

APPENDIX "F"
GAS REFERENCES

F-1 through F-32 are excerpts from the Appendix of NFPA No. 54
F-33—Typical Gas Train with example of specification

APPENDIX A (of NFPA No. 54)
Work on Gas Supply System

This appendix applies only to work on gas supply systems ahead of the outlet of the meter set assembly, or of the service regulator when a meter is not provided.

Serving Gas Supplier's Main

No person, unless in the employ of, or having permission from, the serving gas supplier, shall open or make connections with a gas main.

Service Gas Piping

No person, unless in the employ of, or having permission from, the serving gas supplier, shall repair, alter, open or make connections to the service gas piping, or do any other work on the parts of the gas supply system up to the meter set assembly or the service regulator when a meter is not provided.

Meter or Service Regulator When a Meter is Not Provided

No person, unless in the employ of or having permission from the serving gas supplier, shall disconnect the inlet of the gas meter or service regulator when a meter is not provided, nor move such meter or regulator. A gas fitter or plumber may disconnect the outlet of such a meter or regulator from the house piping only when necessary. He shall remake the joint at the meter or service regulator outlet when a meter is not provided, carefully replacing all insulating fittings or insulating parts of such fittings, and shall leave the gas turned off at the meter or regulator unless the serving gas supplier's rules require or allow deviation from this procedure.

Notify Servicing Gas Supplier of Any Repairs Needed

In case any work done by a gas fitter or plumber discloses the need for repairs or alterations on any part of the gas supply system, the serving gas supplier shall be notified promptly of this fact.

Notify Servicing Gas Supplier of Any Leaks

If gas is leaking from any part of the gas supply system, a gas fitter or plumber not in the employ of the serving gas supplier may make necessary repairs and shall promptly notify the serving gas supplier.

APPENDIX B (of NFPA No. 54)
Sizing and Capacities of Gas Piping

In order to determine the size of piping to be used in designing a gas piping system, the following factors must be considered:

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

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Description of Tables

(a) The quantity of gas to be provided at each outlet should be determined, whenever possible, directly from the manufacturer's Btu input rating of the appliance which will be installed. In case the ratings of the appliances to be installed are not known, Table 1 shows 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.

(b) Capacities for gas at low pressures (0.5 psig or less) in cubic feet per hour of 0.60 specific gravity gas for different sizes and lengths are shown in Tables 2 and 3 for iron pipe or equivalent rigid pipe and in Tables 4 and 5 for semirigid tubing. Tables 2 and 4 are based upon a pressure drop of 0.3 inch water column, whereas Tables 3 and 5 are 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.

(c) 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 7 for iron pipe or equivalent rigid pipe and in Table 8 for semirigid tubing. In using these Tables no additional allowance is necessary for an ordinary number of fittings.

(d) 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 2 through 5 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.

Application of the gravity factor converts the figures given in Tables 2 through 5 to capacities with another gas of different specific gravity. Such application is accomplished by multiplying the capacities given in Tables 2 through 5 by the multipliers shown in Table 6. In case the exact specific gravity does not appear in the Table, choose the next higher value specific gravity shown.

(e) For any gas piping system, for special gas appliances or for conditions other than those covered by Tables 2 through 5, 7 or 8, such as longer runs, greater gas demands, or greater pressure drops, the size each gas piping system shall be determined by standard engineering methods acceptable to the authority having jurisdiction and the serving gas supplier.

Use of Capacity Tables

To determine the size of each section of gas piping in a system within the range of the capacity tables, proceed as follows: (Also see sample calculation at end of Appendix B.)

1. Determine the gas demand of each appliance to be attached to the piping system. When Tables 2 through 5 are to be used to select the piping size, calculate the gas demand in terms of cubic feet per hour for each piping system outlet. When Tables 7 or 8 are to be used to select the piping size, calculate the gas demand in terms of thousands of Btu per hour for each piping system outlet.
2. When the piping system is for use with other than undiluted liquefied petroleum gases, determine the design system pressure, the allowable loss in pressure (pressure drop), and the specific gravity of the gas to be used in the piping system.

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3. Measure the length of piping from the gas meter, or service regulator when a meter is not provided, to the most remote outlet in the building.
4. In the appropriate capacity table, select the column showing the measured length, or the next longer length if the table does not give the exact length. This is the only length used in determining the size of any section of gas piping. If the gravity factor is to be applied, the values in the selected column of the table are multiplied by the appropriate multiplier from Table 6.
5. Use this vertical column to locate ALL gas demand figures for this particular system of piping.
6. Starting at the most remote outlet, find in the vertical column just selected the gas demand for that outlet. If the exact figure of demand is not shown, choose the next larger figure below in the column.
7. Opposite this demand figure, in the first column at the left, will be found the correct size of gas piping.
8. Proceed in a similar manner for each outlet and each section of gas piping. For each section of piping determine the total gas demand supplied by that section.

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

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TABLE 2
Maximum Capacity of Pipe in Cubic Feet of Gas per Hour for Gas Pressures of 0.5 Psig or Less and a Pressure Drop of 0.3 Inch Water Column (Based on a 0.60 Specific Gravity Gas)

Nominal Iron Pipe Size, Inches	Internal Diameter, Inches	Length of Pipe, Feet															
		10	20	30	40	50	60	70	80	90	100	125	150	175	200		
1/4	.364	32	22	18	15	14	12	11	11	10	9	8	8	7	6		
3/8	.493	72	49	40	34	30	27	25	23	22	21	18	17	15	14		
1/2	.622	132	92	73	63	56	50	46	43	40	38	34	31	28	26		
3/4	.824	278	190	152	130	115	105	96	90	84	79	72	64	59	55		
1	1.049	520	350	285	245	215	195	180	170	160	150	130	120	110	100		
1 1/4	1.380	1,050	730	590	500	440	400	370	350	320	305	275	250	225	210		
1 1/2	1.610	1,600	1,100	890	760	670	610	560	530	490	460	410	380	350	320		
2	2.067	3,050	2,100	1,650	1,450	1,270	1,150	1,050	990	930	870	780	710	650	610		
2 1/2	2.469	4,800	3,300	2,700	2,300	2,000	1,850	1,700	1,600	1,500	1,400	1,250	1,130	1,050	980		
3	3.068	8,500	5,900	4,700	4,100	3,600	3,250	3,000	2,800	2,600	2,500	2,200	2,000	1,850	1,700		
4	4.026	17,500	12,000	9,700	8,300	7,400	6,800	6,200	5,800	5,400	5,100	4,500	4,100	3,800	3,500		

TABLE 3
Maximum Capacity of Pipe in Cubic Feet of Gas per Hour for Gas Pressures of 0.5 Psig or Less and a Pressure Drop of 0.5 Inch Water Column (Based on a 0.60 Specific Gravity Gas)

Nominal Iron Pipe Size, Inches	Internal Diameter, Inches	Length of Pipe, Feet															
		10	20	30	40	50	60	70	80	90	100	125	150	175	200		
1/4	.364	43	29	24	20	18	16	15	14	13	12	11	10	9	8		
3/8	.493	95	65	52	45	40	36	33	31	29	27	24	22	20	19		
1/2	.622	175	120	97	82	73	66	61	57	53	50	44	40	37	35		
3/4	.824	360	250	200	170	151	138	125	118	110	103	93	84	77	72		
1	1.049	680	465	375	320	285	260	240	220	205	195	175	160	145	135		
1 1/4	1.380	1,400	950	770	660	580	530	490	460	430	400	360	325	300	280		
1 1/2	1.610	2,100	1,460	1,180	990	900	810	750	690	650	620	550	500	460	430		
2	2.067	3,950	2,750	2,200	1,900	1,680	1,520	1,400	1,300	1,220	1,150	1,020	950	850	800		
2 1/2	2.469	6,300	4,350	3,520	3,000	2,650	2,400	2,250	2,050	1,950	1,850	1,650	1,500	1,370	1,280		
3	3.068	11,000	7,700	6,250	5,300	4,750	4,300	3,900	3,700	3,450	3,250	2,950	2,650	2,450	2,280		
4	4.026	23,000	15,800	12,800	10,900	9,700	8,800	8,100	7,500	7,200	6,700	6,000	5,500	5,000	4,600		

TABLE 4
Maximum Capacity of Semirigid Tubing in Cubic Feet of Gas per Hour for Gas Pressures of 0.5 Psig or less and a Pressure Drop of 0.3 Inch Water Column (Based on a 0.60 Specific Gravity Gas)

Outside Diameter, Inch	Length of Tubing, Feet															
	10	20	30	40	50	60	70	80	90	100	125	150	175	200		
3/8	20	14	11	10	9	8	7	7	6	6	5	5	4	4		
1/2	42	29	23	20	18	16	15	14	13	12	11	10	9	8		
5/8	86	59	47	40	36	33	30	28	26	25	22	20	18	17		
3/4	150	103	83	71	63	57	52	49	46	43	38	35	32	30		
7/8	212	146	117	100	89	81	74	69	65	61	54	49	45	42		

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TABLE 5
Maximum Capacity of Semirigid Tubing in Cubic Feet of Gas
per Hour for Gas Pressures of 0.5 Psig or Less and a
Pressure Drop of 0.5 Inch Water Column
(Based on a 0.60 Specific Gravity Gas)

Outside Diameter, Inch	Length of Tubing, Feet													
	10	20	30	40	50	60	70	80	90	100	125	150	175	200
3/8	27	18	15	13	11	10	9	9	8	8	7	6	6	5
1/2	56	38	31	26	23	21	19	18	17	16	14	13	12	11
5/8	113	78	62	53	47	43	39	37	34	33	29	26	24	22
3/4	197	136	109	93	83	75	69	64	60	57	50	46	42	39
7/8	280	193	155	132	117	106	98	91	85	81	71	65	60	55

TABLE 6
Multipliers to be used only with Tables 2 through 5
when Applying the Gravity Factor

Specific Gravity	Multiplier	Specific Gravity	Multiplier
.35	1.31	1.00	.78
.40	1.23	1.10	.74
.45	1.16	1.20	.71
.50	1.10	1.30	.68
.55	1.04	1.40	.66
.60	1.00	1.50	.63
.65	.96	1.60	.61
.70	.93	1.70	.59
.75	.90	1.80	.58
.80	.87	1.90	.56
.85	.84	2.00	.55
.90	.82	2.10	.54

Note: Table 7 concerns LP-Gas, and is included in the first section of the Appendix of this Code, Appendix "A"

Note: Table 8 concerns LP-Gas and will be found in the first section of this Appendix of the Code, Appendix "A"

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TABLE 9

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

Example of Piping System Design:

Determine the required pipe size of each section and outlet of the piping system shown in Exhibit 1, with a designated pressure drop of 0.50 inch water column. Gas to be used has 0.65 specific gravity and a heating value of 1,000 Btu per cubic foot.

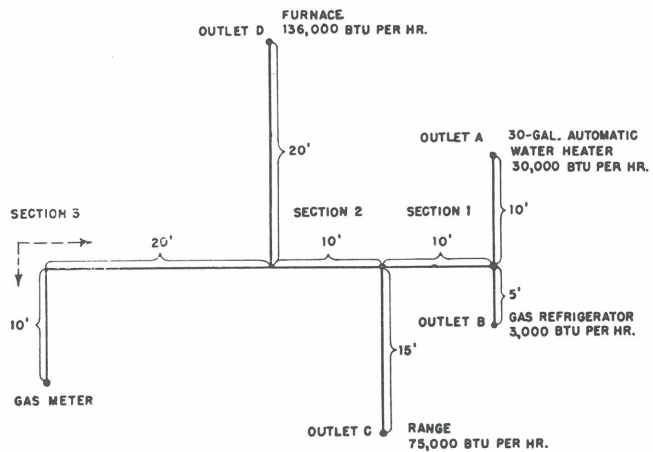


Exhibit 1.

Solution:

- (1) Maximum gas demand for outlet A:

$$\frac{\text{Consumption (rating plate input or Table 1 if necessary)}}{\text{Btu of gas}} =$$

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$$\frac{30,000 \text{ Btu per hour rating}}{1,000 \text{ Btu per cubic foot}} = \frac{30 \text{ cubic feet per hour}}{\text{(or 30 cfh)}}$$

Maximum gas demand for outlet B:

$$\frac{\text{Consumption}}{\text{Btu of gas}} = \frac{3,000}{1,000} = 3 \text{ cfh}$$

Maximum gas demand for outlet C:

$$\frac{\text{Consumption}}{\text{Btu of gas}} = \frac{75,000}{1,000} = 75 \text{ cfh}$$

Maximum gas demand for outlet D:

$$\frac{\text{Consumption}}{\text{Btu of gas}} = \frac{136,000}{1,000} = 136 \text{ cfh}$$

(2) The length of pipe from the gas meter to the most remote outlet (A) is 60 feet. This is the only distance used.

(3) Using the column marked 60 feet in Table 3 (provided this is the Table designated for use by the serving gas supplier):

- Outlet A, supplying 30 cfh, requires 3/8 inch pipe.
- Outlet B, supplying 3 cfh, requires 1/4 inch pipe.
- Section 1, supplying outlets A and B, or 33 cfh, requires 3/8 inch pipe.
- Outlet C, supplying 75 cfh, requires 3/4 inch pipe.
- Section 2, supplying outlets A, B and C, or 108 cfh, requires 3/4 inch pipe.
- Outlet D, supplying 136 cfh, requires 3/4 inch pipe.
- Section 3, supplying outlets A, B, C and D, or 244 cfh, requires 1 inch pipe.

(4) If the gravity factor (see (d) under Description of Tables) is applied to this example, the values in the column marked 60 feet of Table 3 would be multiplied by the multiplier (.96) from Table 6, and the resulting cubic feet per hour values would be used to size the piping.

APPENDIX C (of NFPA No. 54)
Flow of Gas Through Fixed Orifices
TABLE 1

Utility Gases
 (Cubic feet per hour at sea level)

Specific Gravity = 0.60
 Orifice Coefficient = 0.90

For utility gases of another specific gravity, select multiplier from Table 3.
 For altitudes above 2,000 feet, first select the equivalent orifice size at sea level from Table 4.

Orifice or Drill Size	Pressure at Orifice—Inches Water Column								
	3	3.5	4	5	6	7	8	9	10
80	.48	.52	.55	.63	.69	.73	.79	.83	.88
79	.55	.59	.64	.72	.80	.84	.90	.97	1.01
78	.70	.76	.78	.88	.97	1.04	1.10	1.17	1.24
77	.88	.95	.99	1.11	1.23	1.31	1.38	1.47	1.55
76	1.05	1.13	1.21	1.37	1.52	1.61	1.72	1.83	1.92
75	1.16	1.25	1.34	1.52	1.64	1.79	1.91	2.04	2.14
74	1.33	1.44	1.55	1.74	1.91	2.05	2.18	2.32	2.44
73	1.51	1.63	1.76	1.99	2.17	2.32	2.48	2.64	2.78

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TABLE 1 (Continued)

Orifice or Drill Size	Pressure at Orifice—Inches Water Column								
	3	3.5	4	5	6	7	8	9	10
72	1.64	1.77	1.90	2.15	2.40	2.52	2.69	2.86	3.00
71	1.82	1.97	2.06	2.33	2.54	2.73	2.91	3.11	3.26
70	2.06	2.22	2.39	2.70	2.97	3.16	3.38	3.59	3.78
69	2.25	2.43	2.61	2.96	3.23	3.47	3.68	3.94	4.14
68	2.52	2.72	2.93	3.26	3.58	3.88	4.14	4.41	4.64
67	2.69	2.91	3.12	3.52	3.87	4.13	4.41	4.69	4.94
66	2.86	3.09	3.32	3.75	4.11	4.39	4.68	4.98	5.24
65	3.14	3.39	3.72	4.28	4.62	4.84	5.16	5.50	5.78
64	3.41	3.68	4.14	4.48	4.91	5.23	5.59	5.95	6.26
63	3.63	3.92	4.19	4.75	5.19	5.55	5.92	6.30	6.63
62	3.78	4.08	4.39	4.96	5.42	5.81	6.20	6.59	6.94
61	4.02	4.34	4.66	5.27	5.77	6.15	6.57	7.00	7.37
60	4.21	4.55	4.89	5.52	5.95	6.47	6.91	7.35	7.74
59	4.41	4.76	5.11	5.78	6.35	6.78	7.25	7.71	8.11
58	4.66	5.03	5.39	6.10	6.68	7.13	7.62	8.11	8.53
57	4.84	5.23	5.63	6.36	6.96	7.44	7.94	8.46	8.90
56	5.68	6.13	6.58	7.35	8.03	8.73	9.32	9.92	10.44
55	7.11	7.68	8.22	9.30	10.18	10.85	11.59	12.34	12.98
54	7.95	8.59	9.23	10.45	11.39	12.25	13.08	13.93	14.65
53	9.30	10.04	10.80	12.20	13.32	14.29	15.27	16.25	17.09
52	10.61	11.46	12.31	13.86	15.26	16.34	17.44	18.57	19.53
51	11.82	12.77	13.69	15.47	16.97	18.16	19.40	20.64	21.71
50	12.89	13.92	14.94	16.86	18.48	19.77	21.12	22.48	23.65
49	14.07	15.20	16.28	18.37	20.20	21.60	23.06	24.56	25.83
48	15.15	16.36	17.62	19.88	21.81	23.31	24.90	26.51	27.89
47	16.22	17.52	18.80	21.27	23.21	24.93	26.62	28.34	29.81
46	17.19	18.57	19.98	22.57	24.72	26.43	28.23	30.05	31.61
45	17.73	19.15	20.52	23.10	25.36	27.18	29.03	30.90	32.51
44	19.45	21.01	22.57	25.57	27.93	29.87	31.89	33.96	35.72
43	20.73	22.39	24.18	27.29	29.87	32.02	34.19	36.41	38.30
42	23.10	24.95	26.50	29.50	32.50	35.24	37.63	40.07	42.14
41	24.06	25.98	28.15	31.69	34.81	37.17	39.70	42.27	44.46
40	25.03	27.03	29.23	33.09	36.20	38.79	41.42	44.10	46.38
39	26.11	28.20	30.20	34.05	37.38	39.97	42.68	45.44	47.80
38	27.08	29.25	31.38	35.46	38.89	41.58	44.40	47.27	49.73
37	28.36	30.63	32.99	37.07	40.83	43.62	46.59	49.60	52.17
36	29.76	32.14	34.59	39.11	42.76	45.77	48.88	52.04	54.74
35	32.36	34.95	36.86	41.68	45.66	48.78	52.10	55.46	58.34
34	32.45	35.05	37.50	42.44	46.52	49.75	53.12	56.55	59.49
33	33.41	36.08	38.79	43.83	48.03	51.46	54.96	58.62	61.55
32	35.46	38.30	40.94	46.52	50.82	54.26	57.95	61.70	64.89
31	37.82	40.85	43.83	49.64	54.36	58.01	61.96	65.97	69.39
30	43.40	46.87	50.39	57.05	62.09	66.72	71.22	75.86	79.80
29	48.45	52.33	56.19	63.61	69.62	74.45	79.52	84.66	89.04
28	51.78	55.92	59.50	67.00	73.50	79.50	84.92	90.39	95.09
27	54.47	58.83	63.17	71.55	78.32	83.59	89.27	95.04	99.97
26	56.73	61.27	65.86	74.57	81.65	87.24	93.17	99.19	104.57
25	58.87	63.58	68.22	77.14	84.67	90.36	96.50	102.74	108.07
24	60.81	65.67	70.58	79.83	87.56	93.47	99.83	106.28	111.79
23	62.10	67.07	72.20	81.65	89.39	94.55	100.98	107.49	113.07
22	64.89	70.08	75.21	85.10	93.25	99.60	106.39	113.24	119.12
21	66.51	71.83	77.14	87.35	95.63	102.29	109.24	116.29	122.33

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TABLE 1 (Continued)

Orifice or Drill Size	Pressure at Orifice—Inches Water Column								
	3	3.5	4	5	6	7	8	9	10
20	68.22	73.68	79.08	89.49	97.99	104.75	111.87	119.10	125.28
19	72.20	77.98	83.69	94.76	103.89	110.67	118.55	125.82	132.36
18	75.53	81.57	87.56	97.50	108.52	116.03	123.92	131.93	138.78
17	78.54	84.82	91.10	103.14	112.81	120.33	128.52	136.82	143.91
16	82.19	88.77	95.40	107.98	118.18	126.78	135.39	144.15	151.63
15	85.20	92.02	98.84	111.74	122.48	131.07	139.98	149.03	156.77
14	87.10	94.40	100.78	114.21	124.44	133.22	142.28	151.47	159.33
13	89.92	97.11	104.32	118.18	128.93	138.60	148.02	157.58	165.76
12	93.90	101.41	108.52	123.56	135.37	143.97	153.75	163.69	172.13
11	95.94	103.62	111.31	126.02	137.52	147.20	157.20	167.36	176.03
10	98.30	106.16	114.21	129.25	141.82	151.50	161.81	172.26	181.13
9	100.99	109.07	117.11	132.58	145.05	154.71	165.23	175.91	185.03
8	103.89	112.20	120.65	136.44	149.33	160.08	170.96	182.00	191.44
7	105.93	114.40	123.01	139.23	152.56	163.31	174.38	185.68	195.30
6	109.15	117.88	126.78	142.88	156.83	167.51	178.88	190.46	200.36
5	111.08	119.97	128.93	145.79	160.08	170.82	182.48	194.22	204.30
4	114.75	123.93	133.22	150.41	164.36	176.18	188.16	200.25	210.71
3	119.25	128.79	137.52	156.26	170.78	182.64	195.08	207.66	218.44
2	128.48	138.76	148.61	168.64	184.79	197.66	211.05	224.74	235.58
1	136.35	147.26	158.25	179.33	194.63	209.48	223.65	238.16	250.54

TABLE 2

Note: This Table concerns LP-Gas, and will be found in the first section of this Appendix of the Code, Appendix "A"

TABLE 3
Multipliers for Utility Gases of Another Specific Gravity

Specific Gravity	Multiplier	Specific Gravity	Multiplier
0.45	1.155	0.95	0.795
0.50	1.095	1.00	0.775
0.55	1.045	1.05	0.756
0.60	1.000	1.10	0.739
0.65	0.961	1.15	0.722
0.70	0.926	1.20	0.707
0.75	0.894	1.25	0.693
0.80	0.866	1.30	0.679
0.85	0.840	1.35	0.667
0.90	0.817	1.40	0.655

Appendix F

TABLE 4
Equivalent Orifice Sizes at High Altitudes
 (Includes 4% input reduction for each 1,000 feet)

Orifice Size at Sea Level	Orifice Size Required at Other Elevations								
	2000	3000	4000	5000	6000	7000	8000	9000	10000
1	2	2	3	3	4	5	7	8	10
2	3	3	4	5	6	7	9	10	12
3	4	5	7	8	9	10	12	13	15
4	6	7	8	9	11	12	13	14	16
5	7	8	9	10	12	13	14	15	17
6	8	9	10	11	12	13	14	16	17
7	9	10	11	12	13	14	15	16	18
8	10	11	12	13	13	15	16	17	18
9	11	12	12	13	14	16	17	18	19
10	12	13	13	14	15	16	17	18	19
11	13	13	14	15	16	17	18	19	20
12	13	14	15	16	17	17	18	19	20
13	15	15	16	17	18	18	19	20	22
14	16	16	17	18	18	19	20	21	23
15	16	17	17	18	19	20	20	22	24
16	17	18	18	19	19	20	22	23	25
17	18	19	19	20	21	22	23	24	26
18	19	19	20	21	22	23	24	26	27
19	20	20	21	22	23	25	26	27	28
20	22	22	23	24	25	26	27	28	29
21	23	23	24	25	26	27	28	28	29
22	23	24	25	26	27	27	28	29	29
23	25	25	26	27	27	28	29	29	30
24	25	26	27	27	28	28	29	29	30
25	26	27	27	28	28	29	29	30	30
26	27	28	28	28	29	29	30	30	30
27	28	28	29	29	29	30	30	30	31
28	29	29	29	30	30	30	30	31	31
29	29	30	30	30	30	31	31	31	32
30	30	31	31	31	31	32	32	33	35
31	32	32	32	33	34	35	36	37	38
32	33	34	35	35	36	36	37	38	40
33	35	35	36	36	37	38	38	40	41
34	35	36	36	37	37	38	39	40	42
35	36	36	37	37	38	39	40	41	42
36	37	38	38	39	40	41	41	42	43
37	38	39	39	40	41	42	42	43	43
38	39	40	41	41	42	42	43	43	44
39	40	41	41	42	42	43	43	44	44
40	41	42	42	42	43	43	44	44	45
41	42	42	42	43	43	44	44	45	46
42	42	43	43	43	44	44	45	46	47
43	44	44	44	45	45	46	47	47	48
44	45	45	45	46	47	47	48	48	49
45	46	47	47	47	48	48	49	49	50
46	47	47	47	48	48	49	49	50	50

TABLE 4 (Continued)

Orifice Size at Sea Level	Orifice Size Required at Other Elevations								
	2000	3000	4000	5000	6000	7000	8000	9000	10000
47	48	48	49	49	49	50	50	51	51
48	49	49	49	50	50	50	51	51	52
49	50	50	50	51	51	51	52	52	52
50	51	51	51	51	52	52	52	53	53
51	51	52	52	52	52	53	53	53	54
52	52	53	53	53	53	53	54	54	54
53	54	54	54	54	54	54	55	55	55
54	54	55	55	55	55	55	56	56	56
55	55	55	55	56	56	56	56	56	57
56	56	56	57	57	57	58	59	59	60
57	58	59	59	60	60	61	62	63	63
58	59	60	60	61	62	62	63	63	64
59	60	61	61	62	62	63	64	64	65
60	61	61	62	63	53	64	64	65	65
61	62	62	63	63	64	65	65	66	66
62	63	63	64	64	64	65	66	66	67
63	64	64	65	65	65	66	66	67	68
64	65	65	65	66	66	66	67	67	68
65	65	66	66	66	67	67	68	68	69
66	67	67	68	68	68	69	69	69	70
67	68	68	68	69	69	69	70	70	70
68	68	69	69	69	70	70	70	71	71
69	70	70	70	70	71	71	71	72	72
70	70	71	71	71	71	72	72	73	73
71	72	72	72	73	73	73	74	74	74
72	73	73	73	73	74	74	74	74	75
73	73	74	74	74	74	75	75	75	76
74	74	75	75	75	75	76	76	76	76
75	75	76	76	76	76	77	77	77	77
76	76	76	77	77	77	77	77	77	77
77	77	77	77	78	78	78	78	78	78
78	78	78	78	79	79	79	79	80	80
79	79	80	80	80	80	.013	.012	.012	.012
80	80	.013	.013	.013	.012	.012	.012	.012	.011

USE OF ORIFICE TABLES

A. To Check Burner Input in Accordance with 6.1.3 (b);

Gage size of burner orifice and determine flow rate at sea level from Table 1—Utility Gases (cubic feet hour), or from Table 2—LP-Gases (Btu per hour). When the specific gravity of the utility gas is other than 0.6, select the multiplier from Table 3 for the specific gravity of the utility gas served and apply to the flow rate as determined from Table 1. When altitude is above 2,000 feet, first select equivalent orifice size at sea level using Table 4 and then determine flow rate from Table 1 or Table 2 as directed above.

Having determined flow rate (as adjusted for specific gravity and/or altitude when required) check the burner input at sea level with the manufacturer's rated input.

Appendix F

B. To Select Correct Orifice Size for Rated Burner Input;

The selection of a fixed orifice size for any rated burner input is affected by many variables including orifice coefficient and it is recommended that the appliance manufacturer be consulted for that purpose. When correct orifice size cannot be readily determined, the orifice flow rates, as stated in the tables in this appendix, may be used to select a fixed orifice size with a flow rate to approximately equal the required rated burner input.

For gases of the specific gravity and pressure conditions stipulated at elevations under 2,000 feet, Table 1 (in cubic feet per hour) or Table 2 (in Btu per hour) may be used directly.

When the specific gravity of the gas is other than 0.6, select the multiplier from Table 3 for the utility gas served and *divide* the rated burner input by the selected factor to determine equivalent input at a specific gravity of 0.60 and then select orifice size as directed above.

When the appliance is located at an altitude of 2,000 feet or above, first use the manufacturer's rated input at sea level to select orifice size as directed above, then use Table 4 to select the equivalent orifice size for use at the higher altitude.

APPENDIX D (of NFPA No. 54) Sizing of Venting Systems Serving Appliances Equipped with Draft Hoods and Appliances Listed for Use with Type B Vents

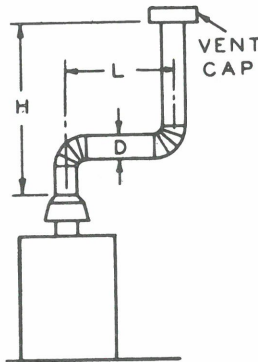


Figure 1
Double Wall or Asbestos Cement
Type B Vents or Single-Wall
Metal Vents Serving a Single
Appliance. (See Tables 1 and 2.)

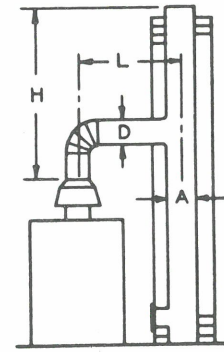


Figure 2
Masonry Chimney Serving a
Single Appliance.
(See Table 3.)

Notes for Single Appliance Vents. (See Tables 1, 2 and 3.)

- (1) For single-wall metal pipe, use Table 2-1
- (2) If the vent size determined from the Tables is less than the size of the draft hood, the smaller sized vent may be used as long as the vent height "H" is at least 10 feet.
- (3) Vents for draft hoods 12 inches in diameter or less should not be reduced more than one size (12 inches to 10 inches is a one-size reduction). For larger gas-burning equipment, reductions of more than two sizes (24 inches to 20 inches is a two-size reduction) are not recommended.
- (4) Regardless of the vent size shown, do not connect any 4-inch draft hoods to 3-inch vents.

Appendix F

(5) "0" Zero lateral "L" applies only to a straight vertical vent attached to a top outlet draft hood.

TABLE 1
Capacity of Single-Wall Metal Pipe or Type B
Asbestos Cement Vents Serving a Single Appliance

Height H	Lateral L	Vent Diameter—D								
		3"	4"	5"	6"	7"	8"	10"	12"	
		Maximum	Appliance	Input	Rating	in	Thousands	of	Btu Per	Hour
6'	0	39	70	116	170	232	312	500	750	
	2'	31	55	94	141	194	260	415	620	
	5'	28	51	88	128	177	242	390	600	
8'	0	42	76	126	185	252	340	542	815	
	2'	32	61	102	154	210	284	451	680	
	5'	29	56	95	141	194	264	430	648	
	10'	24*	49	86	131	180	250	406	625	
10'	0	45	84	138	202	279	372	606	912	
	2'	35	67	111	168	233	311	505	760	
	5'	32	61	104	153	215	289	480	724	
	10'	27*	54	94	143	200	274	455	700	
	15'	NR	46*	84	130	186	258	432	666	
15'	0	49	91	151	223	312	420	684	1040	
	2'	39	72	122	186	260	350	570	865	
	5'	35*	67	110	170	240	325	540	825	
	10'	30*	58*	103	158	223	308	514	795	
	15'	NR	50*	93*	144	207	291	488	760	
	20'	NR	NR	82*	132*	195	273	466	726	
20'	0	53*	101	163	252	342	470	770	1190	
	2'	42*	80	136	210	286	392	641	990	
	5'	38*	74*	123	192	264	364	610	945	
	10'	32*	65*	115*	178	246	345	571	910	
	15'	NR	55*	104*	163	228	326	550	870	
	20'	NR	NR	91*	149*	214*	306	525	832	
30'	0	56*	108*	183	276	384	529	878	1370	
	2'	44*	84*	148*	230	320	441	730	1140	
	5'	NR	78*	137*	210	296	410	694	1080	
	10'	NR	68*	125*	196*	274	388	656	1050	
	15'	NR	NR	113*	177*	258*	366	625	1000	
	20'	NR	NR	99*	163*	240*	344	596	960	
	30'	NR	NR	NR	NR	192*	295*	540	890	
50'	0	NR	120*	210*	310*	443*	590	980	1550	
	2'	NR	95*	171*	260*	370*	492	820	1290	
	5'	NR	NR	159*	234*	342*	474	780	1230	
	10'	NR	NR	146*	221*	318*	456*	730	1190	
	15'	NR	NR	NR	200*	292*	407*	705	1130	
	15'	NR	NR	NR	185*	276*	384*	670*	1080	
	30'	NR	NR	NR	NR	222*	330*	605*	1010	

See Figure 1 and Notes for Single Appliance Vents.

Appendix F

(6) Use sea level input rating when calculating vent size for high altitude installation.

(7) Designation "NR" in Tables 1, 2 and 3 indicates not recommended.

(8) Number followed by an asterisk (*) in Tables 1 and 3 indicate the possibility of continuous condensation, depending on locality. Consult local serving gas supplier and/or local codes.

TABLE 2
Capacity of Type B Double-Wall Vents with Type B Double-Wall Connectors
Serving a Single Appliance

Height H	Lateral L	Vent Diameter—D													
		3"	4"	5"	6"	7"	8"	10"	12"	14"	16"	18"	20"	22"	24"
Maximum Appliance Input Rating in Thousands of Btu Per Hour															
6'	0	46	86	141	205	285	370	570	850	1170	1530	1960	2430	2950	3520
	2'	36	67	105	157	217	285	455	650	890	1170	1480	1850	2220	2670
	6'	32	61	100	149	205	273	435	630	870	1150	1470	1820	2210	2650
	12'	28	55	91	137	190	255	406	610	840	1110	1430	1795	2180	2600
8'	0	50	94	155	235	320	415	660	970	1320	1740	2220	2750	3360	4010
	2'	40	75	120	180	247	322	515	745	1020	1340	1700	2110	2560	3050
	8'	35	66	109	165	227	303	490	720	1000	1320	1670	2070	2530	3030
	16'	28	58	96	148	206	281	458	685	950	1260	1600	2035	2470	2960
10'	0	53	100	166	255	345	450	720	1060	1450	1925	2450	3050	3710	4450
	2'	42	81	129	195	273	355	560	850	1130	1480	1890	2340	2840	3390
	10'	36	70	115	175	245	330	525	795	1080	1430	1840	2280	2780	3340
	20'	60	100	154	217	300	486	735	1030	1360	1780	2230	2720	3250	
15'	0	58	112	187	285	390	525	840	1240	1720	2270	2900	3620	4410	5300
	2'	48	93	150	225	316	414	675	985	1350	1770	2260	2800	3410	4080
	15'	37	76	128	198	275	373	610	905	1250	1675	2150	2700	3300	3980
	30'	60	107	169	243	328	553	845	1180	1550	2050	2620	3210	3840	
20'	0	61	119	202	307	430	575	930	1350	1900	2520	3250	4060	4980	6000
	2'	51	1100	1166	249	346	4470	755	1100	1520	2000	2570	3200	3910	4700
	10'	44	89	150	228	321	443	710	1045	1460	1940	2500	3130	3830	4600
	20'	35	78	134	206	295	410	665	990	1390	1880	2430	3050	3760	4550
30'	68	120	186	273	380	626	945	1270	1700	2330	2980	3650	4390		
30'	0	64	128	220	336	475	650	1060	1550	2170	2920	3770	4750	5850	7060
	2'	56	112	185	280	394	535	865	1310	1800	2380	3050	3810	4650	5600
	20'	90	154	237	343	473	784	1185	1650	2200	2870	3650	4480	5310	
	40'	200	298	415	705	1075	1520	2060	2700	3480	4270	5140			
40'	0	66	132	228	353	500	685	1140	1730	2400	3230	4180	5270	6500	7860
	2'	59	118	198	298	420	579	960	1420	2000	2660	3420	4300	5260	6320
	20'	96	167	261	377	516	860	1310	1830	2460	3200	4050	5000	6070	
	40'	223	333	460	785	1205	1710	2310	3020	3840	4780	5820			
60'	0	NR	136	236	373	535	730	1250	1920	2700	3650	4740	6000	7380	9000
	2'	NR	125	213	330	470	650	1060	1605	2250	3020	3920	4960	6130	7400
	30'	NR	170	275	397	555	930	1440	2050	2780	3640	4700	5730	7000	
	60'	NR	NR	NR	NR	334	475	830	1285	1870	2560	3380	4330	5420	6600
80'	0	NR	NR	239	384	550	755	1290	2020	2880	3900	5100	6450	8000	9750
	2'	NR	NR	217	350	495	683	1145	1740	2460	3320	4310	5450	6740	8200
	40'	NR	NR	NR	275	404	570	980	1515	2180	2980	3920	5000	6270	7650
	80'	NR	NR	NR	NR	NR	NR	850	1420	2000	2750	3640	4680	5850	7200
100'	0	NR	NR	NR	400	560	770	1310	2050	2950	4050	5300	6700	8600	10300
	2'	NR	NR	NR	375	510	700	1170	1820	2550	3500	4600	5800	7200	8800
	50'	NR	NR	NR	NR	405	575	1000	1550	2250	3100	4050	5300	6600	8100
	100'	NR	NR	NR	NR	NR	NR	870	1430	2050	2850	3750	4900	6100	7500

See Figure 1 and Notes for Single Appliance Vents.

Appendix F

TABLE 3
Capacity of Masonry Chimneys and Single-Wall Vent Connectors
Serving a Single Appliance

Height H	Lateral L	Single-Wall Vent Connector Diameter—D							
		To be used with chimney areas not less than those at bottom							
		3"	4"	5"	6"	7"	8"	10"	12"
		Maximum Appliance Input Rating in Thousands of Btu Per Hour							
6'	2'	28	52	86	130	180	247	400	580
	5'	25*	48	81	118	164	230	375	560
8'	2'	29	55	93	145	197	265	445	650
	5'	26*	51	87	133	182	246	422	638
	10'	22*	44*	79	123	169	233	400	598
10'	2'	31	61	102	161	220	297	490	722
	5'	28*	56	95	147	203	276	465	710
	10'	24*	49*	86	137	189	261	441	665
	15'	NR	42*	79*	125	175	246	421	634
15'	2'	35*	67	113	178	249	335	560	840
	5'	32*	61	106	163	230	312	531	825
	10'	27*	54*	96	151	214	294	504	774
	15'	NR	46*	87*	138	198	278	481	738
	20'	NR	NR	73*	128*	184	261	459	706
20'	2'	38*	73	123	200	273	374	625	950
	5'	35*	67*	115	183	252	348	594	930
	10'	NR	59*	105*	170	235	330	562	875
	15'	NR	NR	95*	156	217	311	536	835
	20'	NR	NR	80*	144*	202	292	510	800
30'	2'	41*	81*	136	215	302	420	715	1110
	5'	NR	75*	127*	196	279	391	680	1090
	10'	NR	66*	113*	182*	260	370	644	1020
	15'	NR	NR	105*	168*	240*	349	615	975
	20'	NR	NR	88*	155*	223*	327	585	932
	30'	NR	NR	NR	NR	182*	281*	544	865
50'	2'	NR	91*	160*	250*	350*	475	810	1240
	5'	NR	NR	149*	228*	321*	442	770	1220
	10'	NR	NR	136*	212*	301*	420*	728	1140
	15'	NR	NR	124*	195*	278*	395*	695	1090
	20'	NR	NR	NR	180*	258*	370*	660*	1040
	30'	NR	NR	NR	NR	NR	318*	610*	970

Minimum Internal
Area of Chimney-A
Square Inches

19	28	38	50	63	95	132
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See Table 7 for Masonry Chimney Liner Sizes.
See Figure 2 and Notes for Single Appliance Vents.

Appendix F

Notes for Multiple Appliance Vents. (See Tables 4, 5 and 6.)

1. For single-wall metal pipe connectors, use Table 5.
2. Maximum Vent Connector Length $1\frac{1}{2}$ feet for every inch of connector diameter. Greater lengths require increase in size, rise or total vent height, to obtain full capacity.
3. Each 90-degree turn in excess of the first two reduces the connector capacity by 10 percent.
4. Each 90-degree turn in the common vent reduces capacity by 10 percent.
5. Where possible, locate vent closer to or directly over smaller appliance connector.
6. Connectors must be equal to or larger than draft hood outlets.
7. If both connectors are same size, common vent must be at least one size larger, regardless of tabulated capacity.
8. Common vent must be equal to or larger than largest connector.
9. Interconnection fittings must be same size as common vent.
10. Use sea level input rating when calculating vent size for high altitude installation.
11. Designation "NR" in Tables 4, 5 and 6 indicates not recommended.

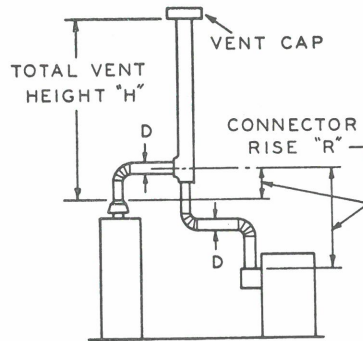


Figure 3

Double-Wall or Asbestos Cement Type B Vents or Single-Wall Metal Vents Serving Two or More Appliances. (See Tables 4 and 5.)

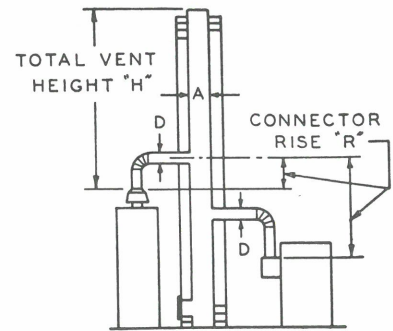


Figure 4

Masonry Chimney Serving Two or More Appliances. (See Table 6.)

Appendix F

TABLE 4
Capacity of Type B Double-Wall Vents with Type B
Vent Connector Capacity
Double-Wall Connectors Serving Two or More
Appliances

Total Vent Height "H"	Connector Rise "R"	Vent Connector Diameter—D													
		3"	4"	5"	6"	7"	8"	10"	12"	14"	16"	18"	20"	22"	24"
Maximum Appliance Input Rating in Thousands of Btu Per Hour															
6'	1'	26	46	72	104	142	185	289	416	577	755	955	1180	1425	1700
	2'	31	55	86	124	168	220	345	496	653	853	1080	1335	1610	1920
	3'	35	62	96	139	189	248	386	556	740	967	1225	1510	1830	2180
8'	1'	27	48	76	109	148	194	303	439	601	805	1015	1255	1520	1810
	2'	32	57	90	129	175	230	358	516	696	910	1150	1420	1720	2050
	3'	36	64	101	145	198	258	402	580	790	1030	1305	1610	1950	2320
10'	1'	28	50	78	113	154	200	314	452	642	840	1060	1310	1585	1890
	2'	33	59	93	134	182	238	372	536	730	955	1205	1490	1800	2150
	3'	37	67	104	150	205	268	417	600	827	1080	1370	1690	2040	2430
15'	1'	30	53	83	120	163	214	333	480	697	910	1150	1420	1720	2050
	2'	35	63	99	142	193	253	394	568	790	1030	1305	1610	1950	2320
	3'	40	71	111	160	218	286	444	640	898	1175	1485	1835	2220	2640
20'	1'	31	56	87	125	171	224	347	500	740	965	1225	1510	1830	2190
	2'	37	66	104	149	202	265	414	596	840	1095	1385	1710	2070	2470
	3'	42	74	116	168	228	300	466	672	952	1245	1575	1945	2350	2800
30'	1'	33	59	93	134	182	238	372	536	805	1050	1330	1645	1990	2370
	2'	39	70	110	158	215	282	439	632	910	1190	1500	1855	2240	2670
	3'	44	79	124	178	242	317	494	712	1035	1350	1710	2110	2550	3040
40'	1'	35	62	97	140	190	248	389	560	850	1110	1405	1735	2100	2500
	2'	41	73	115	166	225	295	461	665	964	1260	1590	1965	2380	2830
	3'	46	83	129	187	253	331	520	748	1100	1435	1820	2240	2710	3230
60' to 100'	1'	37	66	104	150	204	266	417	600	926	1210	1530	1890	2280	2720
	2'	44	79	123	178	242	316	494	712	1050	1370	1740	2150	2590	3090
	3'	50	89	138	200	272	355	555	800	1198	1565	1980	2450	2960	3520

Common Vent Capacity

Total Vent Height "H"	Common Vent Diameter													
	3"	4"	5"	6"	7"	8"	10"	12"	14"	16"	18"	20"	22"	24"
Combined Appliance Input Rating in Thousands of Btu Per Hour														
6'	—	65	103	147	200	260	410	588	815	1065	1345	1660	1970	2390
8'	—	73	114	163	223	290	465	652	912	1190	1510	1860	2200	2680
10'	—	79	124	178	242	315	495	712	995	1300	1645	2030	2400	2920
15'	—	91	144	206	280	365	565	825	1158	1510	1910	2360	2790	3400
20'	—	102	160	229	310	405	640	916	1290	1690	2140	2640	3120	3800
30'	—	118	185	266	360	470	740	1025	1525	1990	2520	3110	3680	4480
40'	—	131	203	295	405	525	820	1180	1715	2240	2830	3500	4150	5050
60'	—	NR	224	324	440	575	900	1380	2010	2620	3320	4100	4850	5900
80'	—	NR	NR	344	468	610	955	1540	2250	2930	3710	4590	5420	6600
100'	—	NR	NR	NR	479	625	975	1670	2450	3200	4050	5000	5920	7200

See Figure 3 and Notes for Multiple Appliance Vents.

Appendix F

TABLE 5

Capacity of A Single-Wall Metal Pipe or Type B Asbestos Cement Vent Serving Two or More Appliances

Vent Connector Capacity

Total Vent Height "H"	Connector Rise "R"	Vent Connector Diameter—D					
		3"	4"	5"	6"	7"	8"
6'-8'	1'	21	40	68	102	146	205
	2'	28	53	86	124	178	235
	3'	34	61	98	147	204	275
15'	1'	23	44	77	117	179	240
	2'	30	56	92	134	194	265
	3'	35	64	102	155	216	298
30' and up	1'	25	49	84	129	190	270
	2'	31	58	97	145	211	295
	3'	36	68	107	164	232	321

Common Vent Capacity

Total Vent Height "H"	Common Vent Diameter						
	4"	5"	6"	7"	8"	10"	12"
6'	48	78	111	155	205	320	NR
8'	55	89	128	175	234	365	505
10'	59	95	136	190	250	395	560
15'	71	115	168	228	305	480	690
20'	80	129	186	260	340	550	790
30'	NR	147	215	300	400	650	940
50'	NR	NR	NR	360	490	810	1190

See Figure 3 and Notes for Multiple Appliance Vents.

TABLE 6

**Capacity of A Masonry Chimney and Single-Wall Vent
Connectors Serving Two or More Appliances**

Single-Wall Vent Connector Capacity

Total Vent Height "H"	Rise Connector "R"	Vent Connector Diameter—D					
		3"	4"	5"	6"	7"	8"
Maximum Appliance Input Rating in Thousands of Btu Per Hour							
6'-8'	1'	21	39	66	100	140	200
	2'	28	52	84	123	172	231
	3'	34	61	97	142	202	269
15'	1'	23	43	73	112	171	225
	2'	30	54	88	132	189	256
	3'	34	63	101	151	213	289
30' and up	1'	24	47	80	124	183	250
	2'	31	57	93	142	205	282
	3'	35	65	105	160	229	312

Common Chimney Capacity

Total Vent Height "H"	Minimum Internal Area of Chimney — "A" Square Inches					
	19	28	38	50	78	113
Combined Appliance Input Rating in Thousands of Btu Per Hour						
6'	45	71	102	142	245	NR
8'	52	81	118	162	277	405
10'	56	89	129	175	300	450
15'	66	105	150	210	360	540
15'	74	120	170	240	415	640
30'	NR	135	195	275	490	740
50'	NR	NR	NR	325	600	910

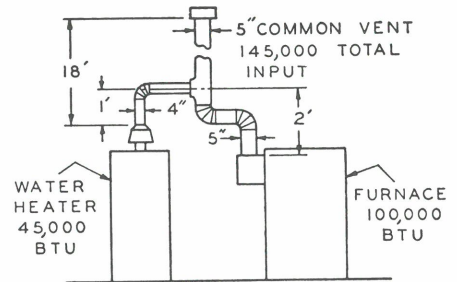
See Table 7 for Masonry Chimney Liner Sizes.

See Figure 4 and Notes for Multiple Appliance Vents.

Appendix F

Example of Multiple Vent Design Using Table 4 Double Wall Type B Vent

Figure 5
EXAMPLE: Connect a 45,000 Btu water heater with a 1 foot connector rise "R" and a 100,000 Btu furnace with a 2 foot connector rise "R" to a common vent with a minimum total vent height "H" of 18 feet. See Figure 5.



1. WATER HEATER VENT CONNECTOR SIZE

Using Table 4, read down Total Vent Height "H" column to 15 feet and read across 1 foot connector rise "R" line to Btu rating equal to or higher than water heater input rating. This figure shows 53,000 Btu and is in the column for four-inch connector. Since this is in excess of the water heater input it is not necessary to find the maximum input for an 18 foot minimum total vent height. Use a four-inch connector.

2. FURNACE VENT CONNECTOR SIZE

Under Vent Connector Tables read down Total Vent Height "H" column to 15 foot and read across 2 foot Connector Rise "R" line. Note 5 inch vent size shows 99,000 Btu per hour or less than furnace input. However, with 20 foot Total Height read across 2 foot connector rise line. Note 5 inch vent size shows 104,000 Btu per hour. Since 18 foot height is $\frac{3}{5}$ th of the difference between 15 and 20 foot heights take difference between 99,000 and 104,000 or 5,000 and add $\frac{3}{5}$ th of this to 15 foot figure of 99,000, $99,000 + 3,000 = 102,000$ which is maximum input for 18 foot Total Vent Height. Therefore a 5-inch connector would be the correct size for the furnace, providing the furnace had a five-inch or smaller draft hood outlet.

3. COMMON VENT SIZE

Total input to Common Vent is 145,000 Btu. Note that for 15 foot Total Vent Height "H" maximum Btu for 5 inch vent is 144,000. For 20 foot Total Vent Height "H" maximum Btu for 5 inch vent is 160,000.

Therefore for 18 foot Total Vent Height maximum allowable input would be $\frac{3}{5}$ th of difference between 144,000 and 160,000 = $\frac{3}{5} \times 16,000$ or 9,600. $144,000 + 9,600 = 153,600$ which is greater than total input to common vent. Therefore common vent can be 5 inch diameter pipe.

Appendix F

TABLE 7
Masonry Chimney Liner Dimensions with Circular Equivalents

Nominal Liner Size Inches	Inside Dimensions of Liner in Inches	Inside Diameter or Equivalent Diameter Inches	Equivalent Area Square Inches
4 x 8	2½ x 6½	4	12.2
		5	19.6
		6	28.3
		7	38.3
8 x 8	6¾ x 6¾	7.4	42.7
		8	50.3
8 x 12	6½ x 10½	9	63.6
		10	78.5
12 x 12	9¾ x 9¾	10.4	83.3
12 x 16	9½ x 13½	11	95
		11.8	107.5
		12	113.0
		14	153.9
16 x 16	13¼ x 13¼	14.5	162.9
		15	176.7
16 x 20	13 x 17	16.2	206.1
		18	254.4
20 x 20	16¾ x 16¾	18.2	260.2
		20	314.1
20 x 24	16½ x 20½	20.1	314.2
		22	380.1
24 x 24	20¼ x 20¼	22.1	380.1
		24	452.3
24 x 28	20¼ x 24¼	24.1	456.2
28 x 28	24¼ x 24¼	26.4	543.3
		27	572.5
30 x 30	25½ x 25½	27.9	607
		30	706.8
30 x 36	25½ x 31½	30.9	749.9
		33	855.3
36 x 36	31½ x 31½	34.4	929.4
		36	1017.9

When liner sizes differ dimensionally from those shown in Table 7, equivalent diameters may be determined from published tables for square and rectangular ducts of equivalent carrying capacity or by other engineering methods.

Appendix F

LIST OF Z21 SERIES OF ANSI STANDARDS FOR GAS APPLIANCES, GAS APPLIANCE ACCESSORIES, AND GAS APPLIANCE AND GAS PIPING INSTALLATION

Appliances

Domestic Gas Ranges, Z21.1
Volume I (Z21.1.1) Free Standing Units
Volume II (Z21.1.2) Built-in Domestic Cooking Units
Hotel and Restaurant Gas Ranges and Unit Broilers, Z21.3
Gas Clothes Dryers, Z21.5
Volume I (Z21.5.1) Type 1 Clothes Dryers
Volume II (Z21.5.2) Type 2 Clothes Dryers
Domestic Gas-Fired Incinerators, Z21.6
Domestic Gas Hot Plates and Laundry Stoves, Z21.9
Gas Water Heaters, Z21.10
Volume I (Z21.10.1) Automatic Storage Type Water Heaters With Inputs
Less Than 50,000 Btu Per Hour
Volume II (Z21.10.2) Side-Arm Type Water Heaters
Volume III (Z21.10.3) Circulating Tank, Instantaneous and Large Automatic Storage Type Water Heaters
Gas-Fired Room Heaters, Z21.11
Volume I (Z21.11.1) Vented Room Heaters
Volume II (Z21.11.2) Unvented Room Heaters
Gas-Fired Steam and Hot Water Boilers, Z21.13
Gas Unit Heaters, Z21.16
Refrigerators Using Gas Fuel, Z21.19
Hotel and Restaurant Gas Deep Fat Fryers, Z21.27
Commercial Gas Baking and Roasting Ovens, Z21.28
Gas Counter Appliances, Z21.31
Gas-Fired Duct Furnaces, Z21.34
Gas-Fired Absorption Summer Air Conditioning Appliances, Z21.40.1
Gas Engine-Powered Summer Air Conditioning Appliances, Z21.40.2
Gas-Fired Illuminating Appliances, Z21.42
Unvented Gas-Fired Infrared Radiant Heaters, Z21.43
Gas-Fired Gravity and Fan Type Sealed Combustion System Wall Furnaces, Z21.44
Gas-Fired Kettles, Steam Cookers and Steam Generators, Z21.46
Gas-Fired Gravity and Forced Air Central Furnaces, Z21.47
Gas-Fired Gravity and Fan Type Floor Furnaces, Z21.48
Gas-Fired Gravity and Fan Type Vented Wall Furnaces, Z21.49
Vented Decorative Gas Appliances, Z21.50
Vented Gas-Fired Infrared Radiant Heaters, Z21.51
Gas-Fired Single Firebox Boilers, Z21.52
Gas-Fired Heavy-Duty Forced Air Heaters, Z21.53

Accessories

Gas Hose Connectors for Portable Indoor Gas-Fired Appliances, Z21.2
Draft Hoods, Z21.12
Manually Operated Gas Valves, Z21.15
Domestic Gas Conversion Burners, Z21.17
Domestic Gas Appliance Pressure Regulators, Z21.18
Automatic Burner Ignition and Safety Shutoff Devices, Z21.20
Automatic Valves for Gas Appliances, Z21.21
Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, Z21.22

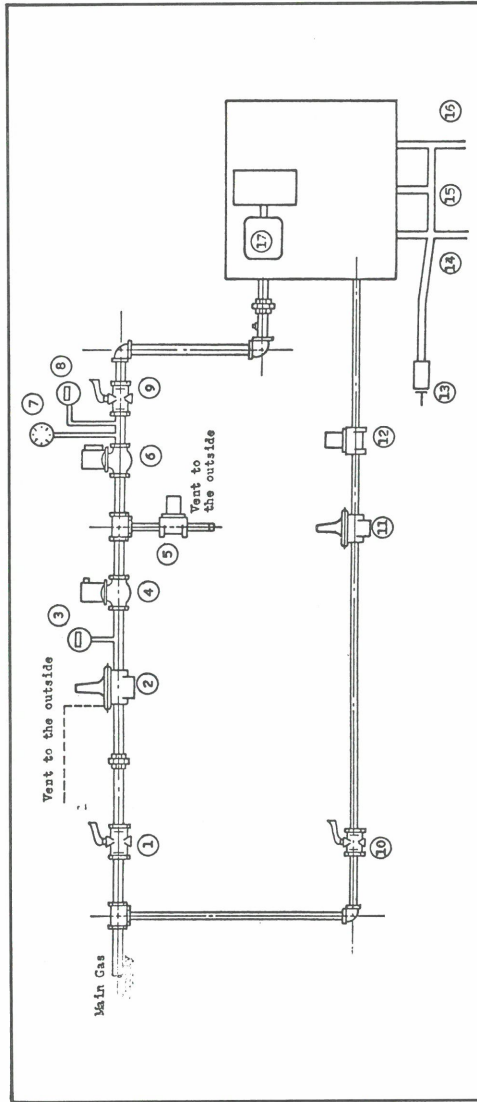
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Gas Appliance Thermostats, Z21.23
Metal Connectors for Gas Appliances, Z21.24
Gas Filters on Appliances, Z21.35
Gas Conversion Burners for Domestic Ranges, Z21.39
Quick-Disconnect Devices for Use With Gas Fuel, Z21.41
Flexible Connectors of Other Than All-Metal Construction for Gas Appliances, Z21.45
Gas Hose Connectors for Portable Outdoor Gas-Fired Appliances, Z21.54

Installation

Domestic Gas Conversion Burners, Z21.8
Gas Appliances and Gas Piping, Z21.30
Gas Equipment in Large Boilers, Z21.33
Gas Conversion Burners in Domestic Ranges, Z21.38

Appendix F



GAS TRAIN (TYPICAL)
 Note—Factory Set—Low Pressure
 Switch 1.73" (1 oz.)
 High Pressure Switch 3.85" (8 oz.)

LEGEND	
ITEM	DESCRIPTION
1.	LUBRICATED PLUG COCK
2.	PRESSURE REGULATOR
3.	LOW PRESSURE GAS SWITCH
4.	SAFETY SHUTOFF GAS VALVE
5.	VENT VALVE N.O.
6.	OPERATING GAS VALVE
7.	PRESSURE GAUGE DIAL
8.	LUBRICATED PLUG COCK
9.	PRESSURE REGULATOR
10.	LUBRICATED PLUG COCK
11.	PILOT MANIFOLD GAS COCK
12.	PILOT PRESSURE REGULATOR
13.	PILOT SOLENOID VALVE
14.	ELECTRIC IGNITER TRANSFORMER
15.	ELECTRIC IGNITER PILOT
16.	RUNNER PILOT
17.	PROVING PILOT
18.	FLOWER MOTOR
	NORDSTROM #142
	MAXIFLOL
	HONEYWELL C437E
	G.C. AH2/770
	ASCO
	G.C. AH2/770
	FIG. 81
	HONEYWELL C437D
	NORDSTROM #142
	SCHROEDER
	MAXIFLOL R400S 3/8"
	BASO 91FZ1A26 3/8"
	DORGAN AGS-S46
	HONEYWELL DIELECTRIC V40
	HONEYWELL R4127A FLAME SAFEGUARD, FLAME ROD TYPE, FRACTIONAL HP 115 V, w/built-in overload