INSTALLER'S GUIDE

ALL phases of this installation must comply with NATIONAL, STATE AND LOCAL CODES

18-CH23D1-2

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Venting Instructions for Category 1, Gas-Fired Furnaces, "Fan Assisted Combustion"

GENERAL VENTING INSTRUCTIONS

GENERAL INSTALLATION INFORMATION

The information in this guide is from the combined standards AGA ANSI Z21.47-1993 and CAN/CGA-2.3-M93 for GAS-FIRED CENTRAL FURNACES. The information, drawings, and tables are from PART IX - Exhibit J.

VENT PIPING

These instructions are for furnaces which have been classified as Fan-Assisted Combustion System, Category I furnaces under the "latest edition" provisions of ANSI Z21.47 and CAN/CGA 2.3 standards, which operate with a non-positive vent static pressure and with a flue loss of not less than 17 percent .

NOTE: If desired, a sidewall termination can be accomplished through the use of an "add-on" draft inducer. The inducer must be installed according to the inducer manufacturer's instructions. Set the barometric pressure relief to achieve -0.02 inch water column.

NOTE: When an existing furnace is removed from a venting system serving other appliances, the venting system is likely to be too large to properly vent the remaining attached appliances.

The following steps shall be followed with each appliance connected to the venting system placed in operation, while any other appliances connected to the venting system are not in operation:

a. Seal any unused openings in the venting system;

b. Inspect the venting system for proper size and horizontal pitch as required in the National Fuel Gas Code, ANSI Z223.1 or the CAN/CGA B149 Installation Codes and these instructions. Determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition;

c. In so far as is practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers;

d. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so the appliance shall operate continuously;

e. Test for draft hood equipped appliance spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle;

f. After it has been determined that each appliance remaining connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use;

g. If improper venting is observed during any of the above tests, the venting system must be corrected.

All vent installations must be in accordance with the "latest edition" provisions of the National Fuel Gas Code, ANSI Z223.1 section 7 and/or CAN/CGA B149 Installation Codes or the Vent Tables.

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The furnace shall be connected to a factory built chimney or vent complying with a recognized standard, or a masonry or concrete chimney lined with a lining material acceptable to the authority having jurisdiction.

NOTE: ***Furnace venting into an unlined masonry chimney or concrete chimney is prohibited.***

VENTING INTO A MASONRY CHIMNEY

If the chimney is oversized, the liner is inadequate, or flue-gas condensation is a problem in your area, consider using the chimney as a pathway or chase for type "B" vent or flexible vent liner. If flexible liner material is used, size the vent using the "B" vent tables, then reduce the maximum capacity by 20% (multiply 0.80 times the maximum capacity).

Internal Masonry Chimneys

Venting of fan assisted appliances into a lined, internal masonry chimney is allowed only if it is common vented with at least one natural draft appliance; **OR**, if the chimney is lined with type "B", double wall vent or suitable flexible liner material, (See Table 1).

TABLE 1
MASONRY CHIMNEY VENTING

	Tile Lined Chimney		Chimney Lining	
Type Furnace	Internal	External	"B" Vent	Flexible Metal Liner
Single Fan Assist	No	No	Yes	*Yes
Fan Assist + Fan Assist	No	No	Yes	*Yes
Fan Assist + Natural	Yes	No	Yes	*Yes

* Flexible chimney liner size is determined by using the type "B" vent size for the available BTUH input, then reducing the maximum capacity by 20% (multiply maximum capacity times 0.80). The minimum capacity is the same as shown in the "B" vent tables.

NOTE: The chimney liner must be thoroughly inspected to insure no cracks or other potential areas for flue gas leaks are present in the liner. Liner leaks will result in early deterioration of the chimney.

External Masonry Chimney

Venting of fan assisted appliances into external chimneys (one or more walls exposed to outdoor temperatures), requires the chimney be lined with type "B", double wall vent or suitable flexible chimney liner material. This applies in all combinations of common venting as well as for fan assisted appliances vented alone.

The following installation practices are recommended to minimize corrosion caused by condensation of flue products in the furnace and flue gas system.

1. Avoid an excessive number of bends.

2. Horizontal runs should pitch upward at least 1/4" per foot.

3. Horizontal runs should be as short as possible.

4. All vent pipe or connectors should be securely supported and must be inserted into, but not beyond the inside wall at the chimney vent.

5. When vent connections must pass through walls or partitions of combustible material, a thimble must be used and installed according to local codes.

6. Vent pipe through the roof should be extended to a height determined by National Fuel Gas Code or local codes. It should be capped properly to prevent rain water from entering the vent. Roof exit should be waterproofed.

7. Use type "B" double wall vent when vent pipe is routed through cool spaces, (below 60°F).

8. Where long periods of airflow are desired for comfort, use long fan cycles instead of continuous airflow.

9. Apply other good venting practices as stated in the venting section of the National Fuel Gas Code ANSI Z223.1 "latest edition".

10. **Vent connectors serving appliance vented by natural draft or non-positive pressure shall not be connected into any portion of a mechanized draft system operating under positive pressure.**

11. Horizontal pipe runs must be supported by hangers, straps or other suitable material in intervals at a minimum of every 3 feet of pipe.

12. A furnace shall not be connected to a chimney or flue serving a separate appliance designed to burn solid fuel.

13. The flow area of the largest section of vertical vent or chimney shall not exceed 7 times the smallest listed appliance categorized vent area, flue collar area, or draft hood outlet area unless designed in accordance with approved engineering methods.

$$\text{Maximum Vent or Tile Lined Chimney Flow Area} = \frac{\pi(D^*)^2}{4} \times 7$$

*Drafthood outlet diameter, flue collar diameter, or listed appliance categorized vent diameter.

TABLE 2

GAS VENT TERMINATION	
ROOF PITCH	MINIMUM HEIGHT
FLAT TO 7/12	1.0 FEET *
OVER 7/12 TO 8/12	1.5 FEET
OVER 8/12 TO 9/12	2.0 FEET
OVER 9/12 TO 10/12	2.5 FEET
OVER 10/12 TO 11/12	3.25 FEET
OVER 11/12 TO 12/12	4.0 FEET
OVER 12/12 TO 14/12	5.0 FEET
OVER 14/12 TO 16/12	6.0 FEET
OVER 16/12 TO 18/12	7.0 FEET
OVER 18/12 TO 20/12	7.5 FEET
OVER 20/12 TO 22/12	8.0 FEET
* THIS REQUIREMENT COVERS MOST INSTALLATIONS	

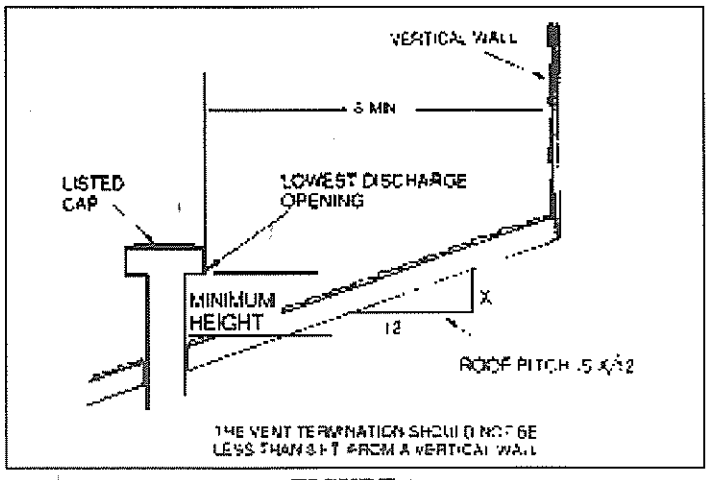


FIGURE 1

SIZING OF VENTING SYSTEMS SERVING APPLIANCES EQUIPPED WITH DRAFT HOODS AND APPLIANCES LISTED FOR USE WITH TYPE B VENTS

Definitions. The following definitions apply to tables in the venting portion of this Installer's Guide:

Fan-Assisted Combustion System - An appliance equipped with an integral mechanical means to either draw or force products of combustion through the combustion chamber and/or heat exchanger.

FAN Min. - The minimum appliance input rating of a Category I appliance with a fan-assisted combustion system that could be attached to the vent.

FAN Max. - The maximum appliance input rating of a Category I appliance with a fan-assisted combustion system that could be attached to the vent.

NAT Max. - The maximum input rating of a Category I appliance equipped with a draft hook that could be attached to the vent. There are no minimum appliance input ratings for draft hood equipped appliances.

FAN+FAN - The maximum combined appliance input rating of one or more fan-assisted appliances attached to the common vent.

FAN+NAT - The maximum combined appliance input rating of one or more fan-assisted appliances attached to the common vent.

NAT+NAT - The maximum combined input rating of two or more draft hood equipped appliances attached to the common vent.

NR - Vent configuration is **not recommended** due to potential for condensate formation and/or pressurization of the venting system.

NA - Vent configuration is **not applicable** due to physical or geometric constraints.

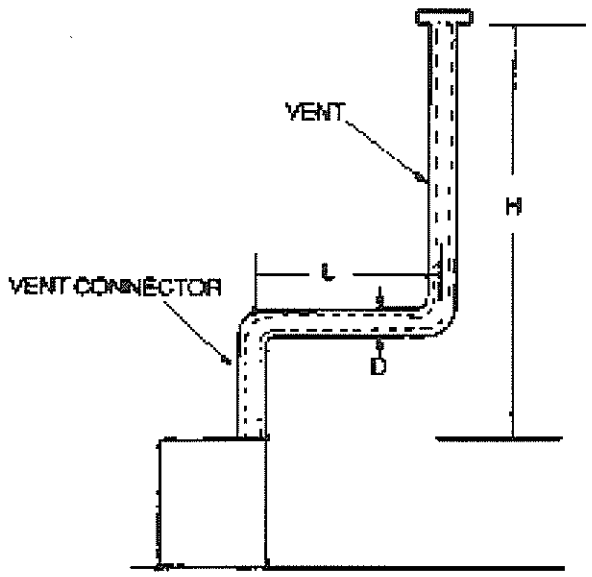
Notes for Single Appliance Vents: (See Tables J-1 to J-5)

1. If the vent size determined from the tables is smaller than the appliance draft hood outlet or flue collar, the smaller size shall be permitted to be used, provided:
   (a) The total vent height ("I") is at least 10 feet;
   (b) Vents for appliance draft hood outlets or flue collars 12 inches in diameter or smaller are not reduced more than one table size;
   (c) Vents for appliance draft hood outlets or flue collars above 12 inches in diameter are not reduced more than two table sizes;
   (d) The maximum capacity listed in the tables for a fan-assisted appliance is reduced by 10 percent (.09 x maximum table capacity);
   (e) The draft hood outlet is greater than 4 inches in diameter. Do not connect a 3 inch diameter vent to a 4 inch diameter draft hood outlet. This provision ("e") shall not apply to fan-assisted appliances.
2. Single appliance venting configurations with zero (0") lateral lengths in Tables J-1, J-2 and J-5 shall have no elbows in the venting system. For vent configurations with lateral lengths, the venting tables include allowance for two 90 degree (1.57 rad) elbows. For each additional 90 degree (1.57 rad) elbow, or equivalent beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum table capacity).
   Note: Two 45 degree (0.79 rad) elbows are equivalent to one 90 degree (1.57 rad) elbow.
3. Zero ("0") lateral ("L") shall apply only to a straight vertical-vent attachment to a top outlet draft hood or flue collar.
4. Sea-level input ratings shall be used when determining maximum capacity for high-altitude installation. Actual input (derated for altitude) shall be used to determine minimum capacity for high altitude installation.
5. Numbers followed by asterisk (*) in Tables J-3, J-4 and J-5 indicate the possibility of continuous condensation, depending on locality. Consult local serving gas supplier or local codes.
6. For appliances with more than one input rate, the minimum vent capacity determined from the tables shall be greater than the highest appliance input rating.
7. Listed corrugated chimney-liner systems in masonry chimneys shall be sized by using Tables J-1 or J-2 for Type B vents with the maximum capacity reduced by 20 percent (0.80 maximum table capacity) and the minimum capacity as shown in Tables J-1 and J-2. Corrugated metal venting systems installed with bends or offsets shall have their maximum capacity reduces. (See Note 2).
8. If the vertical vent has a larger diameter than the vent connector, use the vertical vent-connector diameter to determine the minimum vent capacity and the connector diameter to determine the maximum vent capacity. The flow area of the vertical vent shall not exceed seven times the flow area of the listed appliance categorized vent area, flue collar area, or draft hood outlet area, unless designated in accordance with approved engineering methods.
9. The tables included in this part shall be used for chimneys and vents not exposed to the outdoors below the roof line. Exterior chimneys or vents exposed to the outdoors below the roof line may experience continuous condensation depending on locality. Consult local serving gas suppliers, or the authority having jurisdiction. A Type B vent or listed chimney lining system passing through an otherwise unused masonry chimney flue shall be considered to be an interior vent system.
10. Vent connectors shall not be sized upward more than two sizes greater than the appliance categorized vent diameter, flue collar diameter, or draft hood outlet diameter.
11. In a single run of vent or vent connector, more than one diameter and type shall be permitted to be used provided that all the sizes and types are permitted by the tables.
12. Interpolation shall be permitted in calculating capacities for vent dimensions which fall between table entries.
13. Extrapolation beyond the table entries shall not be permitted.

SEE EXAMPLES ON PAGES 14 TO 16.

TYPICAL VENTING APPLICATIONS

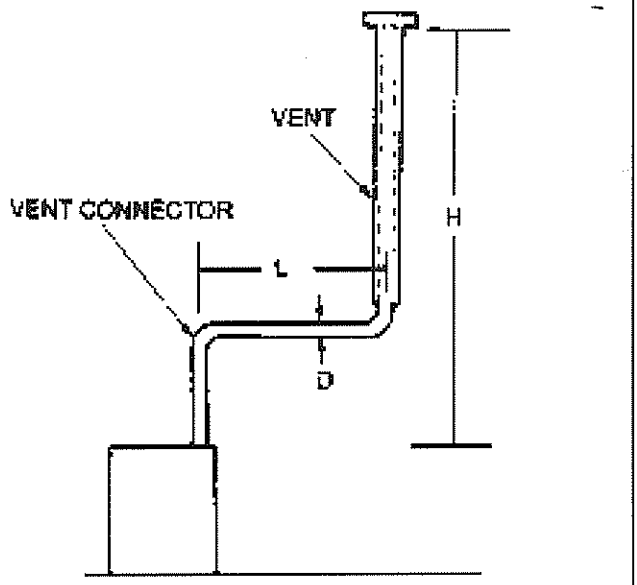
Table J-1 shall be used when Type B Double-Wall Vent Pipe is used for both the vent connector and the vent.



Note: The appliance may be either Category I Draft Hood equipped or Fan-assisted type.

FIGURE J-1

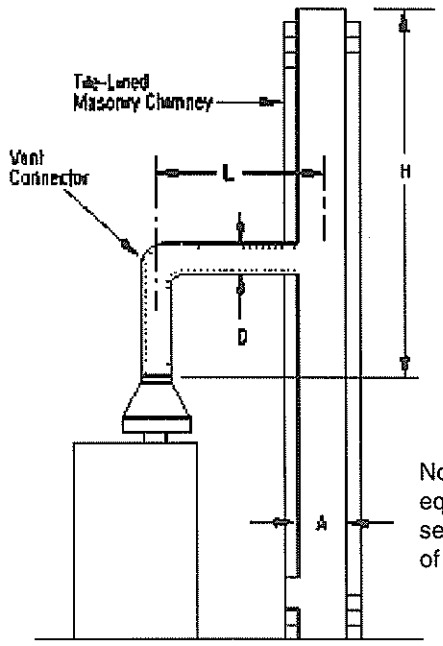
Table J-2 shall be used when a Single Wall Metal Vent Connector is attached to Type B Double-wall Vent.



Note: The appliance may be either Category I Draft Hood equipped or Fan-assisted type.

FIGURE J-2

Table J-3 shall be used when a Type B Double-Wall Vent Connector is attached to a Tile Lined Masonry Chimney.

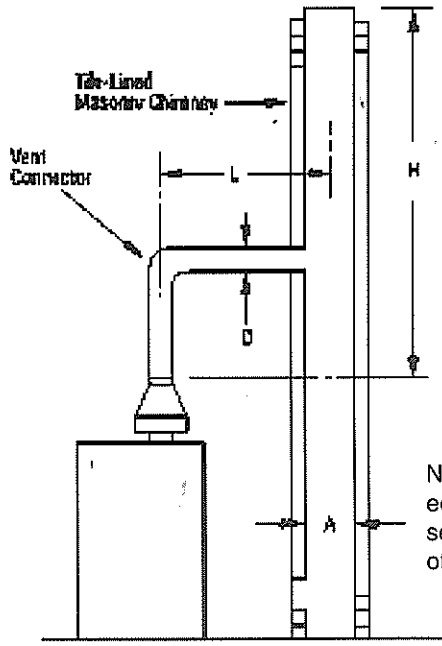


Note: "A" is the equivalent cross sectional area of the Tile Liner

Note: The appliance may be either Category I Draft Hood equipped or Fan-assisted type.

FIGURE J-3

Table J-4 shall be used when a Single-wall Metal Vent Connector is attached to a Tile Lined Masonry Chimney.



Note: "A" is the equivalent cross sectional area of the Tile Liner

Note: The appliance may be either Category I Draft Hood equipped or Fan-assisted type.

FIGURE J-4

TABLE J-1

Capacity of Type B Double-Wall Vents with Type B Double-Wall Connectors Serving a Single Category I Appliance

Height H (ft)	Lateral L (ft)	Vent Connector Diameter - D (inches) 3" FAN Min	3" FAN Max	3" NAT Max	4" FAN Min	4" FAN Max	4" NAT Max	5" FAN Min	5" FAN Max	5" NAT Max	6" FAN Min	6" FAN Max	6" NAT Max
		Appliance Input Rating in Thousands of Btu Per Hour											
6	0	0	78	46	0	152	86	0	251	141	0	375	205
	2	13	51	36	18	97	67	27	157	105	32	232	157
	4	21	49	34	30	94	64	39	153	103	50	227	153
	6	25	46	32	36	91	61	47	149	100	59	223	149
8	0	0	84	50	0	165	94	0	276	155	0	415	235
	2	12	57	40	16	109	75	25	178	120	28	263	180
	5	23	53	38	32	103	71	42	171	115	53	255	173
	8	28	49	35	39	98	66	51	164	109	64	247	165
10	0	0	88	53	0	175	100	0	295	166	0	447	255
	2	12	61	42	17	118	81	23	194	129	26	289	195
	5	23	57	40	32	113	77	41	187	124	52	280	188
	10	30	51	36	41	104	70	54	176	115	67	267	175
15	0	0	94	58	0	191	112	0	327	187	0	502	285
	2	11	69	48	15	136	93	20	226	150	22	339	225
	5	22	65	45	30	130	87	39	219	142	49	330	217
	10	29	59	41	40	121	82	51	206	135	64	315	208
	15	35	53	37	48	112	76	61	195	128	76	301	198
20	0	0	97	61	0	202	119	0	349	202	0	540	307
	2	10	75	51	14	149	100	18	250	166	20	377	249
	5	21	71	48	29	143	96	38	242	160	47	367	241
	10	28	64	44	38	133	89	50	229	150	62	351	228
	15	34	58	40	46	124	84	59	217	142	73	337	217
	20	48	52	35	55	116	78	69	206	134	84	322	206
30	0	0	100	64	0	213	128	0	374	220	0	587	336
	2	9	81	56	13	166	112	14	283	185	18	432	280
	5	21	77	54	28	160	108	36	275	176	45	421	273
	10	27	70	50	37	150	102	48	262	171	59	405	261
	15	33	64	NR	44	141	96	57	249	163	70	389	249
	20	56	58	NR	53	132	90	66	237	154	80	374	237
	30	NR	NR	NR	73	113	NR	88	214	NR	104	346	219
50	0	0	101	67	0	216	134	0	397	232	0	633	363
	2	8	86	61	11	183	122	14	320	206	15	497	314
	5	20	82	NR	27	177	119	35	312	200	43	487	308
	10	26	76	NR	35	168	114	45	299	190	56	471	298
	15	59	70	NR	42	158	NR	54	287	180	66	455	288
	20	NR	NR	NR	50	149	NR	63	275	169	76	440	278
	30	NR	NR	NR	69	131	NR	84	250	NR	99	410	259

TABLE J-2

Capacity of Type B Double-Wall Vents with Single-Wall Metal Connectors Serving a Single Category I Appliance

Height H (ft)	Lateral L (ft)	Vent Connector Diameter - D (inches) 3" FAN Min	3" FAN Max	3" NAT Max	4" FAN Min	4" FAN Max	4" NAT Max	5" FAN Min	5" FAN Max	5" NAT Max	6" FAN Min	6" FAN Max	6" NAT Max
		Appliance Input Rating in Thousands of Btu Per Hour											
6	0	38	77	45	59	151	85	85	249	140	126	373	204
	2	39	51	36	60	96	66	85	156	104	123	231	156
	4	NR	NR	33	74	92	63	102	152	102	146	225	152
	6	NR	NR	31	83	89	60	114	147	99	163	220	148
8	0	37	83	50	58	164	93	83	273	154	123	412	234
	2	39	56	39	59	108	75	83	176	119	121	261	179
	5	NR	NR	37	77	102	69	107	168	114	151	252	171
	8	NR	NR	33	90	95	64	122	161	107	175	243	163
10	0	37	87	53	57	174	99	82	293	165	120	444	254
	2	39	61	41	59	117	80	82	193	128	119	287	194
	5	52	56	39	76	111	76	105	185	122	148	277	186
	10	NR	NR	34	97	100	68	132	171	112	188	261	171
15	0	36	93	57	56	190	111	80	325	186	116	499	283
	2	38	69	47	57	136	93	80	225	149	115	337	224
	5	51	63	44	75	128	86	102	216	140	144	326	217
	10	NR	NR	39	95	116	79	128	201	131	182	308	203
	15	NR	NR	NR	NR	NR	72	158	186	124	220	290	192
20	0	35	96	60	54	200	118	78	346	201	114	537	306
	2	37	74	50	56	148	99	78	248	165	113	375	248
	5	50	68	47	73	140	94	100	239	158	141	363	239
	10	NR	NR	41	93	129	86	125	223	146	177	344	224
	15	NR	NR	NR	NR	NR	80	155	208	136	216	325	210
	20	NR	NR	NR	NR	NR	NR	186	192	126	254	306	196
30	0	34	99	63	53	211	127	76	372	219	110	584	334
	2	37	80	56	55	164	111	76	281	163	109	429	279
	5	49	74	52	72	157	106	98	271	173	136	417	271
	10	NR	NR	NR	91	144	98	122	255	168	171	397	257
	15	NR	NR	NR	115	131	NR	151	239	157	208	377	242
	20	NR	NR	NR	NR	NR	NR	181	223	NR	246	357	228
	30	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
50	0	33	99	66	51	213	133	73	394	230	105	629	361
	2	36	84	61	53	181	121	73	318	205	104	495	312
	5	48	80	NR	70	174	117	94	308	198	131	482	305
	10	NR	NR	NR	89	160	NR	118	292	186	162	461	292
	15	NR	NR	NR	112	148	NR	145	275	174	199	441	280
	20	NR	NR	NR	NR	NR	NR	176	257	NR	236	420	267
	30	NR	NR	NR	NR	NR	NR	NR	NR	NR	315	376	NR

TABLE J-3

Capacity of Masonry Chimney with Type B Double-Wall Vent Connectors Serving A Single Category I Appliance

Connector Diameter (D in inches) - To be used with Chimney areas within size limits at bottom

Height H (ft)	Lateral L (ft)	3" FAN Min - Max	3" NAT Max	4" FAN Min - Max	4" NAT Max	5" FAN Min - Max	5" NAT Max	6" FAN Min - Max	6" NAT Max
6	2	NR	28	NR	52	NR	86	NR	130
	5		25*		49		82		117
10	2	NR	31	NR	61	NR	103	NR	162
	5		28*		57		96		148
	10		25*		50*		87		139
15	2	NR	35*	NR	67	NR	114	NR	179
	5		33*		62		107		164
	10		28*		55*		97		153
	15		NR		48*		89*		141
20	2	NR	38*	NR	74	NR	124	NR	201
	5		36*		68*		116		184
	10		NR		60*		107		172
	15		NR		NR		97		159
	20		NR		NR		83*		148*
30	2	NR	41*	NR	82*	NR	137	NR	216
	5		NR		76*		128*		198
	10		NR		67*		115*		184*
	15		NR		NR		107*		171*
	20		NR		NR		91*		159*
	30		NR		NR		NR		NR
50	2	NR	NR	NR	92*	NR	151*	NR	251*
	5		NR		NR		151*		230*
	10		NR		NR		138*		215*
	15		NR		NR		128*		199*
	20		NR		NR		NR		185*
	30		NR		NR		NR		NR
Minimum Internal Area of Chimney - Square Inches		12		19		28		38	
Maximum Internal Area of Chimney - Square Inches		49		88		137		198	

* Possibility of continuous condensation

TABLE J-4

Capacity of Masonry Chimney with Single-Wall Vent Connectors Serving A Single Category I Appliance

Connector Diameter (D in inches) - To be used with Chimney areas within size limits at bottom

Height H (ft)	Lateral L (ft)	3" FAN Min - Max	3" NAT Max	4" FAN Min - Max	4" NAT Max	5" FAN Min - Max	5" NAT Max	6" FAN Min - Max	6" NAT Max
6	2	NR	28	NR	52	NR	86	NR	130
	5		25*		48		81		116
10	2	NR	31	NR	61	NR	102	NR	161
	5		28*		56		95		147
	10		24*		49*		86		137
15	2	NR	35*	NR	67	NR	113	NR	178
	5		32*		61		106		163
	10		27*		54*		96		151
	15		NR		46*		87*		138
20	2	NR	38*	NR	73	NR	123	NR	200
	5		35*		67*		115		183
	10		NR		59*		105		170
	15		NR		NR		95		156
	20		NR		NR		80*		144*
30	2	NR	41*	NR	81*	NR	136	NR	215
	5		NR		75*		127*		196
	10		NR		66*		113*		182*
	15		NR		NR		105*		168*
	20		NR		NR		88*		155*
	30		NR		NR		NR		NR
50	2	NR	NR	NR	91*	NR	160*	NR	250*
	5		NR		NR		149*		228*
	10		NR		NR		136*		212*
	15		NR		NR		124*		195*
	20		NR		NR		NR		180*
	30		NR		NR		NR		NR
Minimum Internal Area of Chimney - Square Inches		12		19		28		38	
Maximum Internal Area of Chimney - Square Inches		49		88		137		198	

* Possibility of continuous condensation

Table J-5

Capacity of Single-Wall Metal Pipe or Type B Asbestos Cement Vents Serving a Single Draft Hood Equipped Appliance

Height "H" (ft.)	Lateral L (ft.)	Vent Diameter - D (inches)							
		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	281	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	284	455	700
	15	NR	46	82	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	458	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	100	292	407	705	1130
	20	NR	NR	NR	185	276	384	670	1080
	30	NR	NR	NR	NR	222	330	605	1010

Notes for Multiple Appliance Vents: (See Tables J-6 to J-10)

1. The maximum vent connector horizontal length inch of vent-connector diameter as follows:

Connector Diameter		Maximum Connector Horizontal Length	
(Inches)	(mm)	(Feet)	(m)
3	(76.2)	4½	(1.37)
4	(102)	6	(1.83)
5	(127)	7½	(2.29)
6	(152)	9	(2.74)
7	(178)	10½	(3.20)
8	(203)	12	(3.65)
9	(229)	13½	(4.11)
10	(254)	15	(4.57)
12	(305)	18	(5.49)
14	(356)	21	(6.40)
16	(406)	24	(7.32)
18	(457)	27	(8.22)
20	(508)	30	(9.14)
22	(559)	33	(10.06)
24	(610)	36	(10.97)

2. The vent connector shall be routed to the vent utilizing the shortest possible route. Longer connectors than those listed above are permitted under the following conditions:

   (a) The maximum capacity of the vent connector shall not be reduced more than 10 percent for each additional multiple of the length listed above. For example, the maximum length listed above for a 4 inch (120 mm) connector is 6 feet (1.83 m). With a connector length greater than 12 feet (3.66 mm) but not exceeding 18 feet (5.49 m), the maximum capacity must be reduced by 20 percent (0.80 x maximum vent capacity;

   (b) The minimum capacity shall be determined by referring to the corresponding single appliance table (Tables J-1 to J-2). In this case, for each appliance the entire vent connector and common vent from the appliance to the vent termination shall be treated as a single appliance vent, as if the other appliances were not present.

3. If vent connectors are combined prior to entering the common vent, the maximum common vent capacity listed in the common venting tables shall be reduced by 10 percent (0.90 x maximum vent capacity). (See Figure J-9). The length of the common vent connector manifold (L_o) shall not exceed 1½ feet (18 inches) (457 mm) for each inch (25.4 mm) of common vent connector manifold diameter (D).

4. If the common vertical vent is offset as shown in Figure J-10, the maximum common vent capacity listed in the common venting tables shall be reduced by 20 percent (0.80 x maximum vent capacity), the equivalent of two 90 degree (1.57 rad) elbows. The horizontal length of the common vent offset shall not exceed 1½ feet (457 mm) for each inch (25.4 mm) of common vent diameter.

5. Excluding elbows counted in (4) above, for each additional elbow in excess of two, the maximum capacity of that portion of the venting system shall be reduced by 10 percent.

   Note: Two 45 degree (0.79 rad) elbows are equivalent to one 90 degree (1.57 rad) elbow.

6. The common vent diameter shall be at least as large as the largest vent connector diameter.

7. Interconnection fittings must be the same size as the common vent.

8. Sea-level input ratings shall be used when determining maximum capacity for high-altitude installation. Actual input (derated for altitude) shall be used to determine minimum capacity for high-altitude installation.

9. For multiple units of gas utilization equipment all located on one floor, available total height ("H") shall be measured from the highest draft hood outlet or flue collar up to the level of the cap or terminal. Connector rise ("R") shall be measured from the draft hood outlet or flue collar to the level where the vent gas streams come together. (Not applicable to multistory).

10. For multistory installations, available total height ("H") shall be the vertical distance between the highest draft hood outlet or flue collar entering that segment and the center line of the next higher interconnection tee. (See Figure J-11).

11. The size of the lowest connector and of the vertical vent leading to the lowest interconnection of the multistory system shall be in accordance with Table J-1 or J-2 for available total height ("H") up to the lowest interconnection. (See Figure J-11).

12. Vertical common vents shall have no offsets when used in multistory systems.

13. When two or more appliances are connected to a vertical vent or chimney, the flow area of the largest section of vertical vent shall not exceed seven times the flow area of the smallest flue collar area or draft hood outlet area unless designed in accordance with approved engineering methods.

14. For appliances with more than one input rate, the minimum vent capacity determined from the tables shall be less than the lowest appliance input rating and the maximum vent capacity determined from the tables should be greater than the highest appliance input rating.

15. Listed corrugated metallic chimney liner systems in masonry chimneys should be sized by using Tables J-6 or J-7 for Type B vents with the maximum capacity reduced by 20 percent (0.80 x maximum table capacity) and the minimum capacity as shown in Tables J-6 or J-7. Corrugated metal venting systems installed with bends or offsets require additional reduction of the vent maximum capacity. (See Note 5)

16. The tables included in this part shall be used for chimneys and vents not exposed to the outdoors below the roof line. Exterior chimneys or vents exposed to the outdoors below the roof line may experience continuous condensation depending on the locality. Consult local serving gas suppliers, to the authority having jurisdiction. A Type B vent or listed chimney lining system passing through an otherwise unused chimney flue shall be considered to be an interior vent system.

17. Vent connectors shall not be sized upward more than two size greater than the appliance categorized vent diameter, flue collar diameter, or draft hood outlet diameter.

18. All combinations of pipe sizes, single-wall, and double-wall metal pipe shall be allowed within any connector run(s) or within the common vent provided all of the appropriate tables permit all of the desired sizes and types, as if they were used for the entire length of the subject connector or vent. If a single-wall and Type B double-wall metal pipe are used for vent connectors, the common vent must be sized using Table J-7 or J-9 as appropriate.

19 The draft hood outlet or flue collar of the smallest input appliance shall be located closest to, or under, the common vent.

20. When a table permits more than one diameter of pipe to be used for a connector or vent, all the permitted sizes shall be permitted to be used.

    Note: In general, it is preferable to use the smallest diameter permitted to minimize heat loss.

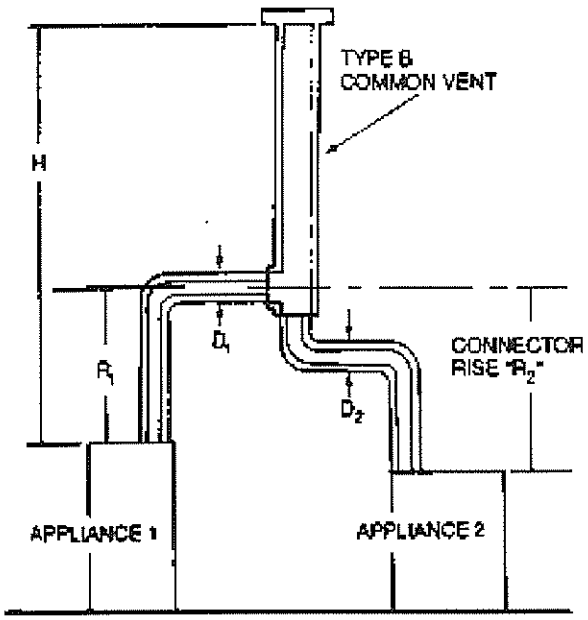
21. Interpolation shall be permitted in calculating capacities for vent dimensions which fall between table entries.

22. Extrapolation beyond the table entries shall not be permitted.

SEE EXAMPLES ON PAGES 14 TO 16.

TYPICAL COMMON VENTING APPLICATIONS

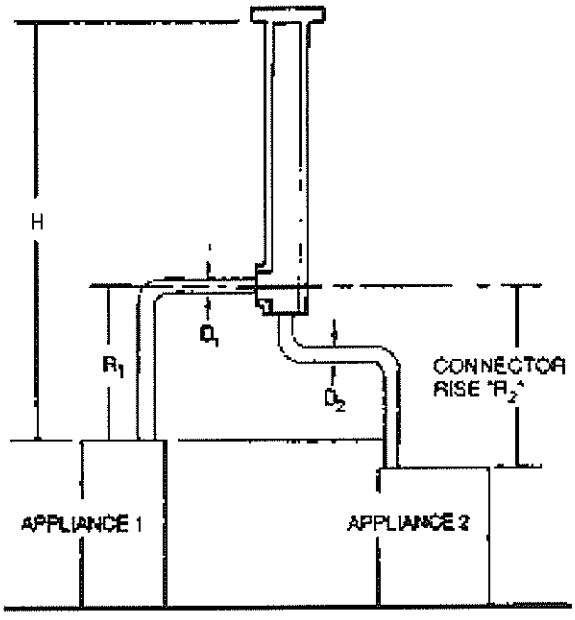
Table J-6 shall be used when Type B vent connectors are attached to a Type B common vent.



Note: The appliance may be either Category I Draft Hood equipped or Fan-assisted type.

FIGURE J-5

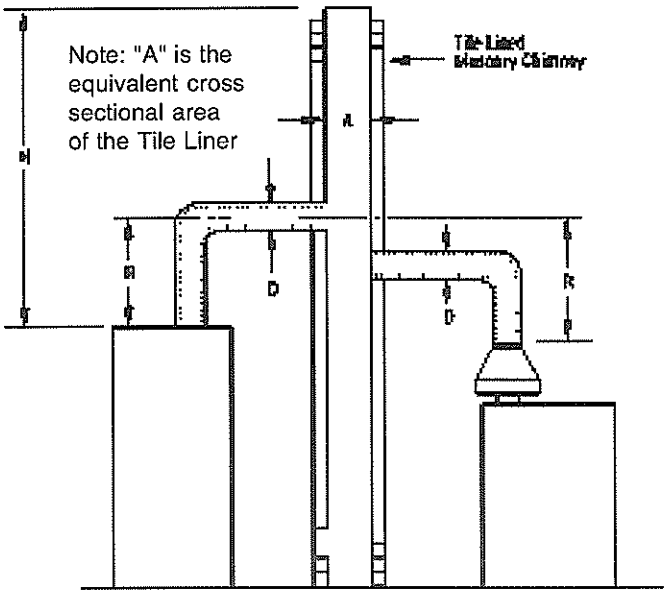
Table J-7 should be used when single-wall metal vent connectors are attached to a Type B common vent.



Note: The appliance may be either Category I Draft Hood equipped or Fan-assisted type.

FIGURE J-6

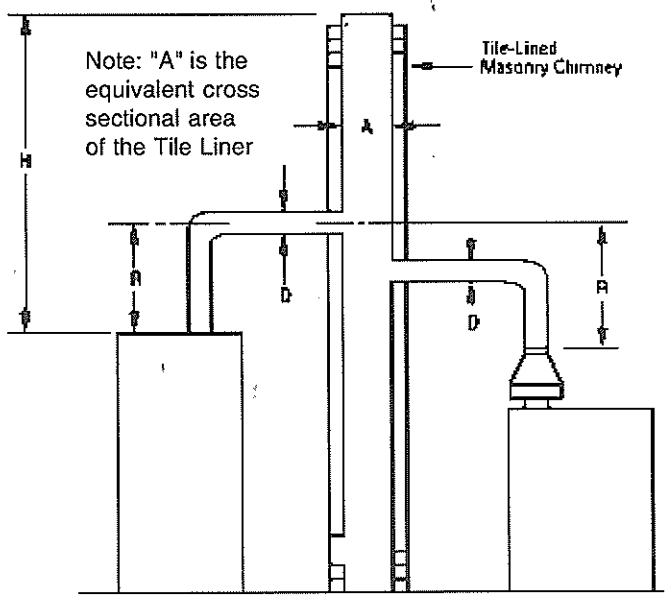
Table J-8 shall be used when Type B double-wall vent connectors are attached to a tile lined masonry chimney.



Note: The appliance may be either Category I Draft Hood equipped or Fan-assisted type.

FIGURE J-7

Table J-9 shall be used when single-wall metal vent connectors are attached to a tile lined masonry chimney.



Note: The appliance may be either Category I Draft Hood equipped or Fan-assisted type.

FIGURE J-8

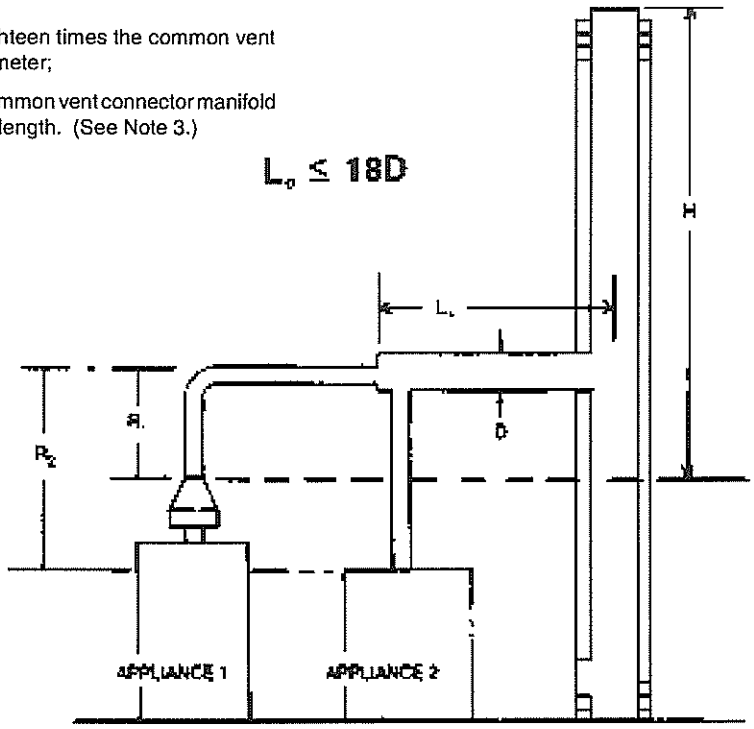
TYPICAL COMMON VENTING APPLICATIONS (Cont.)

EXAMPLE A: Manifold Common Vent Connector

L shall be no greater than eighteen times the common vent connector manifold inside diameter;

i.e. a 4-inch inside diameter common vent connector manifold shall not exceed 72 inches in length. (See Note 3.)

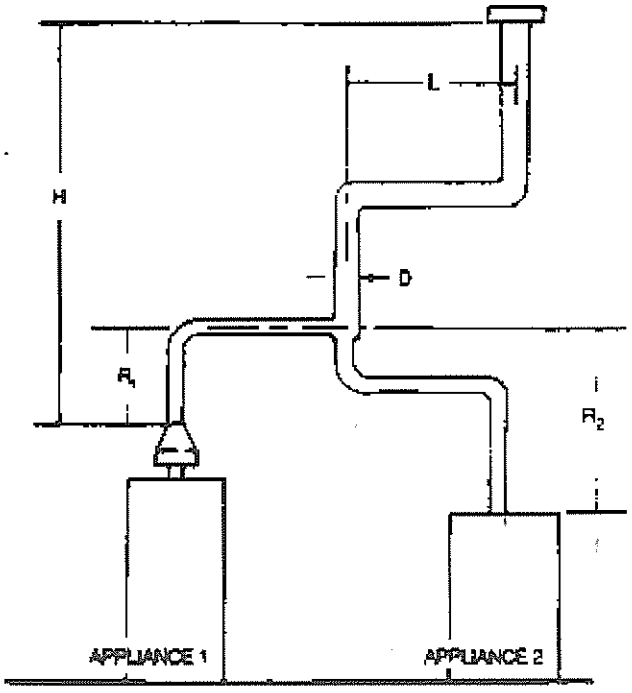
$L_o \leq 18D$



Note: This is an illustration of a typical manifold vent connector. Different appliance, vent connector, or common vent types are possible. Consult the notes for Common Venting.

FIGURE J-9

EXAMPLE B: Offset Common Vent

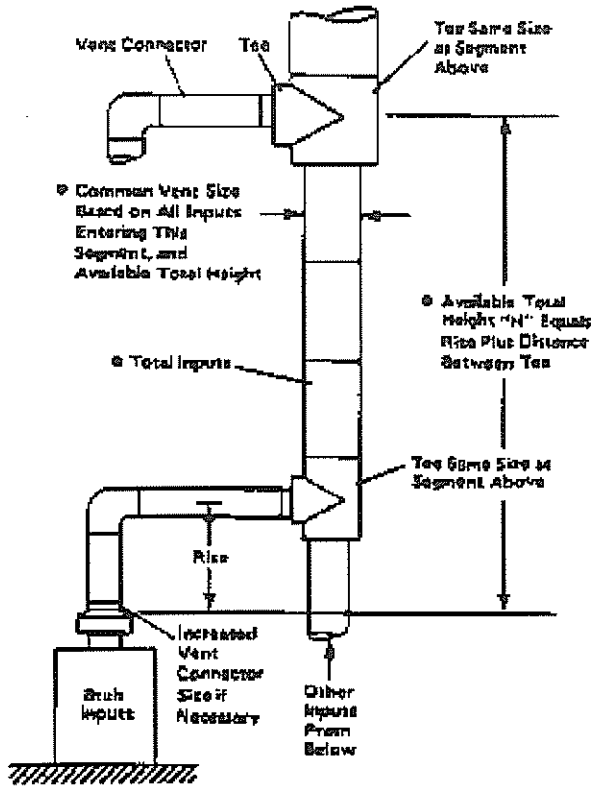


Note: This is an illustration of a typical Offset Vent. Different appliance, vent connector, or vent types are possible. Consult the notes for Single Appliance and Common Venting.

FIGURE J-10

TYPICAL VENTING APPLICATIONS (Cont.)

Figure J-11
Multistory Gas Vent Design Procedure for Each Segment of System
(See Notes: 9, 10, 11, 12 and 13)



Vent Connector Size Depends on:

- Input
- Rise
- Available Total Height "H"
- Table J-6 Connectors

Common Vent Size Depends on:

- Combined Inputs
- Available Total Height "H"
- Table J-6 Common Vent
- Vertical Common Vent with no Offsets

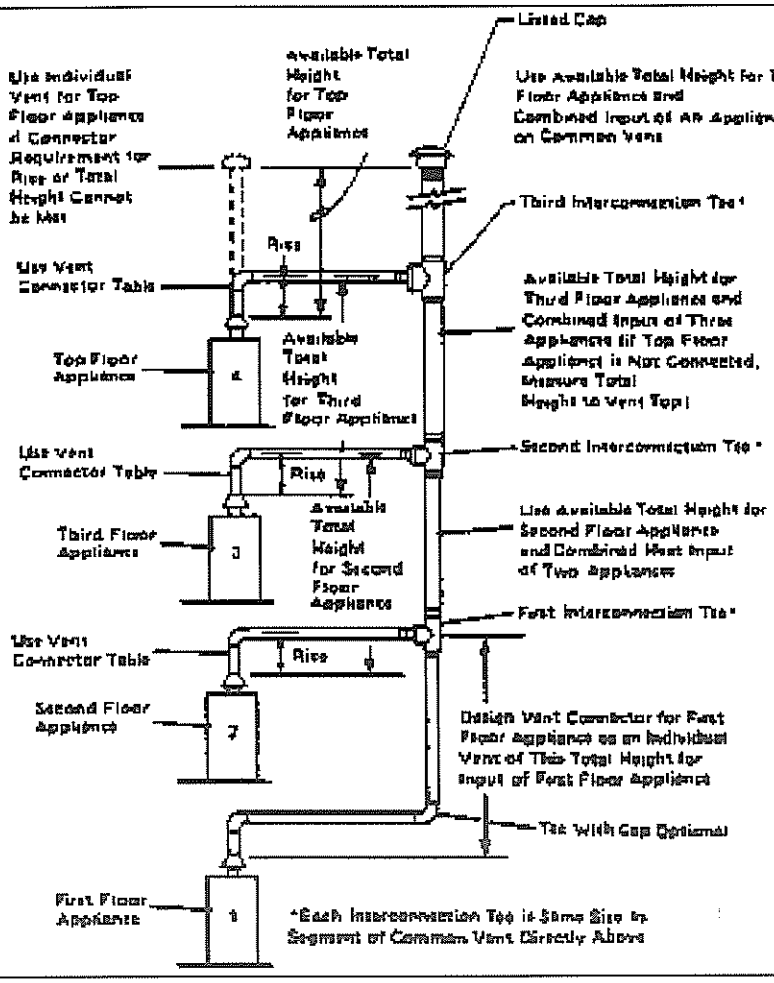


Figure J-12
Multistory Gas Vent Design Procedure for Each Segment of System
(See Notes: 9, 10, 11, 12 and 13)

Principles of Design of Multistory Vents Using Vent Connector and Common Vent Design Tables

TABLE J-6A

Capacity of Type B Double-Wall Vents with Type B Double-wall Connectors Serving Two or more Category I Appliances

Vent Height H (ft)	Connector Rise R (ft)	Vent Connector Diameter - D (inches)																					
		3"			4"			5"			6"			7"			8"			9"			10"		
		Appliance Input Rating in Thousands of Btu Per Hour																					
		FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT
		Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max
6	1	22	37	26	35	66	46	46	106	72	58	164	104	77	225	142	92	296	185	109	376	237	128	466	289
	2	23	41	31	37	75	55	48	121	86	60	183	124	79	253	168	95	333	220	112	424	282	131	526	345
	3	24	44	35	38	81	62	49	132	96	62	199	139	82	275	189	97	363	248	114	463	317	134	575	386
8	1	22	40	27	35	72	48	49	114	79	64	176	109	84	243	148	100	320	194	118	408	248	138	507	303
	2	23	44	32	36	80	57	51	128	90	66	195	129	86	269	175	103	356	230	121	454	294	141	564	358
	3	24	47	36	37	87	64	53	139	101	67	210	145	88	290	198	105	384	258	123	492	330	143	612	102
10	1	22	43	28	34	78	50	49	123	78	65	189	113	89	257	154	106	341	200	125	436	257	146	542	314
	2	23	47	33	36	86	59	51	136	93	67	206	134	91	282	182	109	374	238	128	479	305	149	596	372
	3	24	50	37	37	92	67	52	146	104	69	220	150	94	303	205	111	402	268	131	515	342	152	642	417
15	1	21	50	30	33	89	53	47	142	83	64	220	120	86	298	163	110	389	214	134	493	273	162	609	333
	2	22	53	35	35	96	63	49	153	99	66	235	142	91	320	193	112	419	253	137	532	323	165	658	394
	3	24	55	40	36	102	71	51	163	111	68	248	160	93	339	218	115	445	286	140	565	365	167	700	444
20	1	21	54	31	33	99	56	46	157	87	62	246	125	86	334	171	107	436	224	131	552	285	158	681	347
	2	22	57	37	34	105	66	48	167	104	64	259	149	89	354	202	110	463	265	134	587	339	161	425	414
	3	23	60	42	35	110	74	50	176	116	66	271	168	91	371	228	113	486	300	137	618	518	164	764	466
30	1	20	62	33	31	113	59	45	181	93	60	288	134	83	391	182	103	512	238	125	649	305	151	802	372
	2	21	64	39	33	118	70	47	190	110	62	299	158	85	408	215	105	535	282	129	679	360	155	840	439
	3	22	66	44	34	123	79	48	198	124	64	309	178	88	423	242	108	555	317	132	706	405	158	874	494
50	1	19	71	36	30	133	64	43	216	101	57	349	145	78	477	197	97	627	257	120	797	330	144	984	403
	2	21	73	43	32	137	76	45	223	119	59	358	172	81	490	234	100	645	306	123	820	392	148	1014	478
	3	22	75	48	33	141	86	46	229	134	61	366	194	83	502	263	103	661	343	126	842	441	151	1043	528
100	1	18	82	37	28	158	66	40	262	104	53	442	150	73	611	204	91	810	266	112	1038	341	135	1285	417
	2	19	83	44	30	161	79	42	267	123	55	447	178	75	619	242	94	822	316	115	1054	405	139	1306	494
	3	20	84	50	31	163	89	44	272	138	57	452	200	78	627	272	97	834	355	118	1069	455	142	1327	555

TABLE J-6B

Common Vent Capacity

Vent Height H (ft)	Common Vent Diameter - D																				
	4"			5"			6"			7"			8"			9"			10"		
	Combined Appliance Input Rating in Thousands of Btu Per Hour																				
	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT
6	92	81	65	140	116	103	204	161	147	309	248	200	404	314	260	547	434	335	672	520	410
8	101	90	73	155	129	114	224	178	163	339	275	223	444	348	290	602	480	378	740	577	465
10	110	97	79	169	141	124	243	194	178	367	299	242	477	377	315	649	522	405	800	627	495
15	125	112	91	195	164	144	283	228	206	427	352	280	556	444	365	753	612	465	924	733	565
20	136	123	102	215	183	160	314	255	229	475	394	310	621	499	405	842	688	523	1035	826	640
30	152	138	118	244	210	185	361	297	266	547	459	360	720	585	470	979	808	605	1209	975	740
50	167	153	134	279	244	214	421	353	310	641	547	423	854	706	550	1164	977	705	1451	1188	860
100	185	163	NR	311	277	NR	489	421	NR	751	653	479	1025	873	625	1408	1215	800	1784	1502	975

TABLE J-7A

Capacity of Type B Double-Wall Vent with Single-Wall Connectors Serving Two or more Category I Appliances

Vent Height H (ft)	Connector Rise R (ft)	Vent Connector Diameter - D (inches)																					
		3"			4"			5"			6"			7"			8"			9"			10"		
		Appliance Input Rating in Thousands of Btu Per Hour																					
		FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT
		Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max
6	1	NR	NR	26	NR	NR	46	NR	NR	71	NR	NR	102	207	223	140	262	293	183	325	373	234	447	463	286
	2	NR	NR	31	NR	NR	55	NR	NR	85	168	182	123	215	251	167	271	331	219	334	422	281	458	524	344
	3	NR	NR	34	NR	NR	62	121	131	95	174	198	138	222	273	188	279	361	247	344	462	316	468	574	385
15	1	NR	NR	29	79	87	52	116	138	81	177	214	116	238	291	158	312	380	208	397	482	266	556	596	324
	2	NR	NR	34	83	94	62	121	150	97	185	230	138	246	314	189	321	411	248	407	522	317	568	646	387
	3	NR	NR	39	87	100	70	127	160	109	193	243	157	255	333	215	331	438	281	418	557	360	579	690	437
30	1	47	60	31	77	110	57	113	175	89	169	278	129	226	380	175	296	497	230	378	630	294	528	779	358
	2	50	62	37	81	115	67	117	185	106	177	290	152	236	397	208	307	521	274	389	662	349	541	819	425
	3	54	64	42	85	119	76	122	193	120	185	300	172	244	412	235	316	542	309	400	690	394	555	855	492
50	1	46	69	33	75	128	60	109	207	96	162	336	137	217	460	188	284	604	245	364	768	314	507	951	384
	2	49	71	40	79	132	72	114	215	113	170	345	164	226	473	223	294	623	293	376	793	375	520	983	458
	3	53	72	45	83	136	82	119	221	128	178	353	186	235	486	252	304	640	331	387	816	424	535	1013	518

TABLE J-7B

Common Vent Capacity

Vent Height H (ft)	Common Vent Diameter - D																				
	4"			5"			6"			7"			8"			9"			10"		
	Combined Appliance Input Rating in Thousands of Btu Per Hour																				
	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT
6	89	78	64	136	113	100	200	158	144	304	244	196	398	310	257	541	429	332	665	515	407
8	98	87	71	151	126	112	218	173	159	331	269	218	436	342	285	592	473	373	730	569	460
10	106	94	76	163	137	120	237	189	174	357	292	236	467	369	309	638	512	398	787	617	487
15	121	108	88	189	159	140	275	221	200	416	343	274	544	434	357	738	599	456	905	718	553
20	131	118	98	208	177	155	305	247	223	463	383	302	606	487	395	824	673	512	1013	808	626
30	145	132	113	236	202	179	250	286	257	533	446	349	703	570	459	958	790	593	1183	952	723
50	159	145	128	268	233	204	406	337	296	622	529	410	833	686	535	1139	954	689	1418	1157	838

Capacity of Masonry Chimney with Type B Double-Wall Connectors Serving two or more Category I Appliances

TABLE J-8A Vent Connector Capacity

Vent Height H (ft)	Connector Rise R (ft)	Vent Connector Diameter - D (inches)																					
		3"			4"			5"			6"			7"			8"			9"			10"		
		Appliance Input Rating in Thousands of Btu Per Hour																					
		FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT
		Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max
6	1	24	NR	21	39	62	40	52	106	67	65	194	101	87	274	141	104	370	201	124	479	253	145	599	319
	2	26	43	28	41	79	52	53	133	85	67	230	124	89	324	173	107	436	232	127	562	330	148	694	378
	3	27	49	34	42	92	61	55	155	97	69	262	143	91	369	203	109	491	270	129	633	349	151	795	439
15	1	24	48	23	38	93	44	54	154	74	72	277	114	100	384	174	125	511	229	153	658	297	184	824	375
	2	25	55	31	39	105	55	56	174	89	74	299	134	103	419	192	128	558	263	156	718	339	187	900	432
	3	26	59	35	41	115	64	57	189	102	76	319	153	105	448	215	131	597	292	159	760	382	190	960	486
30	1	24	54	25	37	111	48	52	192	82	69	357	127	96	504	187	119	680	255	145	883	337	175	1115	432
	2	25	60	32	38	122	58	54	208	95	72	376	145	99	531	209	122	715	287	149	928	378	179	1171	484
	3	26	64	36	40	131	66	56	221	107	74	392	163	101	554	233	125	746	317	152	968	418	182	1220	535
50	1	23	52	26	36	116	49	51	209	82	67	405	133	92	582	198	115	798	271	140	1049	362	168	1334	462
	2	24	59	31	37	127	58	53	225	96	70	421	152	95	604	222	118	827	304	143	1085	400	172	1379	510
	3	26	64	37	39	135	66	55	237	108	72	435	170	98	624	247	121	854	334	147	1118	439	176	1421	558

TABLE J-8B Common Vent Capacity

Vent Height H (ft)	Minimum Internal Area of Chimney, Square Inches																							
	12			19			28			38			50			63			78			113		
	Combined Appliance Input Rating in Thousands of Btu Per Hour																							
	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT
6	NR	74	25	NR	119	46	NR	178	71	NR	257	103	NR	351	143	NR	458	188	NR	582	246	NR	853	NR
8	NR	80	28	NR	130	53	NR	193	82	NR	279	119	NR	384	163	NR	501	218	NR	636	278	NR	937	408
10	NR	84	31	NR	138	56	NR	207	90	NR	299	131	NR	409	177[1]	NR	538	236	NR	686	302	NR	1010	454
15	NR	90	36	NR	152	67	NR	233	106	NR	334	152	NR	467	212	NR	611	283	NR	781	365	NR	1156	546
20	NR	92	41	NR	159	75	NR	250	122	NR	368	172	NR	508	243	NR	668	325	NR	858	419	NR	1286	648
30	NR	NR	NR	NR	NR	NR	NR	270	137	NR	404	198	NR	564	278	NR	747	381	NR	969	496	NR	1473	749
50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	620	328	NR	831	461	NR	1089	606	NR	1692	922

Capacity of Masonry Chimney with Single-Wall Connectors Serving two or more Category I Appliances

TABLE J-9A Vent Connector Capacity

Vent Height H (ft)	Connector Rise R (ft)	Vent Connector Diameter - D (inches)																					
		3"			4"			5"			6"			7"			8"			9"			10"		
		Appliance Input Rating in Thousands of Btu Per Hour																					
		FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT
		Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max
6	1	NR	NR	21	NR	NR	39	NR	NR	66	179	191	100	231	271	140	292	366	200	362	474	252	499	594	283
	2	NR	NR	28	NR	NR	52	NR	NR	84	186	227	123	239	321	172	301	432	231	373	557	299	509	696	331
	3	NR	NR	34	NR	NR	61	134	153	97	193	258	142	247	365	202	309	491	269	381	634	348	519	793	375
15	1	NR	NR	23	NR	NR	43	129	151	73	199	271	112	268	376	171	349	502	225	445	646	291	623	808	360
	2	NR	NR	30	92	103	54	135	170	88	207	295	132	277	411	189	359	548	256	456	706	334	634	884	402
	3	NR	NR	34	96	112	63	141	185	101	215	315	151	286	439	213	368	586	289	466	755	378	646	945	437
30	1	NR	NR	24	86	108	47	126	187	80	193	347	124	259	492	183	338	665	250	430	864	330	600	1069	455
	2	NR	NR	31	91	119	57	132	203	93	201	366	142	269	518	205	348	699	282	442	908	372	613	1145	490
	3	NR	NR	35	95	127	65	138	216	105	209	381	160	277	540	229	358	729	312	452	946	412	626	1193	521
50	1	NR	NR	25	85	113	48	124	204	80	188	392	130	252	567	194	328	778	265	417	1022	355	582	1302	537
	2	NR	NR	31	89	123	57	130	218	94	196	408	149	262	588	218	339	806	298	429	1058	393	596	1346	567
	3	NR	NR	35	94	131	65	136	231	106	205	422	167	271	607	243	349	831	328	440	1090	431	610	1386	595

TABLE J-9B Common Vent Capacity

Vent Height H (ft)	Minimum Internal Area of Chimney, Square Inches																							
	12			19			28			38			50			63			78			113		
	Combined Appliance Input Rating in Thousands of Btu Per Hour																							
	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT	FAN +FAN	FAN +NAT	NAT +NAT
6	NR	73	25	NR	118	45	NR	176	71	NR	255	102	NR	348	142	NR	455	187	NR	579	245	NR	846	NR
8	NR	79	28	NR	128	52	NR	190	81	NR	276	118	NR	380	162	NR	497	217	NR	633	277	NR	928	405
10	NR	83	31	NR	136	56	NR	205	89	NR	295	129	NR	405	175	NR	532	234	NR	680	300	NR	1000	450
15	NR	88	36	NR	149	66	NR	230	105	NR	335	150	NR	460	210	NR	602	280	NR	772	360	NR	1139	540
20	NR	90	40	NR	157	74	NR	247	120	NR	362	170	NR	503	240	NR	661	321	NR	849	415	NR	1264	640
30	NR	NR	NR	NR	NR	NR	NR	266	135	NR	398	195	NR	558	275	NR	739	377	NR	957	490	NR	1447	740
50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	612	325	NR	821	456	NR	1076	600	NR	1672	910

Table J-10

Capacity of a Single-Wall Metal Pipe or Type B Asbestos Cement Vent Serving Two or More Draft Hood Equipped Appliances

Vent Connector Capacity and Common Vent Capacity are the Exact Same Values

Total Vent Height "H" (ft.)	Connector Rise "R" (ft.)	Vent Connector Diameter - D (inches)					
		3"	4"	5"	6"	7"	8"
		Maximum Appliance Input Rating in Thousands of Btu Per Hour					
6 to 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

TABLE J-11

MASONRY CHIMNEY LINEAR DIMENSIONS WITH CIRCULAR EQUIVALENTS

NOMINAL LINEAR SIZE INCHES	INSIDE DIMENSION IN LINEAR INCHES	INSIDE DIAMETER OR EQUIVALENT DIAMETER INCHES	EQUIVALENT AREA SQUARE INCHES
4 X 8	2-1/2 X 6-1/2	4 5 6 7	12.2 19.6 28.3 38.3
8 X 8	6-3/4 X 6-3/4	7.4 8	42.7 50.3
8 X 12	6-1/2 X 10-1/2	9 10	63.6 78.5
12 X 12	9-3/4 X 9-3/4	10.4 11	83.3 95
12 X 16	9-1/2 X 13-1/2	11.8 12 14	107.5 113 153.9
16 X 16	13-1/4 X 13-1/4	14.5 15	162.9 176.7
16 X 20	13 X 17	16.2 18	206.1 254.4
20 X 20	16-3/4 X 16-3/4	18.2 20	260.2 314.1
20 X 24	16-1/2 X 20-1/2	20.1 22	314.2 380.1
24 X 24	20-1/4 X 20-1/4	22.1 24	380.1 452.3
24 X 28	20-1/2 X24-1/4	24.1	456.2
28 X 28	24-1/2 X 24-1/4	26.4 27	543.3 572.5
30 X 30	25-1/2 X 25-1/2	27.9 30	607 706.8
30 X 36	25-1/2 X 31-1/2	30.9 33	749.9 855.3
36 X 36	31-1/2 X 31-1/2	34.4 36	929.4 1017.9

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

EXAMPLES USING SINGLE APPLIANCE VENTING TABLES

EXAMPLE 1: Single Draft Hood-equipped Appliance

Problem: An installer has a 120,000 Btu/hr input appliance with a 5-inch diameter draft-hood outlet that needs to be vented into a 10-foot high Type B vent system.

Question: What size vent should be used assuming: (a) a 5-foot lateral single-wall metal vent connector is used with two 90-degree elbows, or (b) a 5-foot lateral single-wall metal vent connector is used with three 90-degree elbows in the vent system?

Solution: Table J-2 should be used to solve this problem because single-wall metal vent connectors are being used with a Type B vent.

(a) Read down the first column in Table J-2 until the row associated with a 10-foot height and 5-foot lateral is found. Read across this row until a vent capacity greater than 120,000 Btu/hr is located in the shaded columns labelled "NAT Max" for draft hood-equipped appliances. In this case, a 5-inch diameter vent has a capacity of 122,000 Btu/hr and may be used for this application.

(b) If three 90-degree elbows are used in the vent system, then the maximum vent capacity listed in the tables must be reduced by 10 percent (See note 2 for Single Appliance Vents in Exhibit J, Sizing of Venting Systems Serving Appliances Equipped with Draft Hoods, Category I Appliances, and Appliances Listed for Use with Type B Vents - Venting Tables, Category I, Central Furnaces). This implies that the 5-inch diameter vent has an adjusted capacity of only 110,000 Btu/hr. In this case, the vent system must be increased to 6 inches in diameter. See calculations below:

122,000 x 0.90 = 110,000 for 5-inch Vent

From Table J-2, Select 6-inch Vent:

186,000 x 0.90 = 167,000; This is greater than the required 120,000, therefore, use a 6-inch Vent when three elbows are used.

EXAMPLE 2 - SINGLE FAN-ASSISTED APPLIANCE

Problem: An installer has an 80,000 Btu/hr input fan-assisted appliance that must be installed using 10 feet of lateral connector to a 30-Ft high Type B vent. Two 90o elbows are needed for the installation.

Question: Can a single-wall metal vent connector be used for this application?

Solution: Table J-2 refers to the use of single-wall metal vent connectors with Type B vent. In the first column find the row associated with a 30-foot height and a 10-foot lateral. Read across this row, looking at the "FAN Min" and "FAN Max" columns, to find that a 3 inch diameter single-wall metal connector vent is not recommended. Moving to the next larger size single-wall connector (4-inch), we find that a 4-inch diameter single-wall metal connector has a recommended minimum vent capacity of 91,000 Btu/hr and a recommended maximum vent capacity of 144,000 Btu/hr. The 80,000 Btu/hr fan-assisted appliance is outside this range, so we conclude that a single-wall metal vent connector cannot be used to vent this appliance using 10 feet of lateral for the connector.

However, we see that if the 80,000 Btu/hr input appliance could be moved to within 5 feet of the vertical vent, then a 4-inch single-wall metal connector could be used to vent the appliance. Table J-2 shows the acceptable range of vent capacities for a 4-inch vent with 5 feet of lateral to be between 72,000 Btu/hr and 157,000 Btu/hr.

If the appliance cannot be moved closer to the vertical vent, then Type B vent could be used as the connector material. In this case, Table 8 shows that for a 30-Ft vent with 10 feet of lateral, the acceptable range of capacities for a 4 inch diameter vent attached to a fan-assisted appliance is between 37,000 Btu/hr and 150,000 Btu/hr.

EXAMPLE 3: Interpolating Between Table Values

Problem: An installer has an 80,000 Btu/hr input appliance with a 4-inch diameter draft hood outlet that needs to be vented into a 12-foot high Type B vent. The vent connector has a 5-foot lateral length and is also Type B.

Question: Can this appliance be vented using a 4-inch diameter vent?

Solution: Table J-1 is used in the case of an all Type B vent system. However, since there is no entry in Table J-1 for a height of 12 feet, interpolation must be used.

Read down the 4-inch diameter "NAT Max" column to the row associated with 10-foot height and 5-foot lateral to find the capacity value of 77,000 Btu/hr. Read down further to the 15-foot height, 5-foot lateral row to find the capacity value of 87,000 Btu/hr. The difference between the 15-foot height capacity value and the 10-foot height capacity value is 10,000 Btu/hr.

The capacity for a vent system with a 12-foot height is equal to the capacity for a 10-foot height plus 2/5 of the difference between the 10-foot and 15-foot height values, or 77,000 + 2/5 x 10,000 - 81,000 Btu/hr.

Therefore, a 4-inch diameter vent may be used in the installation.

EXAMPLES USING COMMON VENTING TABLES

EXAMPLE 4: Common Venting Two Draft Hood-equipped Appliances

Problem: A 35,000 Btu/hr water heater is to be common vented with a 150,000 Btu/hr furnace, using a common vent with a total height of 30 feet. The connector rise is 2 feet for the water heater with a horizontal length of 4 feet. The connector rise for the furnace is 3 feet with a horizontal length of 8 feet. Assume single-wall metal connectors will be used with Type B vent.

Question: What size connectors and combined vent should be used in this installation?

Solution: Table J-7 should be used to size single-wall metal vent connectors attached to Type B vertical vent. In the vent connector capacity portion of Table J-7, find the row associated with a 30-foot vent height. For a 2-foot rise on the vent connector for the water heater, read the shaded columns for draft hood-equipped appliances to find that a 3-inch diameter connector has a capacity of 37,000 Btu/hr. Therefore, a 3-inch single-wall metal vent connector may be used with the water heater.

For a draft hood-equipped furnace with a 3-foot rise, read across the appropriate row to find that a 5-inch diameter vent connector has a maximum capacity or 120,000 Btu/hr (which is too small for the furnace), and a 6-inch diameter vent connector has a maximum vent capacity of 172,000 Btu/hr. Therefore, a 6-inch diameter vent connector should be used with the 150,000 Btu/hr furnace.

Since both vent connector horizontal lengths are less than the maximum lengths listed in Note 1, the table values may be used without adjustments.

In the common vent capacity portion of Table J-7, find the row associated with a 30-foot vent height and read over to the NAT+NAT portion of the 6-inch diameter column to find a maximum-combined capacity of 257,000 Btu/hr. Since the two appliances total only 185,000 Btu/hr, a 6-inch common vent may be used.

EXAMPLE 5A: Common Venting a Draft Hood-equipped Water Heater with a Fan-assisted Furnace into a Type B Vent

Problem: In this case, a 35,000 Btu/hr input draft hood-equipped water heater with 2 feet of connector rise and 4 feet of horizontal length is to be common vented with a 100,000 Btu/hr fan-assisted furnace with 3 feet of connector rise and 6 feet of horizontal length. The common vent consists of a 30-foot rise of Type B vent. The installer would like to use a single-wall metal vent connector.

Question: What are the recommended vent diameters for each connector and the common vent?

Solution: - (Table J-7) **Water Heater Vent Connector Diameter** - Since the water heater vent connector horizontal length of 4 feet is less than the maximum value listed in Note 1, the venting table values may be used without adjustments. Using Table J-7 (Vent Connector Capacity), read down the Total Vent Height "H" column to 30 feet and read across the 2-foot Connector Rise "R" row to the first Btu/hr rating in the "NAT Max" column that is equal to, or greater than, the water heater input rating. The table shows that a 3-inch vent connector has a maximum input rating of 37,000 Btu/hr. Since this is greater than the water heater input rating, a 3-inch vent connector is adequate. Furthermore, since the water heater is equipped with a draft hood, there are no minimum input rating restrictions.

Furnace Vent Connector Diameter - Using Table J-7 (Vent Connector Capacity), read down the Total Vent Height "H" column to 30 feet and read across the 3-foot Connector Rise "R" row. Since the furnace has a fan-assisted combustion system, find the first "FAN Max" column with a Btu/hr rating greater than the furnace input rating. The 4-inch vent connector has a maximum input rating of 119,000 Btu/hr and a minimum input rating of 85,000 Btu/hr. The 100,000 Btu/hr furnace in this example falls within this range, so a 4-inch connector is adequate. Since the furnace vent connector horizontal length of 6 feet is less than the maximum value listed in Note 1, the venting table values may be used without adjustment. If the furnace had an input rating of 80,000 Btu/hr, then a Type B vent connector (See Table J-6) would be needed in order to meet the minimum capacity limit.

Common Vent Diameter - The total input to the common vent is 135,000 Btu/hr. Using Table J-7, (Common Vent Capacity) read down the Total Vent Height "H" column to 30 feet and across this row to find the smallest vent diameter in the "FAN+NAT" column that has a Btu/hr rating equal to, or greater than 135,000 Btu/hr. The 4-inch common vent has a capacity of 132,000 Btu/hr and the 5-inch common vent has a capacity of 202,000 Btu/hr. Therefore, the 5-inch common vent should be used in this Example.

Summary - In this Example, the installer may use a 3-inch diameter, single-wall metal vent connector for the water heater and a 4-inch diameter, single-wall metal vent connector for the furnace. The common vent should be a 5-inch diameter Type B vent.

EXAMPLE 5B - Common Venting Into a Masonry Chimney

Problem: In this case, a 35,000 Btu/hr input draft hood-equipped water heater with 2 feet of connector rise and 4 feet of horizontal length is to be common vented with a 100,000 Btu/hr fan-assisted furnace with 3 feet of connector rise and 6 feet of horizontal length. The common vent is a clay tile lined masonry chimney with a 30 foot height. The internal dimensions of the clay tile liner are nominally 8 inches X 12 inches.

Question: Assuming the same vent connector heights, laterals, and materials found in Example 5A, what are the recommended vent connector diameters and is this an acceptable installation?

Solution: Table J-9 is used to size common venting installations involving single wall connectors into masonry chimneys.

Water Heater Vent Connector Diameter. Using Table J-9 (Vent Connector Capacity), read down the Total Vent Height "H" column to 30 feet and read across the 2-foot Connector Rise "R" row to the first Btu/hr rating in the "NAT Max" column that is equal to or greater than the water heater input rating. The table shows that a 3 inch vent connector has a maximum input of only 31,000 Btu/hr, while a 4-inch vent connector has a maximum input of 57,000 Btu/hr. A 4-inch vent connector must therefore be used.

Furnace Vent Connector Diameter. Using Table J-9 (Vent Connector Capacity), read down the Total Vent Height "H" column to 30 feet and across the 3-foot Connector Rise "R" row. Since the furnace has a fan-assisted combustion system, find the first "FAN Max" column with a Btu/hr rating greater than the furnace input rating. The 4-inch vent connector has a maximum input rating of 127,000 Btu/hr and a minimum input rating of 95,000 Btu/hr. The 100,000 Btu/hr furnace in this example falls within this range, so a 4-inch connector is adequate.

Masonry Chimney. From Table J-11, the Equivalent Area for a Nominal Liner size of 8 inches X 12 inches is 63.6 square inches. Using Table J-9 (Common Vent Capacity), read down the "Fan+Nat" column under the Minimum Internal Area of Chimney value of 63, to the row for 30 foot height, to find a capacity value of 739,000 Btu/hr. The combined input rating of the furnace and water heater, 135,000 Btu/hr, is less than the table value, so this is an acceptable installation.

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