

Errata
ANSI Z223.1
National Fuel Gas Code ®
2015 Edition

Reference: Various
Errata Z223.1-2015-1

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National Fuel Gas Code user:

The American Gas Association (AGA) notes the following errors in the 2015 edition of ANSI Z223.1, *National Fuel Gas Code*. The first printing of the code by AGA contains these errors. AGA's later code printings are revised to include these corrections. To determine if you have a later printing, look for "Second (or later) Printing" located on the inside front cover of the code. AGA and NFPA separately print the code. Please visit the NFPA website at www.nfpa.org for any issued errata on NFPA 54.

Notes on using the errata:

Each erratum is numbered which includes the impacted section, table, or figure designation, along with the page number where it would appear in the published code. Underscored material denotes those items or wording that are to be added and strike through material denotes those items or wording that are to be deleted. Shading is provided where necessary to identify hard-to-see revisions. AGA provides the attached replacement code pages that can be inserted into the printed code. The replacement pdf files can be downloaded from www.aga.org/nfgc.

Additional Information:

For additional information on the errata, the code or National Fuel Gas Code Committee, please contact Mr. Paul Cabot, AGA, 202.824.7312, pcabot@aga.org. Also visit AGA's National Fuel Gas Code webpages at www.aga.org/nfgc for additional code information.



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**Errata Z223.1-2015-1
AGA Printed Version**

NOTE: The following errata apply to the American Gas Association’s first printing of ANSI Z223.1-2015.

Errata Z223.1-2015-1 Table 6.2(m), Page 39:

Table 6.2(m) Semi-Rigid Copper Tubing

Gas	Natural
Inlet pressure	2.0 psi
Pressure Drop	4.0 <u>1.5</u> psi
Specific Gravity	0.60

Errata Z223.1-2015-1 Table 6.2(s), Page 45:

Table 6.2(s) Corrugated Stainless Steel Tubing (CSST)

Gas	Natural
Inlet pressure	2.0 <u>5.0</u> psi
Pressure Drop	4.0 <u>3.5</u> psi
Specific Gravity	0.60

Errata Z223.1-2015-1 11.1.1, Page 97:

11.1.1* Adjusting Input. The input rate of the burner shall be adjusted to the proper value in accordance with the appliance manufacturer’s instructions. Firing at a rate in excess of the nameplate rating shall be prohibited.

Errata Z223.1-2015 Table 12.5.1, Page 100:

Table 12.5.1 Type of Venting System to Be Used.

Appliances	Type of Venting System	Location of Requirements
Listed vented wall furnaces	Type B-W gas vent	12.7, 10. 27 <u>26</u>

Errata Z223.1-2015-1 12.7.3.2, Page 103:

12.7.3.2 Vent Offsets. Type B and Type L vents sized in accordance with item (3) or (4) of Section ~~42.6.3.1~~ 12.7.3.1 shall extend in a generally vertical direction with offsets not exceeding 45 degrees, except that a vent system having not more than one 60-degree offset shall be permitted. Any angle greater than 45 degrees from the vertical is considered horizontal. The total horizontal distance of a vent plus the horizontal vent connector serving draft hood-equipped appliances shall not be greater than 75 percent of the vertical height of the vent.

Errata Z223.s-2015-1 Figure A.12.9, Page 142:

**Figure A.12.9
Exit terminals of mechanical draft and direct-vent venting systems.**

Direct vent terminal clearance		Mechanical draft	Mechanical
Minimum clearance, C		vent terminal	draft vent
Input (Btu/hr)	Clearance (in.)	[see 10.8.2 <u>12.9.2</u>]	terminal
10,000 or less	6		[see 10.8.4 <u>12.9.1</u>]
10,001 to 50,000	9		
Over 50,000	12		
[see 10.8.3 <u>12.9.3</u>]			

Table 6.2(m) Semi-Rigid Copper Tubing

Gas	Natural
Inlet pressure	2.0 psi
Pressure Drop	1.5 psi
Specific Gravity	0.60

INTENDED USE: Sizing Between Point of Delivery and the House Line Regulator. Total Load Supplied by a Single House Line Regulator Not Exceeding 150 Cubic Feet per Hour.²										
		Tube Size (in.)								
Nominal:	K & L	¼	⅜	½	⅝	¾	1	1¼	1½	2
	ACR	⅜	½	⅝	¾	⅞	1⅛	1⅜	-	-
Outside:		0.375	0.500	0.625	0.750	0.875	1.125	1.375	1.625	2.125
Inside:		0.305	0.402	0.527	0.652	0.745	0.995	1.245	1.481	1.959
Length (ft)		Capacity in Cubic Feet of Gas per Hour								
10	303	625	1,270	2,220	3,150	6,740	12,100	19,100	39,800	
20	208	430	874	1,530	2,170	4,630	8,330	13,100	27,400	
30	167	345	702	1,230	1,740	3,720	6,690	10,600	22,000	
40	143	295	601	1,050	1,490	3,180	5,730	9,030	18,800	
50	127	262	532	931	1,320	2,820	5,080	8,000	16,700	
60	115	237	482	843	1,200	2,560	4,600	7,250	15,100	
70	106	218	444	776	1,100	2,350	4,230	6,670	13,900	
80	98	203	413	722	1,020	2,190	3,940	6,210	12,900	
90	92	190	387	677	961	2,050	3,690	5,820	12,100	
100	87	180	366	640	907	1,940	3,490	5,500	11,500	
125	77	159	324	567	804	1,720	3,090	4,880	10,200	
150	70	144	294	514	729	1,560	2,800	4,420	9,200	
175	64	133	270	472	670	1,430	2,580	4,060	8,460	
200	60	124	252	440	624	1,330	2,400	3,780	7,870	
250	53	110	223	390	553	1,180	2,130	3,350	6,980	
300	48	99	202	353	501	1,070	1,930	3,040	6,320	
350	44	91	186	325	461	984	1,770	2,790	5,820	
400	41	85	173	302	429	916	1,650	2,600	5,410	
450	39	80	162	283	402	859	1,550	2,440	5,080	
500	36	75	153	268	380	811	1,460	2,300	4,800	
550	35	72	146	254	361	771	1,390	2,190	4,560	
600	33	68	139	243	344	735	1,320	2,090	4,350	
650	32	65	133	232	330	704	1,270	2,000	4,160	
700	30	63	128	223	317	676	1,220	1,920	4,000	
750	29	60	123	215	305	652	1,170	1,850	3,850	
800	28	58	119	208	295	629	1,130	1,790	3,720	
850	27	57	115	201	285	609	1,100	1,730	3,600	
900	27	55	111	195	276	590	1,060	1,680	3,490	
950	26	53	108	189	268	573	1,030	1,630	3,390	
1,000	25	52	105	184	261	558	1,000	1,580	3,300	
1,100	24	49	100	175	248	530	954	1,500	3,130	
1,200	23	47	95	167	237	505	910	1,430	2,990	
1,300	22	45	91	160	227	484	871	1,370	2,860	
1,400	21	43	88	153	218	465	837	1,320	2,750	
1,500	20	42	85	148	210	448	806	1,270	2,650	
1,600	19	40	82	143	202	432	779	1,230	2,560	
1,700	19	39	79	138	196	419	753	1,190	2,470	
1,800	18	38	77	134	190	406	731	1,150	2,400	
1,900	18	37	74	130	184	394	709	1,120	2,330	
2,000	17	36	72	126	179	383	690	1,090	2,270	

Notes:

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

Table 6.2(s) Corrugated Stainless Steel Tubing (CSST)

Gas	Natural
Inlet pressure	5.0 psi
Pressure Drop	3.5 psi
Specific Gravity	0.60

Tube Size (EHD)														
Flow Designation:	13	15	18	19	23	25	30	31	37	39	46	48	60	62
Length (ft)	Capacity in Cubic Feet of Gas per Hour													
10	523	674	1,080	1,300	2,000	2,530	4,920	5,660	8,300	9,140	18,100	19,800	34,400	40,400
25	322	420	691	827	1,290	1,620	3,080	3,540	5,310	5,911	11,400	12,600	22,00	25,600
30	292	382	632	755	1,180	1,480	2,800	3,230	4,860	5,420	10,400	11,500	20,100	23,400
40	251	329	549	654	1,030	1,280	2,420	2,790	4,230	4,727	8,970	10,000	17,400	20,200
50	223	293	492	586	926	1,150	2,160	2,490	3,790	4,251	8,020	8,930	15,600	18,100
75	180	238	403	479	763	944	1,750	2,020	3,110	3,506	6,530	7,320	12,800	14,800
80	174	230	391	463	740	915	1,690	1,960	3,020	3,400	6,320	7,090	12,400	14,300
100	154	205	350	415	665	820	1,510	1,740	2,710	3,057	5,650	6,350	11,100	12,800
150	124	166	287	339	548	672	1,230	1,420	2,220	2,521	4,600	5,200	9,130	10,500
200	107	143	249	294	478	584	1,060	1,220	1,930	2,199	3,980	4,510	7,930	9,090
250	95	128	223	263	430	524	945	1,090	1,730	1,977	3,550	4,040	7,110	8,140
300	86	116	204	240	394	479	860	995	1,590	1,813	3,240	3,690	6,500	7,430
400	74	100	177	208	343	416	742	858	1,380	1,581	2,800	3,210	5,650	6,440
500	66	89	159	186	309	373	662	766	1,040	1,422	2,500	2,870	5,060	5,760

Notes:

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

10.27.7* Antisiphon Devices. Means acceptable to the authority having jurisdiction shall be provided to prevent siphoning in any water heater or any tank to which a circulating water heater that incorporates a cold water inlet tube is attached.

10.28 Compressed Natural Gas (CNG) Vehicular Fuel Systems.

The installation of compressed natural gas (CNG) fueling (dispensing) systems shall conform with NFPA 52, *Vehicular Fuel Systems Code*.

10.29 Appliances for Installation in Manufactured Housing.

Appliances installed in manufactured housing after the initial sale shall be listed for installation in manufactured housing, or approved, and shall be installed in accordance with the requirements of this code and the manufacturers' installation instructions. Appliances installed in the living space of manufactured housing shall be in accordance with the requirements of 9.3.

10.30 Fuel Cell Power Plants.

Fuel cell power plants with a power output of less than 50 kW shall be listed and installed in accordance with the manufacturer's instructions. Fuel cell power plants with a power output of greater than 50 kW shall be installed in accordance with NFPA 853, *Standard for Installation of Stationary Fuel Cell Power Systems*.

10.31 Outdoor Open-Flame Decorative Appliances.

Permanently fixed-in-place outdoor open-flame decorative appliances shall be installed in accordance with 10.31.1 through 10.31.3.

10.31.1 Listed Units. Listed outdoor open-flame decorative appliances shall be installed in accordance with the manufacturer's installation instructions.

10.31.2 Unlisted Units. Unlisted outdoor open-flame decorative appliances shall be installed outdoors in accordance with the manufacturer's installation instructions and with clearances to combustible material of not less than 36 in. (910 mm) from the sides. In no case shall the appliance be located under overhead combustible construction.

10.31.3 Connection to the Piping System. The connection to the gas piping system shall be in accordance with 9.6.1 (1), (2), (4) or (5).

Chapter 11 Procedures to Be Followed to Place Appliance in Operation

11.1 Adjusting the Burner Input.

11.1.1* Adjusting Input. The input rate of the burner shall be adjusted to the proper value in accordance with the appliance manufacturer's instructions. Firing at a rate in excess of the nameplate rating shall be prohibited.

11.1.1.1 The input rate can be adjusted by either changing the size of a fixed orifice, changing the adjustment of an adjustable orifice, or readjusting the appliance's gas pressure regulator outlet pressure (where a regulator is provided in the appliance).

11.1.1.2 Input rate shall be determined by either one of the following:

- (1) Checking burner input by using a gas meter.
- (2) Checking burner input by using orifice pressure drop and orifice size.

11.1.1.3 Overfiring shall be prohibited.

11.1.2 High Altitude. Gas input ratings of appliances shall be used for elevations up to 2,000 ft (600 m). The input ratings of appliances operating at elevations above 2,000 ft (600 m) shall be reduced in accordance with one of the following methods:

- (1) 4 percent for each 1,000 ft (300 m) above sea level before selecting appropriately sized appliance.
- (2) As permitted by the authority having jurisdiction.
- (3) Listed appliances derated in accordance with the manufacturer's installation instructions shall be permitted.

11.2* Primary Air Adjustment.

The primary air for injection (Bunsen)-type burners shall be adjusted for proper flame characteristics in accordance with the appliance manufacturers' instructions. After setting the primary air, the adjustment means shall be secured in position.

Table 12.5.1 Type of Venting System to Be Used.

Appliances	Type of Venting System	Location of Requirements
Listed Category I appliances	Type B gas vent	12.7
Listed appliances equipped with draft hood	Chimney	12.6
Appliances listed for use with Type B gas vent	Single-wall metal pipe	12.8
	Listed Chimney lining system for gas venting	12.6.1.3
	Special Gas Vent listed for these appliances	12.5.4
Listed vented wall furnace	Type B-W gas vent	12.7, 10.26
Category II appliances Category III appliances Category IV appliances	Specified or furnished by manufacturers of listed appliances	12.5.2, 12.5.4
Incinerators	In accordance with NFPA 82	
Appliances that can be converted to use of solid fuel	Chimney	12.6
Unlisted combination gas and oil-burning appliances		
Combination gas- and solid-fuel-burning appliances		
Appliances listed for use with chimneys only		
Unlisted appliances		
Listed combination gas and oil-burning appliances	Type L vent	12.7,
	Chimney	12.6
Decorative appliance in vented fireplace	Chimney	10.6.2
Gas-fired toilets	Single-wall metal pipe	12.8,
		10.24.3
Direct vent appliances		12.3.5
Appliances with integral vent		12.3.6

vent an appliance, the appliance shall be listed for use with such venting materials and the appliance manufacturer's installation instructions shall identify the specific plastic piping material.

12.5.3 Plastic Vent Joints. Plastic pipe and fittings used

to vent appliances shall be installed in accordance with the appliance manufacturer's installation instructions. Where primer is required, it shall be of a contrasting color.

12.5.4 Special Gas Vent. Special gas vent shall be listed and installed in accordance with the special gas vent manufacturer's installation instructions.

12.6 Masonry, Metal, and Factory-Built Chimneys.

12.6.1 Listing or Construction.

12.6.1.1 Factory-built chimneys shall be installed in accordance with the manufacturer's installation instructions. Factory-built chimneys used to vent appliances that operate at positive vent pressure shall be listed for such application.

12.6.1.2 Metal chimneys shall be built and installed in accordance with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*.

12.6.1.3* Masonry chimneys shall be built and installed in accordance with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, and lined with approved clay flue lining, a listed chimney lining system, or other approved material that will resist corrosion, erosion, softening, or cracking from vent gases at temperatures up to 1800°F (982°C).

Exception: Masonry chimney flues lined with a chimney lining system specifically listed for use with listed appliances with draft hoods, Category I appliances, and other appliances listed for use with Type B vents shall be permitted. The liner shall be installed in accordance with the liner manufacturer's installation instructions. A permanent identifying label shall be attached at the point where the connection is to be made to the liner. The label shall read: "This chimney liner is for appliances that burn gas only. Do not connect to solid or liquid fuel-burning appliances or incinerators."

12.6.2 Termination.

12.6.2.1 A chimney for residential-type or low-heat appliances shall extend at least 3 ft (0.9 m) above the highest point where it passes through a roof of a building and at least 2 ft (0.6 m) higher than any portion of a building within a horizontal distance of 10 ft (3 m).

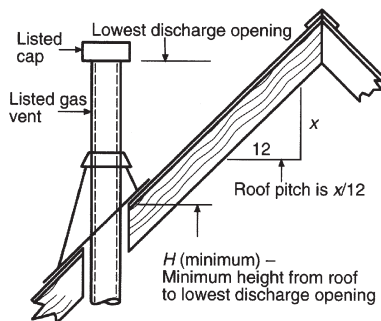
12.6.2.2 A chimney for medium-heat appliances shall extend at least 10 ft (3 m) higher than any portion of any building within 25 ft (7.6 m).

12.6.2.3 A chimney shall extend at least 5 ft (1.5 m) above the highest connected appliance draft hood outlet or flue collar.

appliances equipped with a draft hood or appliances listed for use with Type B gas vent, installed in a single story of a building, shall be in accordance with one of the following methods:

- (1) The provisions of Chapter 13.
- (2) Vents serving fan-assisted combustion system appliances, or combinations of fan-assisted combustion system and draft hood-equipped appliances shall be sized in accordance with Chapter 13 or other approved engineering methods.
- (3) For sizing an individual gas vent for a single, draft hood-equipped appliance, the effective area of the vent connector and the gas vent shall be not less than the area of the appliance draft hood outlet or greater than seven times the draft hood outlet area.
- (4) For sizing a gas vent connected to two appliances, with draft hoods, the effective area of the vent shall be not less than the area of the larger draft hood outlet plus 50 percent of the area of the smaller draft hood outlet or greater than seven times the smaller draft hood outlet area.
- (5) Approved engineering practices.

Figure 12.7.2 Termination Locations for Gas Vents With Listed Caps 12 in. (300 mm) or Less in Size at Least 8 ft (2.4 m) from a Vertical Wall.



12.7.3.2 Vent Offsets. Type B and Type L vents sized in accordance with item (3) or (4) of Section 12.7.3.1 shall extend in a generally vertical direction with offsets not exceeding 45 degrees, except that a vent system having not more than one 60-degree offset shall be permitted. Any angle greater than 45 degrees from the vertical is considered horizontal. The total horizontal distance of a vent plus the horizontal vent connector serving draft hood-equipped appliances shall not be greater than 75 percent of the vertical height of the vent.

12.7.3.3 Category II, Category III, and Category IV Appliances. The sizing of gas vents for Category

II, Category III, and Category IV appliances shall be in accordance with the appliance manufacturers' instructions. The sizing of plastic pipe specified by the appliance manufacturer as a venting material for Category II, III and IV appliances shall be in accordance with the appliance manufacturers' instructions.

12.7.3.4 Sizing. Chimney venting systems using mechanical draft shall be sized in accordance with approved engineering methods.

12.7.4 Gas Vents Serving Appliances on More Than One Floor.

12.7.4.1 A common vent shall be permitted in multistory installations to vent Category I appliances located on more than one floor level, provided the venting system is designed and installed in accordance with approved engineering methods. For the purpose of this section, crawl spaces, basements and attics shall be considered as floor levels.

12.7.4.2* All appliances connected to the common vent shall be located in rooms separated from occupiable space. Each of these rooms shall have provisions for an adequate supply of combustion, ventilation, and dilution air that is not supplied from occupiable space.

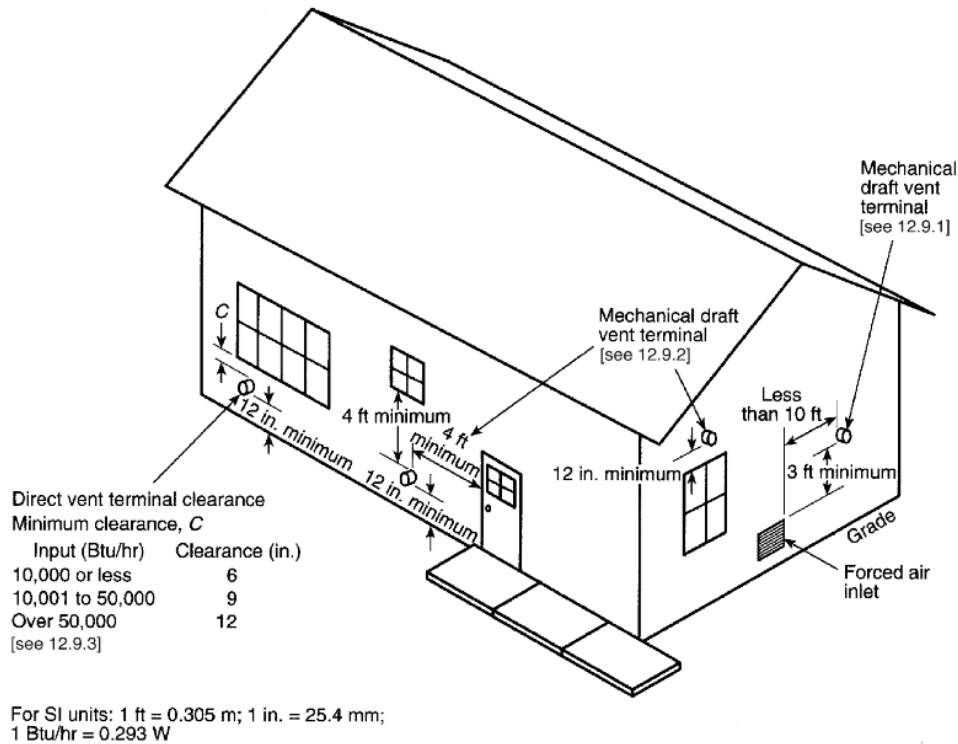
12.7.4.3 The size of the connectors and common segments of multistory venting systems for appliances listed for use with Type B double-wall gas vent shall be in accordance with Table 13.2(a), provided all of the following apply:

- (1) The available total height (H) for each segment of a multistory venting system is the vertical distance between the level of the highest draft hood outlet or flue collar on that floor and the centerline of the next highest interconnection tee.
- (2) The size of the connector for a segment is determined from the appliance's gas input rate and available connector rise and shall not be smaller than the draft hood outlet or flue collar size.
- (3) The size of the common vertical vent segment, and of the interconnection tee at the base of that segment, is based on the total appliance's gas input rate entering that segment and its available total height.

12.7.5 Support of Gas Vents. Gas vents shall be supported and spaced in accordance with the manufacturer's installation instructions.

12.7.6 Marking. In those localities where solid and liquid fuels are used extensively, gas vents shall be permanently

Figure A.12.9
Exit terminals of mechanical draft and direct-vent venting systems.



- (3) The vent system manufacturer's sizing instructions
- (4) Drawings, calculations, and specifications provided by the vent system manufacturer
- (5) Drawings, calculations, and specifications provided by a competent person
- (6) The chapter on chimney, gas vent, and fireplace systems of the ASHRAE Handbook — *HVAC Systems and Equipment*.

Category I appliances may be either draft hood-equipped or fan-assisted combustion system in design. Different vent design methods are required for draft hood-equipped and fan-assisted combustion system appliances.

A.12.7.4.2 An example of practical separation of multistory gas venting is provided in Figure A.12.7.4.2.

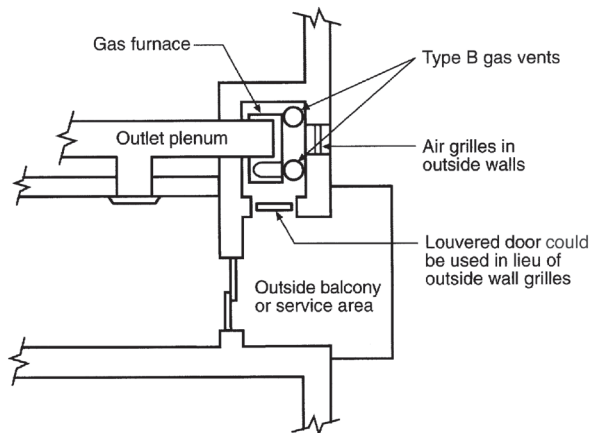
A.12.8.2 Data on winter design temperature can be found in Figure F.2.4 and the 1993 edition of the ASHRAE Handbook — *Fundamentals*.

A.12.8.4.1 The prohibition only applies to a vent entirely constructed of single-wall metal pipe located in a residential occupancy. The prohibition does not apply to single wall vent connectors used to connect an appliance to the vent as permitted in Section 12.11 and Chapter 13.

A.12.8.5 (1) Reference can also be made to the chapter on

chimney, gas vent, and fireplace systems of the ASHRAE Handbook — *HVAC Systems and Equipment*.

Figure A.12.7.4.2
Plan View of Practical Separation Method for Multistory Gas Venting.



A.12.9 See Figure A.12.9

A.12.11.3 Reference can also be made to the chapter on chimney, gas vent, and fireplace systems of the ASHRAE Handbook — *HVAC Systems and Equipment*.

A.12.11.6 A vent connector should be as short as practical, and the appliance located as close as practical, to the