.6 Plumbing connections. Potable water supply and building drainage system connections to *appliances* regulated by this code shall be in accordance with the *International Plumbing Code*.

❖ Plumbing connections to appliances and equipment regulated by the code must be in accordance with the *International Plumbing Code*® (IPC®).

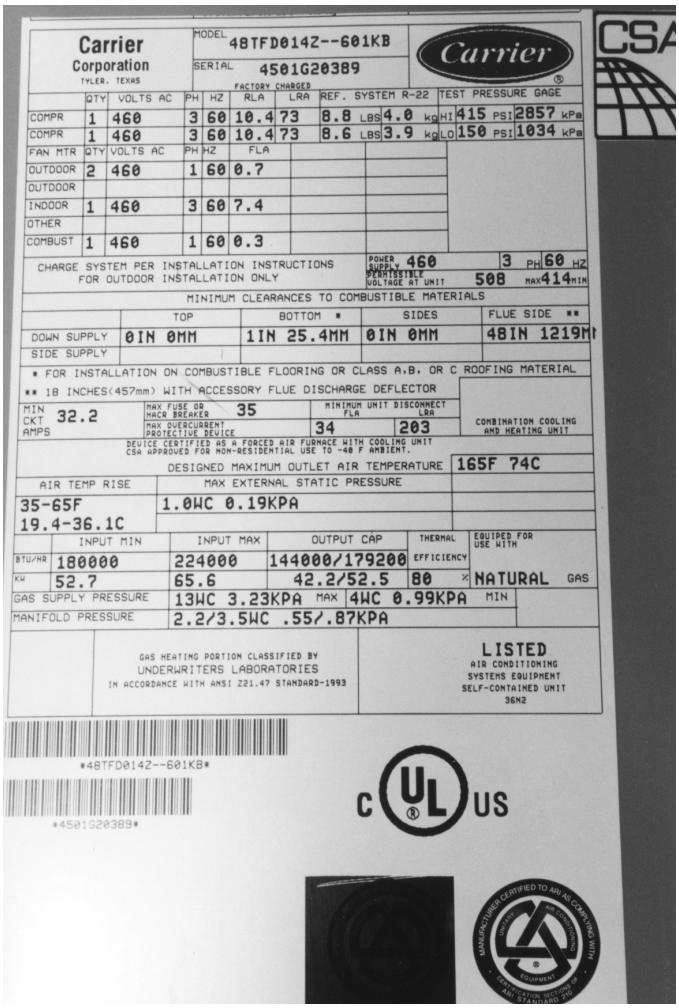
Section 624.2 of the code requires that combination domestic water heating and hydronic supply water heating units be listed and installed according to their listing and manufacturer's instructions.

Hydronic systems normally require a means of supplying fill and makeup water to replace any water lost to evaporation, leakage or intentional draining. Where direct connections are made to the potable water supply, the connections must be isolated from the potable water source. This requirement is intended to protect the potable water system from contamination by backflow when a direct connection is made to a hydronic system.

Hydronic systems are normally pressurized, contain nonpotable water and fluids and can contain conditioning chemicals or antifreeze solutions. Low-temperature hydronic fluids and cooling towers have also been associated with disease-causing organisms such as the Legionnaires' disease bacterium. The potable water system must be protected from potential contamination resulting from connection to hydronic systems, water-wash filter systems, cooling towers, solar systems, water-cooled heat exchangers, cooking appliances, ice makers, humidifiers, evaporative coolers, etc.

In addition, water heaters are part of the potable water distribution system and, therefore, must comply with both the code and the IPC. A water heater installation is complex in that it has a fuel or power supply; a chimney or vent connection, if fuel-fired; a combustion air supply, if fuel-fired; connections to the plumbing potable water distribution system and controls and devices to prevent a multitude of potential hazards from conditions such as excessively high temperatures, pressures and ignition failure.

It is not uncommon for jurisdictions to issue both plumbing and mechanical permits for water heater installations or to require that the installer be licensed in both the plumbing and mechanical trades when performing such installations (see commentary, Section



Commentary Figure 301.5(2)
ROOFTOP HVAC UNIT LABEL
(Figure courtesy of Carrier Corporation)

Chapter 4:
Gas Piping Installations

General Comments

The nature of fuel gases makes proper design, installation and selection of materials and devices necessary to minimize the risk to an acceptable level.

The two most commonly used fuel gases are natural gas and liquefied petroleum gas (LP or LP-gas). These fuel gases have the following characteristics or properties.

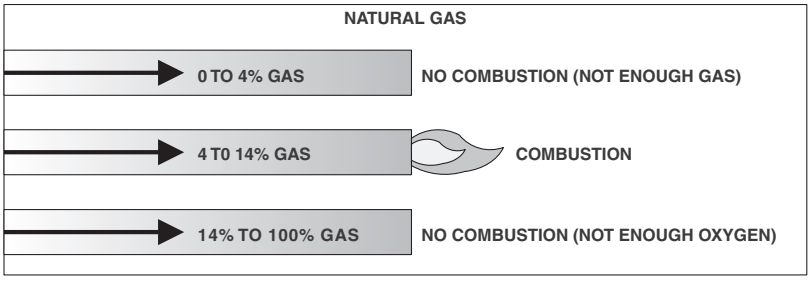
Natural gas: The principal component of natural gas is methane (CH4). It can also contain small quantities of nitrogen, carbon dioxide, hydrogen, hydrogen sulfide, water vapor, other hydrocarbons and various trace elements. Natural gas is colorless, tasteless and odorless; however, an odorant is added to the gas so that it can be readily detected. Natural gas is lighter than air (specific gravity < 1) and has the tendency to rise when escaping to the atmosphere. Natural gas has a rather narrow flammability range above and below which the gas-to-air mixture ratio is too rich or too lean to support combustion (see Commentary Figure 400). The heating value of natural gas varies depending on the source, but it averages 1,050 British thermal units (Btu) per cubic foot (89 MJ/m^3).

Liquefied petroleum gas: Liquefied petroleum gases (LP or LP-gas) include commercial propane (C_3H_8) and commercial butane (C_4H_{10}). LP-gas vapors are heavier than air (specific gravity > 1) and tend to accumulate in low areas and near the floor. The ranges of flammability for LP-gases are narrower than those of natural gas (see Commentary Figure 400). Like natural gas, LP-gases are odorized to make them detectable.

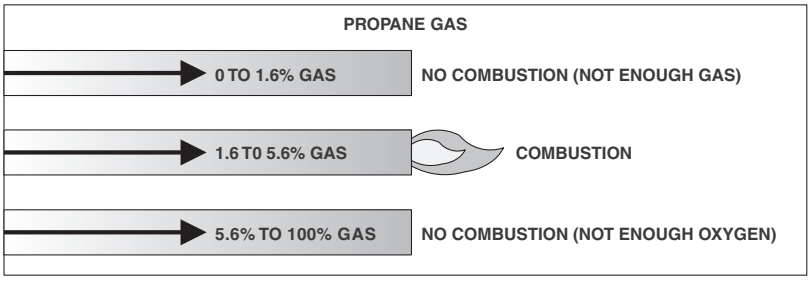
The heating value of propane is approximately 2,500 Btu per cubic foot (93 MJ/m^3) of gas. The heating value of butane is approximately 3,300 Btu per cubic foot (1263 MJ/m^3) of gas.

Purpose

This chapter is intended to regulate the design and installation of fuel-gas distribution piping and systems from the point of delivery of the fuel gas to the appliances and equipment that consume the fuel. The intent is to minimize the hazards associated with the use and distribution of highly flammable/explosive fuel gases.



1-14 FLAMMABILITY LIMITS OF NATURAL GAS



1-15 FLAMMABILITY LIMITS OF PROPANE GAS

Commentary Figure 400
GAS FLAMMABILITY LIMITS
(Figure courtesy of Reznor/Thomas & Betts Corporation)

SECTION 401 (IFGC)
GENERAL

401.1 Scope. This chapter shall govern the design, installation, modification and maintenance of *piping* systems. The applicability of this code to *piping* systems extends from the *point of delivery* to the connections with the *appliances* and includes the design, materials, components, fabrication, assembly, installation, testing, inspection, operation and maintenance of such *piping* systems.

❖ This section regulates aspects of fuel-gas distribution systems, including design, installation, testing, repair and maintenance. The applicability of this chapter is limited to the consumer side of the public utility company's gas distribution system.

The code governs all piping and system components from the end point of the gas purveyor's (utility company) service line to the supplied appliances and equipment. Typically, the gas utility company service line terminates at the service pressure regulator and meter setting. In other words, the code does not apply to piping and components that are owned by the gas utility company. The construction of utility-owned gas piping is governed by the federal Department of Transportation (DOT) regulations wherever the piping is located. However, in cases where the utility-owned piping runs through, in or on a building, it must do so in a way that does not jeopardize the structural integrity or fire safety of the building. Therefore, the relationship of the utility-owned piping to the building (prohibited locations, penetrations, etc.) is governed by the building portion of this code (see Section 401.1.1). No other provision within this chapter applies to utility-owned gas piping.

Although LP-gas storage systems generally remain under the ownership of the gas supplier, these systems are governed by the code through the reference to NFPA 58 (see commentary, Section 401.2). An LP-gas piping system begins at the outlet side of the first-stage pressure regulator. The piping between the first- and second-stage (final) regulator is governed by NFPA 58, and the piping downstream of the second-stage regulator is governed by this code. The first-stage pressure regulator reduces the storage container pressure to 10 pounds per square inch gauge (psig) (69 kPa) or less.

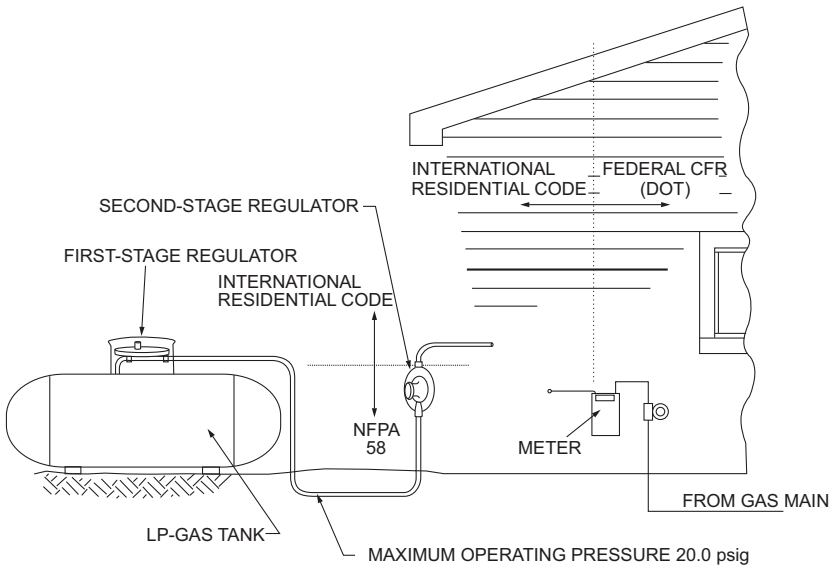
The termination point of gas utility services varies depending on the particular company's policies. Typically, the service terminates at the property line or outdoors, immediately adjacent to the building or structure served by the service [see Commentary Figures 401.1(1) and 401.1(2)].

401.1.1 Utility piping systems located within buildings. Utility service *piping* located within buildings shall be installed in accordance with the structural safety and fire protection provisions of the *International Building Code*.

❖ Piping and components upstream of the point of delivery are designed, installed, tested, owned and maintained by the gas utility company and are regulated by federal DOT regulations, not this code. This code does, however, regulate two aspects of the installation related to protection of the structure from a structural and fire safety standpoint. By reference, the *International Building Code*® (IBC®) would regulate the piping penetrations through structural components and through fire-resistance-rated assemblies. The IBC would also regulate piping support to handle structural loads and seismic forces.

401.2 Liquefied petroleum gas storage. The storage system for liquefied petroleum gas shall be designed and installed in accordance with the *International Fire Code* and NFPA 58.

❖ LP-gas tanks, containers, cylinders, storage vessels and related components must comply with NFPA 58. The storage system includes storage vessels of any type and the vessel appurtenances, such as shutoff valves, pressure gauges, liquid level indicators, pressure regulators, pressure relief valves and filling con-

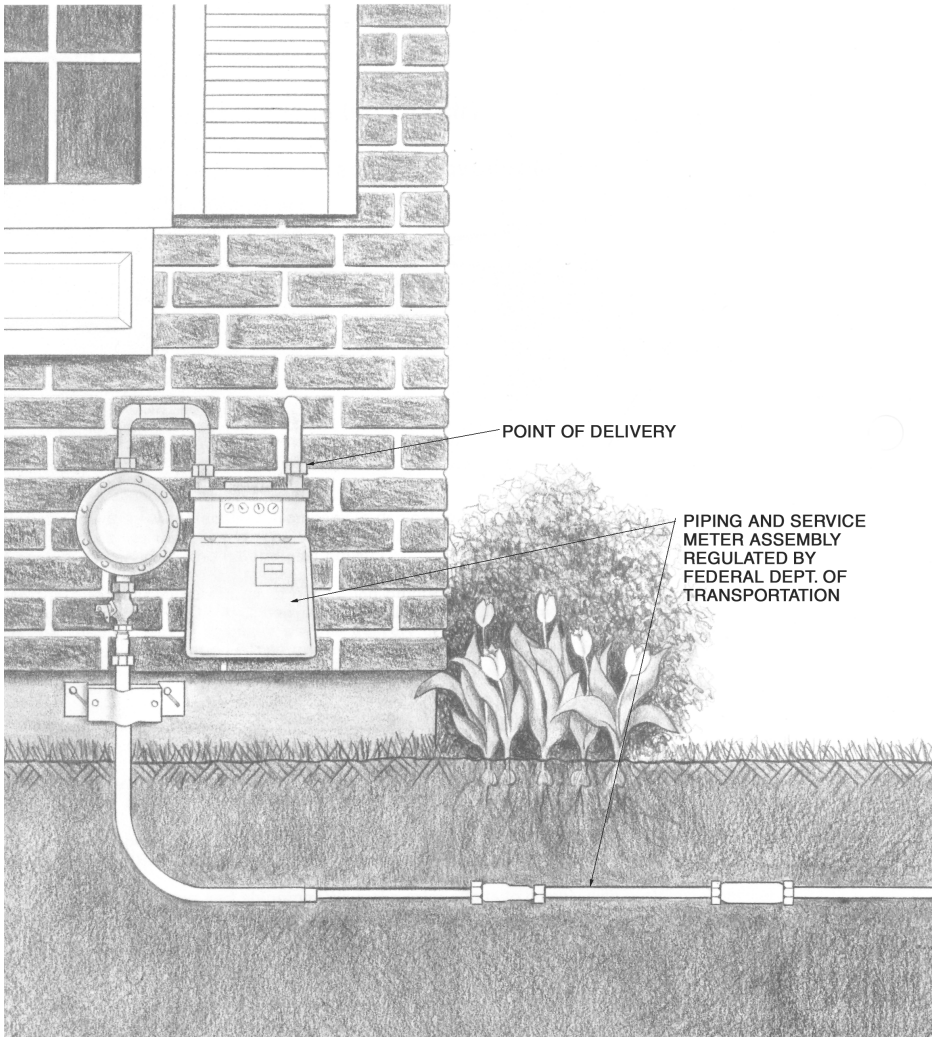


Commentary Figure 401.1(1)
SCOPE OF CODES

nections. The first-stage and second-stage pressure regulators and interconnecting piping are also addressed by the standard and could, therefore, be considered part of the LP-gas storage system. If the piping between the first-stage regulator and the point of delivery [second-stage or 2-psi (13.7 kPa) regulator] is not placed under the control of NFPA 58, it would be unregulated because Section 401.1 states that the code coverage begins at the point of delivery (see definition of "Point of delivery"). Second-stage 2-psi regulators reduce the outlet pressure of the first-stage regulator to 2 psi (13.7 kPa) and a line pressure regulator downstream of the 2-psi regulator reduces the pressure from 2 psi to a maximum of 14 inches water column (w.c.) (3.5 kPa). Second-stage regulators reduce the outlet pressure of the first-stage regulator to a maximum of 14 inches w.c. NFPA 58 addresses all aspects of LP-gas storage systems such as container design and construction, container appurtenances, safety devices, container location and installation. A referenced standard is enforceable only in the context in which it is used. Any portions of NFPA 58 that extend beyond the scope of the storage system are not applicable because of the context of the reference in this section.

401.3 Modifications to existing systems. In modifying or adding to existing *piping* systems, sizes shall be maintained in accordance with this chapter.

❖ The gas volume demand on any portion of a distribution system cannot be increased beyond the capacity of the piping serving that portion. Modifications and additions to existing piping systems can have a detrimental effect on the existing piping system's ability to serve the connected loads. Commonly, new gas-fired equipment or appliances will be added to existing distribution piping without any regard for the effect of the extra load. To prevent dangerously low gas pressures, existing piping must be able to adequately supply additional loads, or the piping size must be increased. For example, a substantial load increase would occur where a storage (tank)-type water heater is replaced by an instantaneous tankless water heater.



Commentary Figure 401.1(2)
TYPICAL POINT OF DELIVERY FOR NATURAL GAS SERVICE
(Figure courtesy of NORMAC)

401.4 Additional appliances. Where an additional *appliance* is to be served, the existing *piping* shall be checked to determine if it has adequate capacity for all *appliances* served. If inadequate, the existing system shall be enlarged as required or separate *piping* of adequate capacity shall be provided.

❖ This section parallels Section 401.8 and makes it clear that when any appliances are added to an existing gas piping system, the system must be carefully evaluated to verify that adding an appliance will not create a dangerous low-gas-pressure condition within the gas piping system. The evaluation must be conducted on the completed system as it will be configured after the appliance is added. If the results indicate that the existing piping system cannot adequately serve the gas demand of the new appliance, the system must be revised accordingly. Undersized (overloaded) piping will cause pressure losses that can result in serious appliance malfunction and hazards.

401.5 Identification. For other than steel pipe and CSST, exposed *piping* shall be identified by a yellow label marked "Gas" in black letters. The marking shall be spaced at intervals not exceeding 5 feet (1524 mm). The marking shall not be required on *piping* located in the same room as the *appliance* served. CSST shall be identified as required by ANSI LC 1/CSA 6.26.

❖ The intent of this section is to prevent gas piping from being mistaken for other piping. A case of mistaken identity could lead to a dangerous condition if gas piping were to be cut or opened unintentionally. It is common for fuel-gas piping systems and various other gas or liquid piping systems in a building to be constructed of the same materials and thus, have the same appearance. The method of identifying fuel gas piping must be permanent, legible and conspicuous. Steel pipe (typically referred to as "black iron") is exempt from the identification requirements because it is the traditional gas pipe material and is generally recognized as such. Corrugated stainless steel tubing (CSST) is manufactured in compliance with the marking requirements of ANSI LC-1/CSA 6.26, which requires the words "fuel gas" to appear every 2 feet along the tubing. CSST can have a yellow or black outer jacket and the tubing manufacturer is allowed to choose the color scheme that will provide highly visible contrast between the marking and the jacket. Some copper tubing is manufactured with a similar yellow plastic jacket. See Commentary Figures 403.4 and 403.4.5(1). Steel pipe does not have to be identified, regardless of its color and regardless of any applied paint. Steel pipe that has been painted another color is still steel pipe.

401.6 Interconnections. Where two or more meters are installed on the same premises but supply separate consumers, the *piping* systems shall not be interconnected on the *outlet* side of the meters.

❖ If gas distribution systems with independent meters were connected downstream of the meters, it would be impossible to determine the actual consumption of each of the interconnected systems. As the result of building renovations, remodeling and additions, or as the result of intentionally valved cross connections between separately metered systems, it is possible for a consumer to be paying for fuel gas consumed by another consumer. Accurate consumption metering can occur only if each metered distribution system is independent of all other metered distribution systems on the premises. Also, a system thought to be shut off could be backfed from an interconnected system, thereby maintaining pressure in the system that was intended to be shut off.

401.7 Piping meter identification. *Piping* from multiple meter installations shall be marked with an *approved* permanent identification by the installer so that the *piping* system supplied by each meter is readily identifiable.

❖ This provision allows service and emergency personnel to readily locate the shutoff valve that serves each piping system. The identification also helps to prevent interconnections between systems and between spaces when additions and/or alterations are made in the piping systems.

401.8 Minimum sizes. Pipe utilized for the installation, extension and *alteration* of any *piping* system shall be sized to supply the full number of outlets for the intended purpose and shall be sized in accordance with Section 402.

❖ Undersized gas piping systems are not capable of delivering the required volume of fuel at the required pressure. Inadequate gas pressure can cause hazardous operation of appliances. Appliances depend on proper gas pressure to maintain the design Btu (J) input rate, to maintain the required minimum manifold pressure and to produce the required gas velocity in the burners. If the gas pressure to an appliance is too low, the result can be incomplete combustion, burner malfunction and flashback, soot production and appliance malfunction and damage. Gas piping must be sized to maintain the required minimum gas pressures at the appliance inlet.

When designing a gas piping distribution system, all connected appliances and equipment are assumed to operate simultaneously, except as provided for in Section 402.2. In other words, the system is designed for maximum demand. The code contains provisions for sizing gas piping systems using an exact equation or design tables. The tabular method is most often used because it is simpler and less likely to produce errors. Factors that affect the sizing of gas piping systems include the specific gravity of the gas, the length of the pipe and the number of fittings installed, the maximum gas demand, the allowable pressure loss through the system and any diversity factor that is applicable.

The design of gas piping installations should also take into account the possibility of future increases in gas demand (load). The farther the gas meter or point of delivery is from the building, the more extensive will be the disruption of the property in the event that a larger yard line between the meter and the building becomes necessary in the future as a result of increased gas demand within the building, a change in fuel gas type or a change in service pressure.