

CHAPTER XIV GAS PIPING, VENTS, AND APPLIANCE INSTALLATION

1400—APPLICABILITY

This standard applies to the installation of nonindustrial type gas appliances and to the design, fabrication, installation and tests of nonindustrial piping systems for fuel gases such as natural gas, manufactured gas, undiluted liquefied petroleum gases, liquefied petroleum gas-air mixtures, or mixtures of any of these gases, as follows:

- (a) Low pressure (not in excess of $\frac{1}{2}$ pound per square inch or 14 inches water column) piping systems extending from the outlet of the meter set assembly, or the outlet of the service regulator when a meter is not provided, to the inlet connections of appliances.
- (b) The installation of appliances supplied at pressures of $\frac{1}{2}$ pound per square inch or less.

1401.0—PIPING PLAN

It is recommended that before proceeding with the installation of a gas piping system, a piping sketch or plan be prepared showing the proposed location of the piping as well as the size of different branches. Adequate consideration should be given to future demands, and provisions made for added gas service.

Before any final plans or specifications are completed, the serving gas supplier or the authority having jurisdiction should be consulted.

When an additional appliance is to be served through any present gas piping, capacity of the existing piping shall be checked for adequacy, and replaced with larger piping if necessary.

1402.0—PROVISION FOR METER LOCATION

The meter location shall be such that the meter can be easily read and the connections are readily accessible for servicing. Location, space requirements, dimensions, and type of installation shall be acceptable to the serving gas supplier.

Gas piping at multiple meter installations shall be plainly 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.

1403.0—INTERCONNECTIONS

(a) INTERCONNECTIONS SUPPLYING SEPARATE CONSUMERS

When two or more meters, or two or more service regulators when meters are not provided, are installed on the same premises and supply separate consumers, the gas piping systems shall not be interconnected on the outlet side of the meters or service regulators.

(b) INTERCONNECTIONS FOR STAND-BY FUELS

When a supplementary gas for stand-by use is connected downstream from a meter or a service regulator when a meter is not provided, a suitable device to prevent backflow shall be installed. A three-way valve installed to admit the stand-by supply and at the same time shut off regular supply may be used for this purpose.

1404.0—SIZE OF PIPING TO GAS APPLIANCES

(a) SIZE OF SUPPLY PIPING FOR GAS APPLIANCES

Gas piping shall be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand without undue

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loss of pressure between the meter, or service regulator when a meter is not provided, and the appliance or appliances. The size of gas piping depends upon the following factors:

- (1) Allowable loss in pressure from meter, or service regulator when a meter is not provided, to appliance.
- (2) Maximum gas consumption to be provided.
- (3) Length of piping and number of fittings.
- (4) Specific gravity of the gas.
- (5) Diversity factor.

(b) GAS CONSUMPTION

The quality of gas to be provided at each outlet shall be determined, whenever possible, directly from the manufacturer's Btu rating of the appliance which will be installed. In case the ratings of the appliances to be installed are not known, Table 1 is given to show the approximate consumption of average appliances of certain types in Btu per hour.

To obtain the cubic feet per hour of gas required, divide the total Btu input of all appliances by the average Btu heating value per cubic foot of the gas. The average Btu per cubic foot of the gas in the area of the installation may be obtained from the serving gas supplier.

(c) GAS PIPING SIZE

- (1) Capacities in cubic feet per hour of 0.60 specific gravity gas for different sizes and lengths are shown in Tables 2A and 2B for iron pipe or equivalent rigid pipe and in Table 2C for semirigid tubing. Tables 2A and 2C are based upon a pressure drop of 0.3 inch water column, whereas Table 2B is based upon a pressure drop of 0.5 inch water column. In using these tables no additional allowance is necessary for an ordinary number of fittings. The serving gas supplier shall designate which Table(s) shall be used.
- (2) Capacities in thousands of Btu per hour of undiluted liquefied petroleum gases based on a pressure drop of 0.5 inch water column for different sizes and lengths are shown in Table 4A for iron pipe or equivalent rigid pipe and in Table 4B for semirigid tubing. In using these tables no additional allowance is necessary for an ordinary number of fittings.
- (3) Gas piping systems that are to be supplied with gas of a specific gravity of 0.70 or less, can be sized directly from Tables 2A, 2B and 2C unless the authority having jurisdiction specifies that a gravity factor be applied. When the specific gravity of the gas is greater than 0.70 the gravity factor shall be applied.

(d) DIVERSITY FACTOR:

The diversity factor is an important factor in determining the correct gas piping size to be used in multiple family dwelling. It is dependent upon the number and kinds of gas appliances being installed. Consult the serving gas supplier or the authority having jurisdiction for the diversity factor to be used.

(e) ADDITIONS TO EXISTING GAS PIPING:

Additions to existing utility piping shall conform to Tables 2A, 2B or 2C, whichever is designated by the serving gas supplier. Additions to existing undiluted liquefied petroleum gas piping shall conform to Table 4A or 4B. Existing gas piping that does not conform to these

TABLE 1
Approximate Gas Input for Some Common Appliances

Appliance	Input Btu per hr. (Approx.)
Range, Free Standing, Domestic	65,000
Built-In Oven or Broiler Unit, Domestic	25,000
Built-In Top Unit, Domestic	40,000
Water heater, Automatic Storage 30 to 40 Gal. Tank	45,000
Water heater, Automatic Storage 50 Gal. Tank	55,000
Water heater, Automatic Instantaneous (2 gal. per minute	142,800
Capacity (4 gal. per minute	285,000
(6 gal. per minute	428,400
Water Heater, Domestic, Circulating or Side-Arm	35,000
Refrigerator	3,000
Clothes Dryer, Type 1 (Domestic)	35,000
Gas Light	2,500
Incinerator, Domestic	35,000

For specified appliances or appliances not shown above, the input should be determined from the manufacturer's rating.

TABLE 2A
Maximum Capacity of Pipe in Cubic Feet of Gas per Hour
 (Based upon a Pressure Drop of 0.3 Inch Water Column
 and 0.6 Specific Gravity Gas)

Length in Feet	Nominal Iron Pipe Size, Inches								
	½	¾	1	1¼	1½	2	2½	3	4
10	132	278	520	1,050	1,600	3,050	4,800	8,500	17,500
20	92	190	350	730	1,100	2,100	3,300	5,900	12,000
30	73	152	285	590	890	1,650	2,700	4,700	9,700
40	63	130	245	500	760	1,450	2,300	4,100	8,300
50	56	115	215	440	670	1,270	2,000	3,600	7,400
60	50	105	195	400	610	1,150	1,850	3,250	6,800
70	46	96	180	370	560	1,050	1,700	3,000	6,200
80	43	90	170	350	530	990	1,600	2,800	5,800
90	40	84	160	320	490	930	1,500	2,600	5,400
100	38	79	150	305	460	870	1,400	2,500	5,100
125	34	72	130	275	410	780	1,250	2,200	4,500
150	31	64	120	250	380	710	1,130	2,000	4,100
175	28	59	110	225	350	650	1,050	1,850	3,800
200	26	55	100	210	320	610	980	1,700	3,500

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TABLE 2B
Maximum Capacity of Pipe in Cubic Feet of Gas per Hour.
 (Based upon a Pressure Drop of 0.5 Inch Water Column
 and 0.6 Specific Gravity Gas)

Length in Feet	Nominal Iron Pipe Size, Inches								
	½	¾	1	1¼	1½	2	2½	3	4
10	175	360	680	1,400	2,100	3,950	6,300	11,000	23,000
20	120	250	465	950	1,460	2,750	4,350	7,700	15,800
30	97	200	375	770	1,180	2,200	3,520	6,250	12,800
40	82	170	320	660	990	1,900	3,000	5,300	10,900
50	73	151	285	580	900	1,680	2,650	4,750	9,700
60	66	138	260	530	810	1,520	2,400	4,300	8,800
70	61	125	240	490	750	1,400	2,250	3,900	8,100
80	57	118	220	460	690	1,300	2,050	3,700	7,500
90	53	110	205	430	650	1,220	1,950	3,450	7,200
100	50	103	195	400	620	1,150	1,850	3,250	6,700
125	44	93	175	360	550	1,020	1,650	2,950	6,000
150	40	84	160	325	500	950	1,500	2,650	5,500
175	37	77	145	300	460	850	1,370	2,450	5,000
200	35	72	135	280	430	800	1,280	2,280	4,600

TABLE 2C
Maximum Capacity of Semirigid Tubing in Cubic Feet of Gas per Hour
 (Based on a Pressure Drop of 0.3 Inch Water Column
 and 0.6 Specific Gravity Gas)

Outside Diameter (Inches)	Length of Tubing (Feet)									
	10	20	30	40	50	60	70	80	90	100
⅜	19	12	10	9	—	—	—	—	—	—
½	45	30	24	20	18	17	15	14	13	12
⅝	97	64	52	44	38	35	32	30	28	26
¾	161	105	88	71	64	59	54	50	46	44
⅞	245	169	135	114	97	91	80	75	71	67

provisions shall be replaced by the proper size of pipe or tubing. Additions shall not be made to existing pipe which is smaller than that permitted in Tables 2A, 2B or 4A, or to existing tubing which is smaller than that permitted in Table 2C or 4B.

1405.0—GAS PIPING IN MOBILE HOME AND TRAVEL TRAILER PARKS

Gas piping systems in mobile home and travel trailer parks extending from the outlet of a meter set assembly or the outlet of a service regulator when a meter is not provided to the terminal of the gas riser at each trailer site shall comply with the following specific provisions and with all other applicable provisions in Part 1 and Part 2 of NFPA Bulletin No. 54.

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(a) **PROTECTION OF PIPING:**

Piping shall be buried to a sufficient depth or covered in a manner so as to protect the piping system from physical damage.

(b) **PROHIBITED LOCATIONS:**

Piping shall not be installed under trailer sites and patio slabs adjacent to trailers when an enclosing foundation is used under the trailer.

(c) **LOCATION, PROTECTION AND SIZING OF RISER:**

The gas riser to each trailer site should be placed in the rear one-third section of the site and not less than 18 inches from the roadside wall of the trailer. It shall be located and protected or supported so as to minimize the likelihood of damage by moving vehicles. The minimum size of the gas piping outlet at the trailer site shall be $\frac{3}{4}$ inch for other than undiluted liquefied petroleum gases.

(d) **LOCATION OF SHUTOFF VALVES:**

(1) Outlets for the individual trailers and gas piping to any building supplied by the system shall be provided with a readily accessible approved valve which cannot be locked in the open position.

(2) A readily accessible valve shall be provided near the point of gas delivery for shutting off the entire trailer park system. The valve provided by the serving gas supplier may be considered acceptable for this purpose provided it is readily accessible.

(e) **CONNECTION OF TRAILER:**

Trailers shall be connected to the gas piping system with rigid pipe, listed connectors or semirigid tubing. Connectors having aluminum exterior surfaces shall not be used.

(f) **DEMAND FACTOR:**

(1) The hourly volume of gas required for any trailer site gas outlet or any section of a trailer park gas piping system may be computed from Table 5.

(2) Other gas equipment or appliances, other than trailer site outlets, shall be computed at the manufacturer's maximum cubic foot per

TABLE 5
Demand Factors for use in Calculating Gas Piping systems in Trailer Parks

No. of Trailer Sites	Btu Per Hour Per Trailer Site
1	125,000
2	117,000
3	104,000
4	96,000
5	92,000
6	87,000
7	83,000
8	81,000
9	79,000
10	77,000
11 - 20	66,000
21 - 30	62,000
31 - 40	58,000
41 - 60	55,000
Over 60	50,000

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hour input rating or from Table 1 and shall be added to the figures given in Table 5.

1406.0—ACCEPTABLE PIPING MATERIALS

(a) PIPING MATERIAL:

Pipe. Gas pipe shall be steel complying with the American Standard for Wrought-Steel and Wrought-Iron Pipe, ASA B36.10-1959.* Threaded copper, brass, or aluminum alloy pipe in iron pipe sizes may be used with gases not corrosive to such material except that aluminum alloy pipe shall not be used in exterior locations, or underground, or where it is in contact with masonry, plaster, or insulation, or is subject to repeated corrosive wettings. Aluminum alloy pipe shall comply with specifications ASTM B-241 (except that the use of alloy 5456 is prohibited) and shall be suitably marked at each end of each length indicating compliance with ASTM specifications.**

Tubing. When acceptable to the serving gas supplier, seamless copper, aluminum alloy, or steel tubing may be used with gases not corrosive to such material. Copper tubing shall be of standard type K or L, or equivalent, complying with specification ASTM B88-62 and having a minimum wall thickness for each tubing size in compliance with ASTM specifications.** Aluminum alloy tubing shall be of standard Type A or B, or equivalent, complying with specifications ASTM B-318-62, having a minimum wall thickness for each tubing size, and being suitably marked every 18 inches in compliance with ASTM specifications. ** Aluminum alloy tubing shall not be used in exterior locations, or underground, or where it is in contact with masonry, plaster, or insulation, or is subject to repeated corrosive wettings.

Piping Joints and Fittings. Pipe joints may be screwed, flanged or welded. Tubing joints shall either be made with approved flared gas tubing fittings, or be soldered or brazed with a material having a melting point in excess of 1,000 degrees F. Compression type tubing fittings shall not be used for this purpose. UL approved or AGA labeled connectors of K or L Copper may be used up to 6-foot length.

Fittings (except stopcocks or valves) shall be malleable iron or steel when used with steel or wrought-iron pipe, and shall be copper or brass when used with copper or brass pipe or tubing. When approved by the authority having jurisdiction, special fittings may be used to connect steel or wrought-iron pipe. Cast-iron fittings in sizes 6 inches and larger may be used to connect steel and wrought-iron pipe when approved by the authority having jurisdiction.

(b) WORKMANSHIP AND DEFECTS:

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Gas pipe or 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 or tubing or fittings shall not be repaired. When defective pipe, tubing or fittings are located in a system the defective material shall be replaced.

(c) PIPE COATING:

When in contact with material exerting a corrosive action, piping and fittings coated with a corrosion resisting material shall be used.

*Available from the American Standards Association, Inc., 10 East 40th Street, New York, New York, 10016.

**Available from American Society for Testing and Materials, 1916 Race St., Philadelphia, Pa. 19103.

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(d) USE OF OLD PIPING MATERIAL:

Gas pipe, tubing, fittings, and valves removed from any existing installation shall not be again used until they have been thoroughly cleaned, inspected and ascertained to be equivalent to new material.

(e) JOINT COMPOUNDS:

Joint compounds (pipe dope) shall be applied sparingly and only to the male threads of pipe joints. Such compounds shall be resistant to the action of liquefied petroleum gases.

1407.0—PIPE THREADS

(a) SPECIFICATIONS FOR PIPE THREADS:

Pipe and fitting threads shall comply with the American Standard for Pipe Threads (Except Dryseal), B2.1-1960.*

(b) DAMAGED THREADS:

Pipe with threads which are stripped, chipped, corroded, or otherwise damaged shall not be used.

(c) NUMBER OF THREADS:

Pipe shall be threaded in accordance with Table 6.

TABLE 6
Specifications for Threading Pipe

Iron Pipe Size (Inches)	Approximate Length of Threaded Portion (Inches)	Approximate No. 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

1408.0—CONCEALED PIPING IN BUILDINGS

(a) MINIMUM SIZE:

No gas pipe smaller than standard 1/2 inch iron pipe size shall be used in any concealed location.

(b) PIPING IN PARTITIONS:

Concealed gas piping should be located in hollow rather than solid partitions. Tubing shall not be run inside walls or partitions unless protected against physical damage. This rule does not apply to tubing which passes through walls or partitions.

(c) PIPING IN FLOORS:

(1) Except as provided in 1408(c)2, gas piping in solid floors such as concrete shall be laid in channels in the floor suitably covered to permit access to the piping with a minimum of damage to the building. When piping in floor channels may be exposed to ex-

*Available from the American Standards Association, Inc., 10 East 40th Street, New York, New York, 10016.

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cessive moisture or corrosive substances, it shall be suitably protected.

- (2) When approved by the authority having jurisdiction and acceptable to the servicing gas supplier, gas piping may be embedded in concrete floor slabs constructed with portland cement. Piping shall be surrounded with a minimum of 1½ inches of concrete and shall not be in physical contact with other metallic structures such as reinforcing rods or electrical neutral conductors. When piping may be subject to corrosion at point of entry into concrete slab, it shall be suitably protected from corrosion. Piping shall not be embedded in concrete slabs containing quickset additives or cinder aggregate.

(d) CONNECTIONS IN ORIGINAL INSTALLATIONS:

When installing gas piping which is to be concealed, unions, tubing fittings, running threads, right and left couplings, bushings, and swing joints made by combinations of fittings shall not be used.

(e) RECONNECTIONS:

When necessary to insert fittings in gas pipe which has been installed in a concealed location, the pipe may be reconnected by use of a ground joint union with the nut center-punched to prevent loosening by vibration. Reconnection of tubing in a concealed location is prohibited.

1409.0—PIPING UNDERGROUND

(a) PROTECTION OF PIPING:

Piping shall be buried a sufficient depth or covered in a manner so as to protect the piping from physical damage.

(b) PROTECTION AGAINST CORROSION:

- (1) Gas piping in contact with earth or other material which may corrode the piping, shall be protected against corrosion in an approved manner. When dissimilar metals are joined underground, an insulating coupling shall be used. Piping shall not be laid in contact with cinders.
- (2) Underground piping for manufactured gas shall be one size larger than that specified by Table 2A or Table 2B, as designated by the serving gas supplier, but in no case less than 1¼ inch.

(c) PIPING THROUGH FOUNDATION WALL:

Underground gas piping, when installed below grade through the outer foundation or basement wall of a building, shall be either encased in a sleeve or otherwise protected against corrosion. The piping or sleeve shall be sealed at the foundation or basement wall to prevent entry of gas or water.

(d) PIPING UNDERGROUND BENEATH BUILDINGS:

When the installation of gas piping underground beneath buildings is unavoidable, the piping shall be encased in a conduit. 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 any gas leakage. The conduit shall extend at least 4 inches outside the building, be vented above grade to the outside and be installed in a way as to prevent the entrance of water.

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1410.0—INSTALLATION OF PIPING

Drips, grading, protection from freezing, and branch pipe connections, as provided for in 1410.2, 1410.4, 1410.7, and 1410.14(a), shall apply only when other than dry gas is distributed and climatic conditions make such provisions necessary.

(a) BUILDING STRUCTURE:

The building structure shall not be weakened by the installation of any gas piping. Before any beams or joists are cut or notched, special permission should be obtained from the authority having jurisdiction.

(b) GAS PIPING TO BE GRADED:

All gas piping shall be graded not less than ¼ inch in 15 feet to prevent traps. All horizontal lines shall grade to risers and from the risers to the meter, or to service regulator when a meter is not provided, or to the appliance.

(c) PIPING SUPPORTS:

- (1) Gas piping in buildings shall be supported with pipe hooks, metal pipe straps, bands or hangers suitable for the size of piping, and of adequate strength and quality, and located at proper intervals so that the piping cannot be moved accidentally from the installed position. Gas piping shall not be supported by other piping.
- (2) Spacing of supports in gas piping installations shall not be greater than shown in Table 7.

TABLE 7
Support of Piping

Size of Pipe (Inches)	(Feet)	Size of Tubing (Inch O.D.)	(Feet)
½	6	½	4
¾ or 1	8	⅝ or ¾	6
1¼ or larger (horizontal)	10	⅞ or 1	8
1¼ or larger (vertical)	every floor level		

(d) PROTECT AGAINST FREEZING:

Gas piping shall be protected against freezing temperatures. When piping must be exposed to wide ranges or sudden changes in temperatures, special care shall be taken to prevent stoppages.

(e) OVERHANGING ROOMS:

When there are overhanging kitchens or other rooms built beyond foundation walls, in which gas appliances are installed, care shall be taken to avoid placing the gas piping where it will be exposed to low temperatures (40 degrees F or below for manufactured gas) or to extreme changes in temperatures. In such cases the gas piping shall be brought up inside the building proper and run around the sides of the room, in the most practical manner.

(f) DO NOT BEND PIPE:

Natural gas pipe shall not be bent. Fittings shall be used when making turns in natural gas pipe. LP gas pipe may be bent in accordance with NFPA No. 54, page 20, paragraph 2.10.(a).

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(g) **PROVIDE DRIPS WHERE NECESSARY:**

A drip shall be provided at any point in the line of pipe where condensate may collect. When condensation is excessive, a drip should be provided at the outlet of the meter. This drip should 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.

(h) **LOCATION AND SIZE OF DRIPS:**

All drips shall be installed only 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. The size of any drip used shall be determined by the capacity and the exposure of the gas piping which drains to it and in accordance with recommendations of the serving gas supplier.

(i) **USE TEE:**

If dirt or other foreign material is a problem, a tee fitting with the bottom outlet plugged or capped shall be used at the bottom of any pipe riser (see Figure 1).

(j) **AVOID CLOTHES CHUTES, ETC.:**

Gas piping inside any building shall not be run in or through an air duct, clothes chute, chimney or gas vent, ventilating duct, dumb waiter, or elevator shaft.

(k) **CAP ALL OUTLETS:**

- (1) Each outlet, including a valve or cock outlet, shall be securely closed gastight and with a threaded plug or cap immediately after installation and shall be left closed until an appliance is connected thereto. Likewise, when an appliance is disconnected from an outlet and the outlet is not to be used again immediately, it shall be securely closed gastight. The outlet shall not be closed with tin caps, wooden plugs, corks, or by other improvised methods.
- (2) The above provision does not prohibit the normal use of a listed quick-disconnect device.

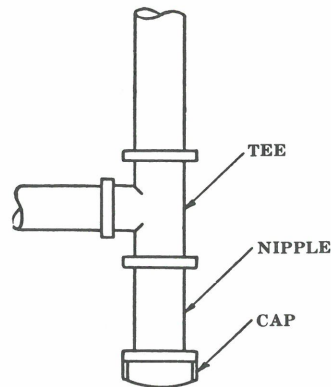


Fig. 1. Suggested Method of Installing Tee.

(l) **LOCATION OF OUTLETS:**

The unthreaded portion of gas piping outlets shall extend at least one inch through finished ceilings and walls, and when extending through floors shall be not less than 2 inches above them. The outlet

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fitting or the piping shall be securely fastened. Outlets shall not be placed behind doors. Outlets shall be far enough from floors, walls and ceilings to permit the use of proper wrenches without straining, bending or damaging the piping.

(m) **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.

(n) **BRANCH PIPE CONNECTION:**

- (1) All branch outlet pipes shall be taken from the top or sides of horizontal lines and not from the bottom.
- (2) When a branch outlet is placed on a main supply line before it is known what size of pipe will be connected to it, the outlet shall be of the same size as the line which supplies it.

(o) **ELECTRICAL BONDING AND GROUNDING:**

- (1) A gas piping system within a building shall be electrically continuous and bonded to any grounding electrode, as defined by the National Electrical Code, (NFPA No. 70)*
- (2) Underground gas service piping shall not be used as a grounding electrode except when it is electrically continuous uncoated metallic piping, and its use as a grounding electrode is acceptable both to the serving gas supplier and to the authority having jurisdiction, since gas piping systems are often constructed with insulating bushings or joints, or are of coated or nonmetallic piping.

1411.0—GAS SHUTOFF VALVES

(a) **ACCESSIBILITY OF GAS VALVES:**

Main gas shutoff valves controlling several gas piping systems shall be placed an adequate distance from each other so they will be easily accessible for operation and shall be installed so as to be protected from physical damage. It is recommended that they be plainly marked with a metal tag attached by the installing agency so that the gas piping systems supplied through them can be readily identified. It is advisable to place a shutoff valve at every point where safety, convenience of operation, and maintenance demands.

(b) **SHUTOFF VALVES FOR MULTIPLE HOUSE LINES:**

- (1) In multiple tenant buildings supplied through a master meter or one service regulator when a meter is not provided, or where meters or service regulators are not readily accessible from the appliance location, an individual shutoff valve for each apartment, or for each separate house line, shall be provided at the convenient point of general accessibility.
- (2) In a common system serving a number of individual buildings, shutoff valves shall be installed at each building.

1412.0—EXCERPTS FROM PART 3, NFPA NO. 54

3.1.2 Type of Gas:

It shall be determined whether the appliance has been designed for use with the gas to which it will be connected. No attempt shall be made to con-

*Available from the National Fire Protection Association, 60 Batterymarch St., Boston, Mass. 02110 in pamphlet form and in the National Fire Codes, Volume 5. Also available from the American Standards Association, Inc., 10 East 40th St., New York, N.Y. 10016.

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vert the appliance from the gas specified on the rating plate for use with a different gas without consulting the serving gas supplier or the appliance manufacturer for complete instructions.

3.1.5 Flammable Vapors:

Gas appliances shall not be installed in any location where flammable vapors are likely to be present, unless the design, operation and installation are such as to eliminate the possible ignition of the flammable vapors.

3.1.6 Installation in Residential Garages:

- (a) Gas appliances may be installed on the floor of a residential garage provided a door of the garage opens to an adjacent ground or driveway level that is at or below the level of the garage floor. When this condition does not exist, appliances shall be installed so that the burners and pilots are at least 18 inches above the floor.
- (b) Gas appliances shall be located, or reasonably protected, so that they are subject to physical damage by a moving vehicle.

3.1.7 Installation in Commercial Garages:

- (a) Floor mounted heaters in commercial garages for more than 3 motor vehicles shall be installed as follows:
 1. Heaters may be located in a room separated from other parts of the garage by construction having at least a one hour fire-resistance rating. This room shall not be used for combustible storage and shall have no direct access from the garage storage or repair areas. All air for combustion purposes entering such a room shall be from outside of the building, or
 2. Floor mounted heaters may be located in the garage if they are installed so that the bottom of the combustion chamber is at least 18 inches above the floor and outside grade level. Such heaters shall be protected from physical damage by vehicles.
- (b) Overhead heaters shall be installed at least 8 feet above the floor.
- (c) Sealed combustion system heaters may be located within a garage. When necessary, they shall be protected against physical damage.

3.1.12 Avoid Strain on Gas Piping:

Gas appliances shall be adequately supported and so connected to the piping as not to exert undue strain on the connections.

3.1.13 Venting of Gas Appliance Pressure Regulators:

- (a) Gas appliance pressure regulators requiring access to the atmosphere for successful operation shall be equipped with vent piping leading to the outdoors, or into the combustion chamber adjacent to a constantly burning 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.
- (b) Vent limiting means on gas appliance pressure regulators, when tested at the inlet pressure indicated, shall limit the escape of gas to not more than that specified in Table 3.
- (c) In the case of vents leading to the outdoors, means shall be employed to prevent stoppage of it by insects and foreign matter.
- (d) In the case of vents entering the combustion chamber, the vent shall be located so that the escaping gas will be readily ignited from the

Table 3

Gas Pressure Regulator	Test Inlet Pressure, inches w.c.	Max. Gas Flow Rate, CFH	
		Nat., Mfd., Mixed, LP Gas-Air	Undiluted L.P. Gases
Listed Class I	10.5	2.5	1.0
Listed Class II	21.0	2.5	1.0
Unlisted	21.0	2.5	1.0

pilot flame and the heat liberated will not adversely affect the operation of the thermal element of the safety shutoff device. The terminus of the vent shall be securely held in a fixed position relative to the pilot flame. For manufactured gas, a flame arrester in the vent piping may also be necessary.

3.1.14 Combination of Appliances:

Any combination of appliances, attachments, or devices used together in any manner shall comply with the standards which apply to the individual appliances.

3.1.15 Installation Instructions:

The installing agency shall conform with the appliance manufacturer's specific recommendations in completing an installation that will provide satisfactory performance and serviceability. The installing agency shall also leave manufacturer's installation, operating and maintenance instructions in a location on the premises where they will be readily available for reference and guidance of the authority having jurisdiction, servicemen and the owner or operator.

3.1.16 Protection of Outdoor Appliances:

Appliances not listed for outdoor installation but installed outdoors shall be provided with protection to the degree that the environment requires and be accessible for service. (See 3.3.1) NFPA No. 54

3.2 DRAFT HOODS

3.2.1 When Required:

- (a) Every vented appliance, except incinerators, dual oven type combination ranges, sealed combustion system appliances and units designed for power burners or for forced venting, shall be installed with a draft hood. The draft hood supplied with or forming a part of listed vented appliances shall be installed without alternation, exactly as furnished and specified by the appliance manufacturer. If a draft hood is not supplied by the appliance manufacturer when one is required, it shall be supplied by the installing agency and be of a listed or approved type, and in the absence of other instructions shall be the same size as the appliance flue collar. When a draft hood is required with a conversion burner, it shall be of a listed or approved type supplied by the installing agency or as recommended by the manufacturer.

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- (b) When the installer determines that a draft hood of special design is needed or preferable for a particular installation, advice of the manufacturer, the serving gas supplier or authority having jurisdiction shall be secured. (For suggested general dimensions of draft hood, see Figures 2, 3 and 4.)

APPLIANCE CONNECTIONS TO BUILDING PIPING

Connecting Gas Appliances:

Gas appliances shall be connected by:

- (a) Rigid pipe, or
- (b) Semi-rigid tubing extensions of a tubing piping system, or,
- (c) Listed appliance connectors that are in the same room as the appliance, or,
- (d) Semi-rigid tubing in lengths up to 6 feet that are in the same room as the appliance. When acceptable to the serving gas supplier greater lengths may be used and need not be connected to an outlet in the same room as the appliance.

The connector or tubing shall be installed so as to be protected against physical damage.

Aluminum alloy tubing and connectors shall be factory coated to protect against external corrosion where they are in contact with masonry, plaster, or insulation or are subject to repeated wettings by such liquids as water (except rainwater), detergents or sewage. Aluminum alloy tubing shall not be used in exterior locations.

- 6-11-74
- (e) Listed gas hose connectors in accordance with next paragraph.

Use of Gas Hose Connectors:

Listed gas hose connectors shall be used as follows:

(a) Indoor:

Indoor gas hose connectors may be used with laboratory, shop or ironing equipment that requires mobility during operation. A shutoff valve shall be installed where the connector is attached to the building piping. The connector shall be of minimum length but shall not exceed 6 feet. The connector shall not be concealed and shall not extend from one room to another nor pass through wall partitions, ceilings or floors.

(b) Outdoor:

Outdoor gas hose connectors may be used to connect portable outdoor gas-fired appliances. A shutoff valve or a listed quick-disconnect device 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 only be made in the outdoor area where the appliance is to be used.

Appliance Shut-off Valves:

Any appliance connected to a piping system shall have an accessible manual shutoff valve installed upstream of the union or connector and within 6 feet of the appliance it serves.

Quick-Disconnect Devices:

Appliance connectors may be connected to the building piping by means of a listed quick-disconnect device and, when installed indoors, a manual shutoff valve shall be installed upstream of the quick-disconnect device.

Continuous Power:

All gas appliances using electrical controls shall have the controls connected into a permanently live electric circuit, i.e., one that is not controlled by a light switch. Central heating gas appliances should be provided with a separate electrical circuit.

1413.0—THE FOLLOWING EXCERPTS ARE FROM PART 4 NFPA No. 54

Erection and Mounting:

A central heating boiler or furnace shall be erected in accordance with the manufacturer's instructions and shall be installed on a floor of fire-resistive construction with noncombustible flooring and surface finish and with no combustible material against the underside thereof or on fire-resistive slabs or arches having no combustible material against the underside thereof unless listed for installation on a combustible floor, or the floor is protected in an approved manner.*

Low Water Cutoff:

Steam boilers shall be provided with an automatic means to shut off the fuel supply to the burner if the boiler water level drops to the lowest safe water line.

Steam Safety and Pressure Relief Valves:

Steam and hot water boilers shall be equipped respectively with listed steam safety or pressure relief valves of appropriate discharge capacity and conforming with ASME requirements.* Steam safety valves and pressure relief valves shall be set to discharge at a pressure not to exceed the maximum allowable working pressure of the boiler.

Plenum Chambers and Air Ducts:

- (a) A plenum chamber supplied as a part of a furnace shall be installed in accordance with the manufacturer's instructions.
- (b) When a plenum chamber is not supplied with the furnace, any fabrication and installation instruction provided by the manufacturer shall be followed. The method of connecting supply and return ducts shall facilitate proper circulation of air.
- (c) When a furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by a duct(s) sealed to the furnace casing and terminating outside the space containing the furnace.

Refrigeration Coils:

- (a) A refrigeration coil shall not be installed in conjunction with a forced air furnace when circulation of cooled air is provided by the furnace blower unless the blower has sufficient capacity to overcome the external static resistance imposed by the duct system and cooling coil at the air throughput necessary for heating or cooling, whichever is greater.

*For details of requirements on low pressure heating boiler safety devices refer to ASME Boiler and Pressure Vessel Code, Section IV, Heating Boilers, available from The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

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- (b) Furnaces shall not be located upstream from cooling units unless the cooling unit is designed or equipped so as not to develop excessive temperature or pressure.
- (c) Refrigeration coils shall be installed in parallel with or on the downstream side of central furnaces to avoid condensation in the heating element unless the furnace has been specifically listed for downstream installation. With a parallel flow arrangement, the dampers or other means used to control flow of air shall be sufficiently tight to prevent any circulation of cooled air through the furnace.
- (d) Adequate means shall be provided for disposal of condensate and to prevent dripping of condensate on the heating element.

Cooling Units Used with Heating Boilers:

- (a) Boilers, when used in conjunction with refrigeration systems, shall be installed so that the chilled medium is piped in parallel with the heating boiler with appropriate valves to prevent the chilled medium from entering the heating boiler.
- (b) When hot water heating boilers are connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation, such boiler piping systems shall be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

WALL FURNACES

Installation:

- (a) Listed wall furnaces shall be installed in accordance with their listing and the manufacturer's instructions. They may be installed in or attached to combustible material.
- (b) Unlisted wall furnaces shall not be installed in or attached to combustible material.
- (c) Vented wall furnaces connected to a Type BW gas vent system listed only for single story shall be installed only in single story buildings or the top story of multistory buildings. Vented wall furnaces connected to a Type BW gas vent system listed for installation in multistory buildings may be installed in single story or multistory buildings. Type BW gas vents shall be attached directly to a solid header plate which may be an integral part of the vented wall furnace, and which serves as a fire stop at that point. The stud space in which the vented wall furnace is installed shall be ventilated at the first ceiling level by installation of the ceiling plate spacers furnished with the gas vent. Fire stop spacers shall be installed at each subsequent ceiling or floor level penetrated by the vent. (See Figure below for Type BW gas vent installation.)
- (d) Sealed combustion system wall furnaces shall be installed with the vent-air intake terminal in the outside atmosphere. The thickness of the walls on which the appliance is mounted shall be within the range of wall thickness marked on the appliance and covered in the manufacturer's installation instructions.
- (e) Panels, grilles and access doors which must be removed for normal servicing operations shall not be attached to the building.

Locations:

Wall furnaces shall be located so as not to cause a hazard to walls, floors,

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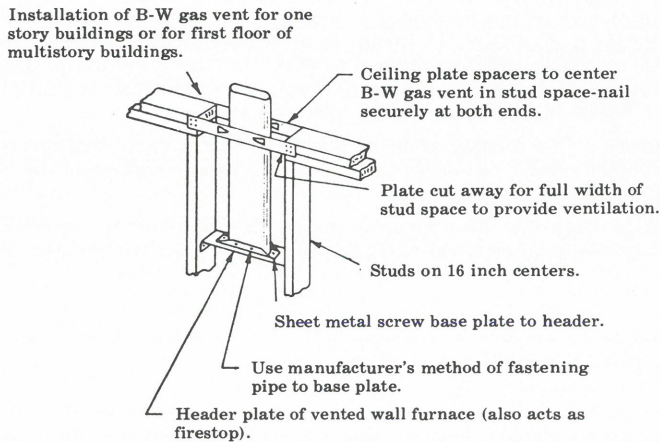
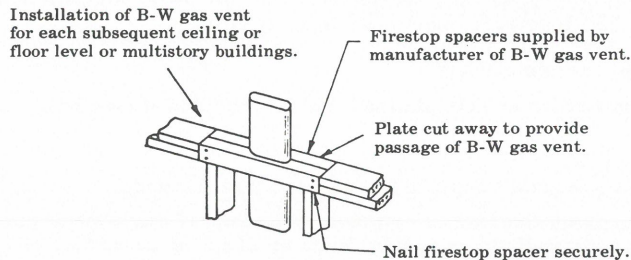
curtains, furniture, or doors. Wall furnaces installed between bathrooms and adjoining rooms shall not circulate air from bathrooms to other parts of the building.

Manual Main Shutoff Valve:

A manual main shutoff valve shall be installed ahead of all controls including the pilot gas valve.

Combustion and Circulating Air:

Adequate combustion and circulating air shall be provided.



Installation of Type B-W Gas Vents for Vented Wall Furnaces.

FLOOR FURNACES

Installation:

- (a) Listed floor furnaces shall be installed in accordance with their listing and the manufacturer's instructions. They may be installed in combustible floors.
- (b) Unlisted floor furnaces shall not be installed in combustible floors.

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Manual Main Shutoff Valve:

A separate manual main shutoff valve shall be provided ahead of all controls and a union connection shall be provided downstream from this valve to permit removal of the controls or the floor furnace.

Temperature Limit Controls:

- (a) Listed automatically operated floor furnaces shall be equipped with a temperature limit control in accordance with the terms of their listing.
- (b) Unlisted automatically operated floor furnaces shall be equipped with a temperature limit control arranged to shut off the flow of gas to the burner in the event the temperature at the warm air outlet grille exceeds 350 degrees F. above room temperature.

Combustion and Circulating Air:

Adequate combustion and circulating air shall be provided (see 3.4).

Placement:

The following provisions apply to furnaces to serve one story.

- (a) Floor furnaces shall not be installed in the floor of any aisle or passageway of any auditorium, public hall, or place of assembly, or in an exitway from any such room or space.
- (b) **Walls and Corners.** The grille of a floor furnace with a horizontal warm air outlet shall not be placed closer than 6 inches to the nearest wall. A distance of at least 15 inches from two adjoining sides of the floor grille to walls shall be provided to eliminate the necessity of occupants walking over the warm air discharge from grilles. Wall-register models shall not be placed closer than 6 inches to a corner.
- (c) **Draperies.** The furnace shall be placed so that a door, drapery, or similar object cannot be nearer than 12 inches to any portion of the register of the furnace.
- (d) **Central Location.** The furnace should be installed in a central location favoring slightly the sides exposed to the prevailing winter winds.

Bracing:

The space provided for the furnace shall be framed with doubled joists and with headers not lighter than the joists.

Support:

Means shall be provided to support the furnace when the floor grille is removed.

Seepage Pan:

When the excavation exceeds 12 inches in depth or water seepage is likely to collect, a watertight copper pan, concrete pit, or other suitable material shall be used, unless adequate drainage is provided or the equipment is sealed by the manufacturer to meet this condition. A copper pan shall be made of not less than 16-ounce-per-square-foot sheet copper. The pan shall be anchored in place, so as to prevent floating, and the walls shall extend at least 4 inches above the ground level, with at least 6 inches clearance on all sides except the control side, which shall have at least 18 inches clearance.

Wind Protection:

Floor furnaces shall be protected, where necessary, against severe wind conditions.

Upper Floor Installations:

Listed floor furnaces may be installed in an upper floor provided the furnace assembly projects below into a utility room, closet, garage, or similar nonhabitable space. In such installations, the floor furnace shall be enclosed completely (entirely separated from the nonhabitable space) with means for air intake to meet the provisions of 3.4, with access for servicing, with minimum furnace clearances of 6 inches to all sides and bottom, and with the enclosure constructed of portland cement plaster on metal lath or material of equal fire resistance.

First Floor Installation:

Listed floor furnaces installed in the first or ground floors of buildings need not be enclosed unless the basements of these buildings have been converted to apartments or sleeping quarters, in which case the floor furnace shall be enclosed as specified for upper floor installations and shall project into a nonhabitable space.

DUCT FURNACES

For clearances, see Chapter III.

Erection of Appliance:

Duct furnaces shall be erected and firmly supported in accordance with the manufacturer's instructions.

Access Panels:

The ducts connected to duct furnaces shall have removable access panels on both the upstream and downstream sides of the furnace.

Location of Draft Hood and Controls:

The controls, combustion air inlet, and draft hoods for duct furnaces shall be located outside the ducts. The draft hood shall be located in the same enclosure from which combustion air is taken.

Circulating Air:

When a duct furnace is installed in a confined space, the air circulated by the furnace shall be handled by ducts which are sealed to the furnace casing and which separate the circulating air from the combustion and ventilation air.

Duct Furnaces Used with Refrigeration Systems:

- (a) A duct furnace shall not be installed in conjunction with a refrigeration coil when circulation of cooled air is provided by the blower unless the blower has sufficient capacity to overcome the external static resistance imposed by the duct system, furnace and the cooling coil at the air throughput necessary for heating or cooling, whichever is greater.
- (b) To avoid condensation within heating elements, duct furnaces used in conjunction with cooling equipment shall be installed in parallel

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with or on the upstream side of cooling coils unless the duct furnace has been specifically listed by AGA or UL for downstream installation. With a parallel flow arrangement, the dampers or other means used to control the flow of air shall be sufficiently tight to prevent any circulation of cooled air through the unit.

- (c) When duct furnaces are to be located upstream from cooling units, the cooling unit shall be so designed or equipped as to not develop excessive temperatures or pressures.
- (d) Duct furnaces may be installed downstream from evaporative coolers or air washers if the heating element is made of corrosion-resistant material. Stainless steel, ceramic-coated steel, or an aluminum-coated steel in which the bond between the steel and the aluminum is an iron-aluminum alloy, are considered to be corrosion-resistant. Air washers operating with chilled water which delivers air below the dew point of the ambient air at the appliance are considered as refrigeration systems.

Installation in Commercial Garages and Aircraft Hangars:

Duct furnaces installed in garages for more than three motor vehicles or in aircraft hangars shall be of a listed type and shall be installed in accordance with 3.1.7 and 3.1.8.

CONVERSION BURNERS

Installation of conversion burners shall conform to ANSI Standard Installation of Domestic Gas Conversion Burners, Z21.8-1965, and Addenda Z21.8a-1967, except that an automatic means to shut off the fuel supply to the burner(s) shall be provided in accordance with 4.7.7.

CONVERSION BURNERS FOR DOMESTIC RANGES

Installation of conversion burners in ranges originally designed to utilize solid or liquid fuels shall conform to American Standard Requirements for Installation of Gas Conversion Burners in Domestic Ranges, Z21.38-1957.*

UNIT HEATERS

Support:

Suspended type unit heaters shall be safely and adequately supported with due consideration given to their weight and vibration characteristics. Hangars and brackets shall be of noncombustible material.

Manual Main Shutoff Valves:

When a complete shutoff type safety shutoff device is not utilized, a manual main shutoff valve shall be provided ahead of all controls except the manual pilot gas valve.

When a complete shutoff type safety device is utilized, a manual main shutoff valve shall be provided ahead of all controls.

A union connection shall be provided downstream from the manual main shutoff valve to permit removal of the controls.

Combustion and Circulating Air:

Adequate combustion and circulating air shall be provided (see 3.4).

*For details on protection refer to the Code for the Installation of Heat Producing Appliances, available from the American Insurance Association, 85 John St., New York, New York 10038.

Ductwork: (Prohibited unless marked)

A unit heater shall not be attached to a warm air duct system unless listed by AGA or UL and marked for such installation, against a static pressure of .4" W.C.

Installation in Commercial Garages and Aircraft Hangars:

Unit heaters installed in garages for more than 3 motor vehicles or in aircraft hangars shall be of a listed type and shall be installed in accordance with 3.1.7 and 3.1.8.

INFRARED RADIANT HEATERS

Support:

Suspended type infrared radiant heaters shall be safely and adequately fixed in position independent of gas and electric supply lines. Hangars and brackets shall be of noncombustible material.

Combustion and Ventilating Air:

(a) Where unvented infrared heaters are used, natural or mechanical means shall be provided to exhaust at least 4 cfm per 1,000 Btu per hour input of installed heaters.

(b) Exhaust openings for removing flue products shall be above the level of the heaters.

Installation in Commercial Garages and Aircraft Hangars:

Overhead heaters installed in garages for more than 3 motor vehicles or in aircraft hangars shall be of a listed type and shall be installed in accordance with 3.1.7 and 3.1.8.

CLOTHES DRYERS

Exhausting to the Outside Air:

(a) Type 1 clothes dryers should not be installed in bathrooms or bedrooms unless exhausted to the outside air.

(b) Type 2 clothes dryers shall be exhausted to the outside air.

Provisions for Make-up Air:

(a) When a Type 1 clothes dryer is exhausted to the outside, consideration shall be given to provision for make-up air. (See 3.4.5.)

(b) Provision for make-up air shall be provided for Type 2 clothes dryers, with a minimum free area (see 3.4.4) of one square inch for each 1,000 Btu per hour total input rating of the dryer(s) installed.

Exhaust Ducts for Type 1 Clothes Dryers:

(a) A clothes dryer exhaust duct shall not be connected into any vent connector, gas vent, chimney, crawl space, attic or other similar concealed space.

Exhaust Ducts for Type 2 Clothes Dryers:

(a) Exhaust ducts for Type 2 clothes dryers shall comply with 4.15.4.

(b) Exhaust ducts for Type 2 clothes dryer shall be constructed of sheet metal or other noncombustible material. Such ducts shall be equivalent in strength and corrosion resistance to ducts made of No. 24 Galvanized Sheet Gage steel.

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- (c) Type 2 clothes dryers shall be equipped or installed with lint controlling means.
- (d) Exhaust ducts for Type 2 clothes dryers shall have a clearance of at least 6 inches to combustible material except as provided in 4.15.5(e).
- (e) Exhaust ducts for Type 2 clothes dryers may be installed with reduced clearances to combustible material provided the combustible material is protected as described in Table 8.
- (f) When ducts pass through walls, floors or partitions, the space around the duct shall be sealed with noncombustible material.
- (g) Multiple installations of Type 2 clothes dryers shall be made in a manner to prevent adverse operation due to back pressures that might be created in the exhaust systems.

Multiple Family or Public Use:

Clothes dryers installed for multiple family or public use shall be equipped with approved safety shutoff devices.

Venting or Ventilating Kits Approved For Use with a Refrigerator:

If an accessory kit is used for conveying air for burner combustion or unit cooling to the refrigerator from areas outside the room in which it is located, or for conveying combustion products diluted with air containing waste heat from the refrigerator to areas outside the room in which it is located, the kit shall be installed in accordance with the refrigerator manufacturer's instructions.

Connection of Gas Engine-Powered Air Conditioners:

To protect against the effects of normal vibration in service, gas engines shall not be rigidly connected to the gas supply piping.

Plenum Chambers and Air Ducts:

A plenum chamber supplied as a part of an air conditioning appliance shall be installed in accordance with the manufacturer's instructions. When a plenum chamber is not supplied with the appliance, any fabrication and installation instructions provided by the manufacturer shall be followed. The method of connecting supply and return ducts shall facilitate proper circulation of air.

When the air conditioner is installed within a confined space, the air circulated by the appliance shall be handled by ducts which are sealed to the casing of the appliance and which separate the circulating air from the combustion and ventilation air.

TABLE 9

Flame Height Above Burner Head, Inches	Minimum clearance from Combustible Material, Feet*	
	Horizontal	Vertical
12	2	6
18	3	8
24	3	10
30	4	12

*Measured from the nearest portion of the burner head.

Mounting on Buildings:

Illuminating appliances designed for wall or ceiling mounting shall be securely attached to substantial structures in such a manner that they are not dependent on the gas piping for support.

Mounting on Posts:

Illuminating appliances designed for post mounting shall be securely and rigidly attached to a post.

Posts shall be rigidly mounted. The strength and rigidity of posts greater than three feet in height shall be at least equivalent to that of a 2½ inch diameter post constructed of 0.064 inch thick (No. 14 gage) steel or a one-inch schedule 40 steel pipe. Posts three feet or less in height shall not be smaller than a ¾ inch schedule 40 steel pipe.

Drain openings should be provided near the base of posts when there is a possibility of water collecting inside them.

Manual Shutoff Valves:

An approved manual shutoff valve shall be installed at or near the base of, or readily accessible to, unlisted open-flame illuminating devices.

Gas Pressure Regulators:

When a gas appliance pressure regulator is not supplied with an illuminating appliance and the service line is not equipped with a service pressure regulator, it is recommended that an appliance pressure regulator be installed in the line to the illuminating appliance. For multiple installations, one regulator of adequate capacity may be used to serve a number of illuminating appliances.

VENTED DECORATIVE APPLIANCES

Installation:

- (a) Listed vented decorative appliances shall be installed in accordance with their listing and the manufacturer's instructions. They may be installed in or attached to combustible material when so listed.
- (b) Unlisted vented decorative appliances shall not be installed in or attached to combustible material. They shall have clearance at sides and rear of not less than 18 inches; except that appliances which make use of metal, asbestos or ceramic material to direct radiation to the front of the appliance shall have a clearance of 36 inches in front, and if constructed with a double back of metal or ceramic may be installed with a clearance of 18 inches at sides and 12 inches at rear. Combustible floors under unlisted vented decorative appliances shall be protected in an approved manner.
- (c) Panels, grilles and access doors which must be removed for normal servicing operations shall not be attached to the building.

Manual Main Shutoff Valve:

A manual main shutoff valve shall be installed ahead of all controls including the pilot gas valve.

Combustion and Circulating Air:

Adequate combustion and circulating air shall be provided (see 3.4).

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1414.0—THE FOLLOWING EXCERPT IS FROM NFPA 54 PART 5

Part 5—Venting of Appliances

SPECIFICATIONS FOR VENTING

Appliances Required to be Vented:

Appliances of the following types shall be provided with venting systems or other means for removing the flue gases to the outside atmosphere.

- (a) Steam and hot water boilers, warm air furnaces, floor furnaces, and wall furnaces.
- (b) Unit heaters and duct furnaces.
- (c) Incinerators.
- (d) Water heaters with inputs over 5,000 Btu per hour, except as provided under 5.1.2 (f) and (g).
- (e) Built-in domestic cooking units listed and marked only as vented units.
- (f) Room heaters listed only for vented use. Room heaters listed as “vented and unvented” units may be installed unvented subject to approval of the authority having jurisdiction. (See also 4.6.1 and 4.6.2)
- (g) Type 2 clothes dryers (see 4.15.2 and 4.15.5).
- (h) Appliances equipped with gas conversion burners
- (i) Other listed appliances which have draft hoods supplied by the appliance manufacturer.
- (j) Unlisted appliances, except as provided under 5.1.2 (1).

Appliances Not Required to be Vented:

- (a) Listed ranges.
- (b) Built-in domestic cooking units listed and marked as unvented units.
- (c) Listed hot plates and listed laundry stoves.
- (d) Listed Type 1 clothes dryers (see 4.15.2).
- (e) Listed water heaters with inputs not over 5,000 Btu per hour.
- (f) Automatically controlled instantaneous water heaters which supply water to a single faucet which is attached to and made a part of the appliance. (see 4.5.1).
- (g) A single listed booster type (automatic instantaneous) water heater when designed and used solely for the sanitizing rinse requirements of a National Sanitation Foundation Class 1, 2 or 3.

Appliances with Integral Vents:

- (a) Appliances incorporating integral venting means shall be considered properly vented when installed in accordance with their listings and the manufacturer's instructions.
- (b) Vent terminals of appliances using natural draft venting shall be located not less than 9 inches from any opening through which combustion products could enter the building. Vent terminals of appliances using forced draft venting shall be located not less than 12 inches from any opening through which combustion products could enter the building.

1415.0—EXCERPTS FROM PART 6, NFPA No. 54A
PART 6—INSTALLATION OF GAS EQUIPMENT

General

Gas equipment within the scope of this standard, but not covered by the following standards shall be installed in accordance with this standard.

- (a) American Insurance Association, Code for the Installation of Heat Producing Appliances, December, 1967.*
- (b) USA Standard for the Storage and Handling of Liquefied Petroleum Gases, Z106.1-1969 (NFPA No. 58-1969).
- (c) NFPA No. 37-1967, Combustion Engines and Gas Turbines.
- (d) NFPA No. 82-1969, Incinerators, Rubbish Handling.
- (e) NFPA No. 85-1967, Fuel Oil and Natural Gas-Fired Watertube Boiler-Furnaces.
- (f) NFPA No. 85B-1969, Natural Gas-Fired Public Utility Boiler-Furnaces.
- (g) NFPA No. 86A-1969, Ovens and Furnaces, Design, Location, and Equipment.

Domestic and commercial type gas appliances, supplied at pressures of $\frac{1}{2}$ pound per square inch or less, but supplied from piping systems operating at pressures in excess of $\frac{1}{2}$ pound per square inch in other than industrial occupancies, shall be installed in accordance with the provisions of USA Standard Installation of Gas Appliances and Gas Piping, Z21.30-1969 (NFPA No. 54-1969).

Domestic and commercial type gas appliances, supplied at pressures of $\frac{1}{2}$ pound per square inch or less that are located in offices, cafeterias, locker rooms, laboratories, first aid rooms and similar locations in industrial occupancies, shall be installed in accordance with appropriate provisions of USA Standard Installation of Gas Appliances and Gas Piping, Z21.30-1969 (NFPA No. 54-1969).

Heaters in aircraft hangars shall be installed in accordance with 1101 of NFPA No. 409-1969, Aircraft Hangars.

Heaters in garages shall be installed in accordance with NFPA No. 88-1968, Standard for Garages.

Equipment Suitability

Before installation it shall be determined that the gas equipment is suitable for use with the type of gas available at the point of utilization. No attempt shall be made to convert the equipment from the gas specified on the rating plate for use with a different gas without consulting either the gas supplier, the equipment manufacturer, or both, for complete instructions.

Locations of Gas Equipment

Gas equipment, and flue or vent connectors when required, shall be installed in a location where normal operation (continuous or intermittent) will not create a nuisance or hazard to persons or property.

Gas equipment shall be installed in a location where the facilities for ventilation permit satisfactory combustion of gas and proper venting under normal conditions of use.

*Available from the American Insurance Association, 85 John St., New York, N.Y. 10038.

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Building Structural Members

Structural members of a building shall not pass through gas equipment having an operating temperature in excess of 500 F.

Structural members passing through gas equipment having an operating temperature of 500 F. or less shall be noncombustible material. Building columns, girders, beams or trusses shall not be included within gas equipment, unless appropriate insulation and ventilation are provided to avoid all deterioration in strength, and linear expansion of the building structure in either a vertical or horizontal direction.

Gas equipment shall be furnished either with load distributing bases, or with a sufficient number of adequate supports to prevent damage to either building structure or equipment.

At the locations selected for installation of gas equipment, the dynamic and static load carrying capacities of the building structure shall be checked to determine if they are adequate to carry the additional loads. Gas equipment shall be adequately supported and shall be connected to the piping so as not to exert undue stress on the connections.

Gas Equipment Physical Protection

When it is necessary to locate gas equipment close to a passageway traveled by trucks or cranes, suitable guard rails or bumper plates shall be installed to protect the equipment from damage.

Connection to Building Gas Piping

Rigid and Semirigid Connectors

- (a) Gas equipment, except that installed in accordance with 6.1.2 or 6.1.3, and except equipment which requires mobility for operation or cleaning, equipment subject to vibration, or equipment used in more than one location, shall be connected to the building gas piping system with rigid piping of proper size and material. When installation conditions require, minimum lengths of tubing may be used. Refer to 3.2 and 4.1 for proper pipe size and materials.
- (b) Connections to buildings gas piping should be made at the top or sides or horizontal lines.
- (c) All connections shall be protected from physical or thermal damage.

Flexible Connections

- (a) Where flexible connections are used, they shall be of the minimum practical length and shall not extend from one room to another nor pass through any walls, partitions, ceilings, or floors. Flexible connections shall not be used in any 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, and with UL or AGA approval.