

# VENTING TABLES

## CATEGORY I CENTRAL FURNACES



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## **GAMA VENTING TABLES FOR CATEGORY I CENTRAL FURNACES**

This booklet contains new venting tables designed specifically for use with Category I central furnaces. These tables are unique, in that, industry wide venting tables now exist for fan-assisted combustion system central furnaces. Venting tables for these types of appliances are not contained in the National Fuel Gas Code (NFPA 54/ANSI Z223.1-1988).

All requirements contained in this booklet apply to both Category I draft-hood equipped central furnaces as well as fan-assisted combustion system central furnaces. At no time should a venting system for a listed Category II, III, or IV central furnace be sized with these tables. The National Fuel Gas Code (NFPA 54/ANSI Z223.1-1988) may also be used to size venting systems for draft-hood equipped central furnaces. However, at this time, the National Fuel Gas Code does not include alternate sizing methods for fan-assisted combustion systems. Therefore, until engineering data is developed to allow alternate sizing methods for Category I fan-assisted central furnaces, the enclosed venting tables must be used for fan-assisted combustion system central furnaces. These tables apply to venting single appliances and common venting multiple appliances, in chimneys other than masonry chimneys.

The new venting tables were developed by Battelle under contract (GRI-5088-245-1728) to the Gas Research Institute (GRI). The computer program (VENT-II) developed by Battelle Columbus generated the venting tables in this booklet and this procedure has been accepted by the American Gas Association Laboratories as an appropriate engineering methodology for determining venting requirements of Category I central furnaces.

For your information, the general venting requirements listed in this booklet are not intended to be used as complete installation instructions and represent only a partial list of venting considerations.

For venting applications that fall outside the parameters of the new venting tables, refer to the furnace manufacturer's complete installation instructions, the specific vent manufacturer's complete installation instructions and state and local codes.

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# VENTING REQUIREMENTS FOR CATEGORY I CENTRAL FURNACES

## I. INTRODUCTION

This booklet contains the current definitions, instructions, and tables necessary to vent today's modern Category I Gas Fired Appliance. A variety of definitions of new terms describing today's gas appliances are included to supplement the actual venting tables which have been generated to correctly vent various combinations of Category I Appliances using Type B or single-wall metal vent connectors attached to Type B vents. Tables are also included covering similar venting material combinations when applied to common venting arrangements of two appliances.

Finally, a series of examples are presented demonstrating how the vent tables are used to size the vent connector and the vertical vent for a variety of typical applications.

## 1.1. DEFINITION OF TERMS

"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"	refers to 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"	refers to 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"	refers to the maximum appliance input rating of a Category I appliance equipped with a draft hood that could be attached to the vent. There are no minimum appliance input ratings for draft-hood-equipped appliances.
"FAN+FAN"	refers to the maximum combined input rating of two fan-assisted appliances attached to the common vent.

"FAN+NAT"	refers to the maximum combined input rating of one fan-assisted appliance and one draft-hood-equipped appliance attached to the common vent.
"NAT+NAT"	refers to the maximum combined input rating of two draft-hood-equipped appliances attached to the common vent.
"NR"	means not recommended due to potential for condensate formation and/or pressurization of the venting system.
"NA"	means not applicable due to physical or geometric constraints.
Draft Hood	A device built into an appliance, or made a part of the vent connector from an appliance, which is designed to (1) provide for the ready escape of the flue gases from the appliance in the event of no draft, backdraft, or stoppage beyond the draft hood, (2) prevent a backdraft from entering the appliance, and (3) neutralize the effect of stack action of the chimney or gas vent upon the operation of the appliance.
Vent	A passageway used to convey flue gases from gas utilization equipment, or their vent connectors, to the outside atmosphere.
Vent Connector	The pipe or duct which connects a fuel-gas burning appliance to a vent or chimney.
Flue Collar	That portion of an appliance designed for the attachment of a draft hood, vent connector, or venting system.

### III. GENERAL VENTING REQUIREMENTS

All requirements contained in this document apply to both Category I draft hood equipped and fan-assisted combustion appliances. At no time should a venting system for a listed Category II, III, or IV appliance be sized with these Tables. The alternate sizing methods described in the National Fuel Gas Code (NFPA54/ANSI Z223.1-1988) may also be used to size the venting system for a draft hood equipped appliance. At this time, alternate sizing methods have not been developed for fan-assisted appliances. Therefore, until engineering data is developed to allow alternate sizing methods for Category I fan-assisted appliances, the vent tables must be used.

1. If the vent size determined from the tables is smaller than the appliance draft hood outlet or flue collar, the smaller size may be used provided:
  - a) The total vent height "H" 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 size (e.g. 12 inches to 10 inches is a one size reduction).
  - c) Vents for appliance draft hood or flue collars above 12 inches in diameter are not reduced more than two sizes (e.g. 24 inches to 20 inches is a two size reduction).
  - d) The maximum capacity listed in the tables for a fan-assisted appliance is reduced by 10% (0.90 x maximum 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 does not apply to fan-assisted appliances.
- 2) Single appliance venting configurations with zero lateral lengths, Tables 1 & 2, are assumed to have no elbows in the vent system. For all other vent configurations with indicated lateral lengths, the vent system is assumed to have two 90° elbows. For each additional 90° elbow, or equivalent\* beyond two; the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).
- 3) The common venting Tables 3 & 4 were generated using a maximum vent connector length of 1 1/2 feet (18 inches) for each inch of connector diameter as follows:

\* Two 45° Elbows are equivalent to one 90° Elbow.

CONNECTOR DIAMETER (INCHES)	MAXIMUM CONNECTOR LENGTH (FEET)
3	4 1/2
4	6
5	7 1/2
6	9
7	10 1/2
8	12
9	13 1/2
10	15
12	18
14	21
16	24
18	27
20	30
22	33
24	36

- The vent connector should be routed to the vent utilizing the shortest possible route. Longer connectors than these listed are possible but require an increase in size, rise, or total vent height to compensate for the additional length. Consult the appliance manufacturer for specific recommendations concerning long vent connectors.
- 4) If vent connectors are combined prior to entering the common vent, the maximum common vent capacity listed in the common venting tables must be reduced by 10% (0.90 x maximum common vent capacity). See Figure 7. The length of the common vent connector offset (L) should not exceed 1-1/2 feet (18 inches) for each inch of common vent connector diameter.
  - 5) If the common vertical vent is offset as shown in Figure 8, the maximum common vent capacity listed in the common venting tables should be reduced by 20% (0.80 x maximum common vent capacity).
  - 6) The flow area in the common vent should be greater than or equal to 80 percent of the sum of the flow areas of the individual vent connectors. However, the common vent diameter must always be at least as large as the largest vent connector diameter. All interconnection fittings must also be the same size as the common vent.
  - 7) Type B gas vents shall terminate above the roof surface with a listed cap or a listed roof assembly in accordance with the terms of their respective listings and the manufacturer's instructions. See Figures 1 and 2.

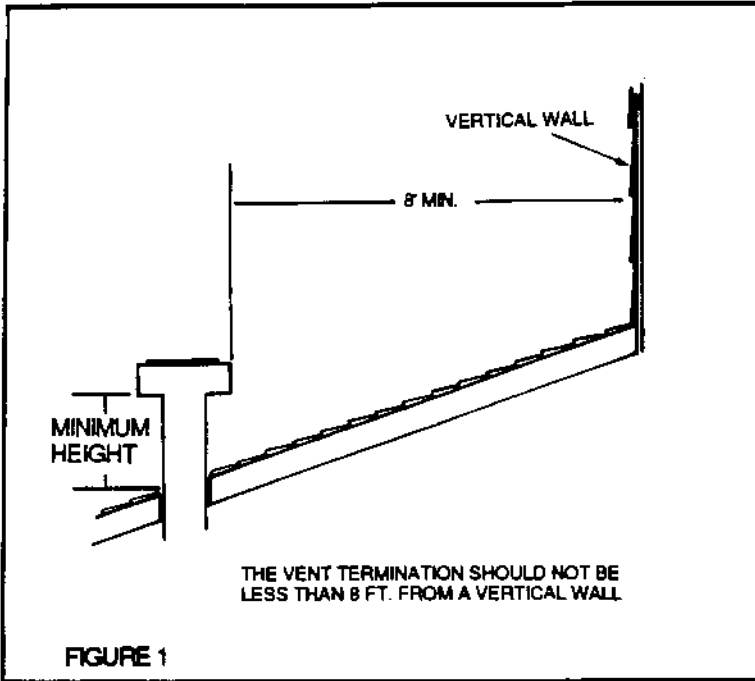
**WIND-TESTED CAPS - (12" and Smaller)**

Listed gas venting systems using listed vent caps 12" and smaller in size may terminate in accordance with the VENT TERMINATION TABLE.

**GAS VENT TERMINATION TABLE**

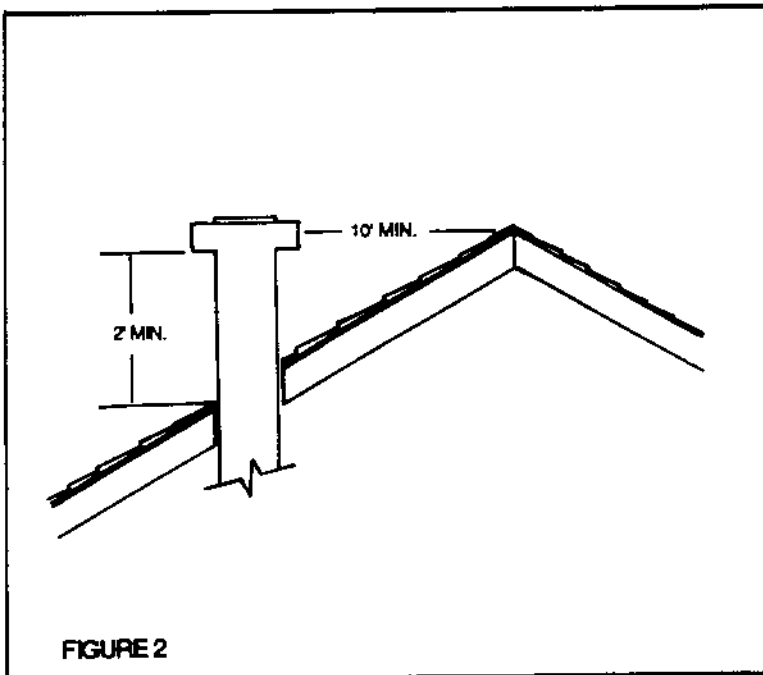
ROOF PITCH	MINIMUM HEIGHT
FLAT TO 7/12	1.0 FEET *
OVER 7/12 TO 8/12	1.5 FEET
OVER 8/12 TO 9/12	2.0 FEET
OVER 9/12 TO 10/12	2.5 FEET
OVER 10/12 TO 11/12	3.25 FEET
OVER 11/12 TO 12/12	4.0 FEET
OVER 12/12 TO 14/12	5.0 FEET
OVER 14/12 TO 16/12	6.0 FEET
OVER 16/12 TO 18/12	7.0 FEET
OVER 18/12 TO 20/12	7.5 FEET
OVER 20/12 TO 21/12	8.0 FEET

\* THIS REQUIREMENT COVERS MOST INSTALLATIONS



**VENT CAPS LARGER THAN 12"**

Listed vent caps larger than 12" must be located at least 2 feet above the highest point and at least 2 feet higher than any portion of a building within a horizontal distance of 10 feet.



- 8) No portion of the venting system can extend into, or pass through any circulating air duct or plenum.
- 9) All vent pipe passing through floors, walls, and ceilings must be installed with the listed clearance to combustible materials and be fire stopped according to local codes. In the absence of local codes, refer to NFGC.
- 10) Vent connectors serving Category I appliances shall not be connected to any portion of mechanical draft systems operating under positive pressure such as Category III or IV Venting Systems.
- 11) A Category I appliance must never be connected to a chimney that is servicing a solid fuel appliance. If a fireplace chimney, lined with a metal liner, is used to vent this appliance, the fireplace opening must be permanently sealed.
- 12) These tables are not applicable to outside chimneys or vents unless enclosed in a chase. A Type B vent passing through an unused masonry chimney is considered to be an enclosed vent system and these tables may be used.

- 13) A vent connector shall be supported without any dips or sags and shall slope a minimum of 1/4 inch per lineal foot of connector, back towards the appliance.
- 14) When two or more vent connectors enter a common gas vent, chimney flue, or single-wall metal pipe, the smaller connector shall enter at the highest level consistent with the available headroom or clearance to combustible material.
- 15) Vent connectors shall be firmly attached to draft hood outlets or flue collars by sheet-metal screws or other approved means, except vent connectors of listed Type B vent material which shall be assembled in accordance with the manufacturer's instructions. Joints between sections of single wall connector piping shall be fastened by sheet-metal screws or other approved means.
- 16) When the vent connector used for Category I appliances must be located in or pass through a crawl space or other area which may be cold, that portion of the vent connector shall be of listed double-wall Type B vent material or material having equivalent insulation qualities.
- 17) The entire length of a vent connector shall be readily accessible for inspection, cleaning, and replacement.
- 18) When more than two appliances are connected to a common vent, and at least one of the common vented appliances is a fan assisted type, the common vent must be sized to accommodate:
  - 1) The capacity of all the common vented appliances.
  - 2) Have a minimum capacity lower than that of the smallest fan assisted appliance. Minimum capacity should be determined using Tables 1 and 2.

### TYPICAL VENTING APPLICATIONS

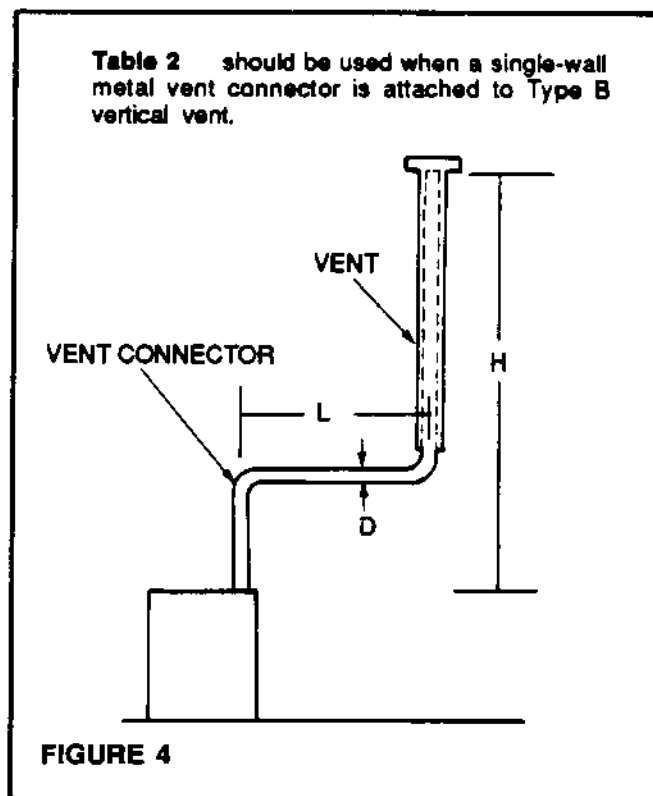
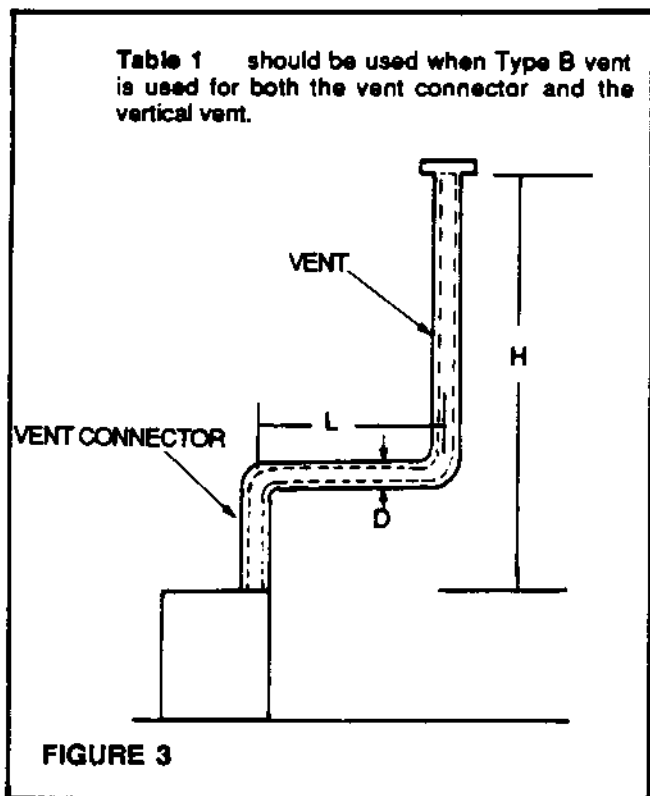


Table 3 should be used when Type B vent connectors are attached to a Type B common vent.

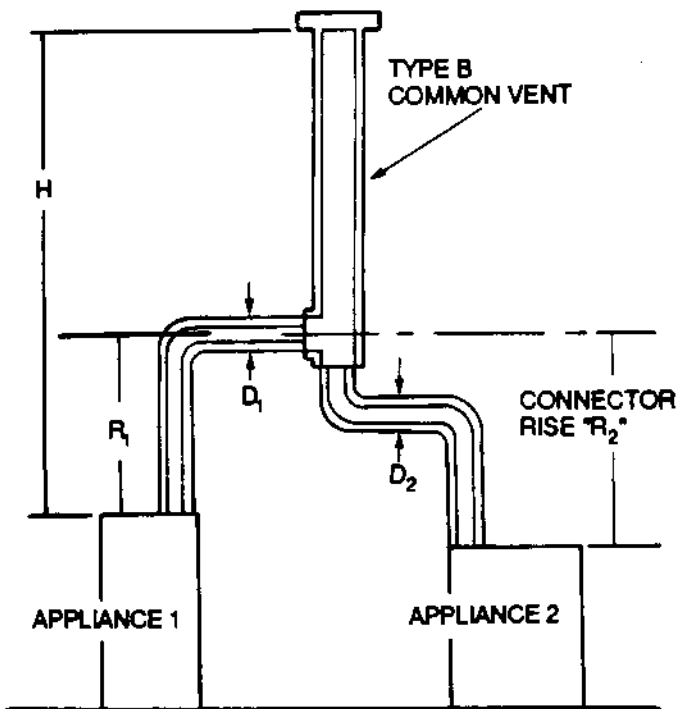


FIGURE 5

Table 4 should be used when single-wall metal vents are attached to a Type B common vent.

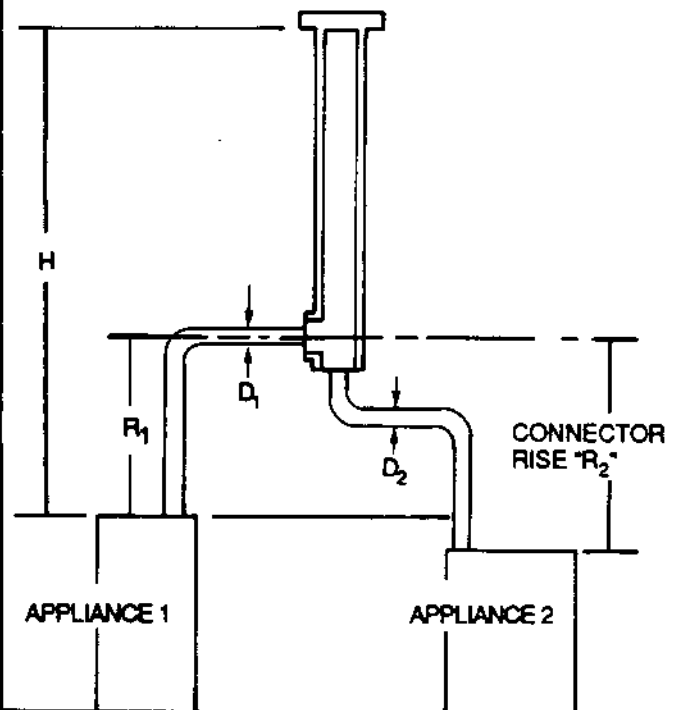


FIGURE 6

Schematic Diagram showing offset in the common vent section "L", of the vent connector.

"L" LESS THAN OR EQUAL TO 1.5 FEET X D

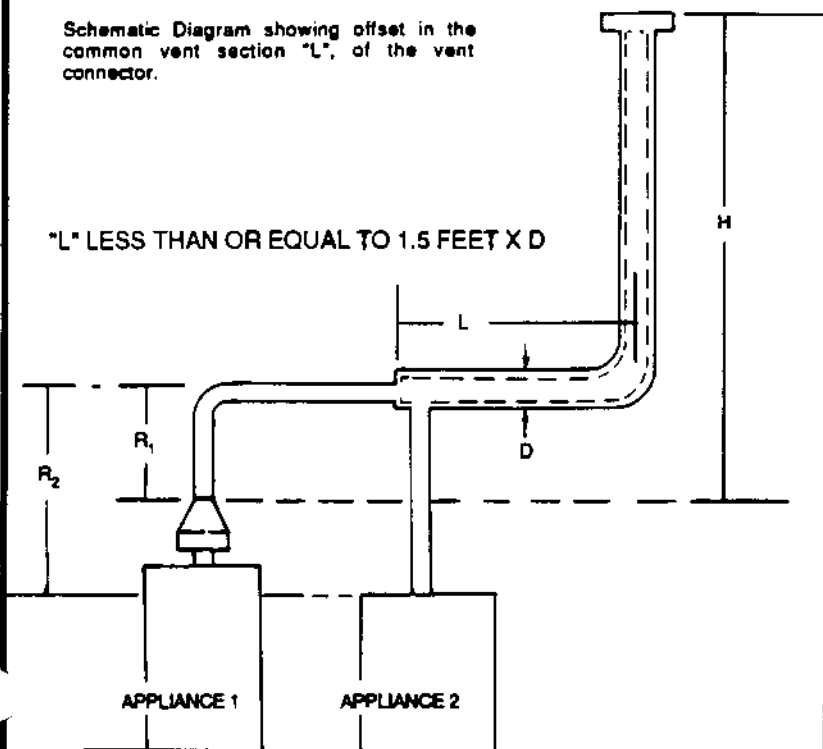


FIGURE 7

Schematic Diagram showing offset in the common vent section of the vertical vent.

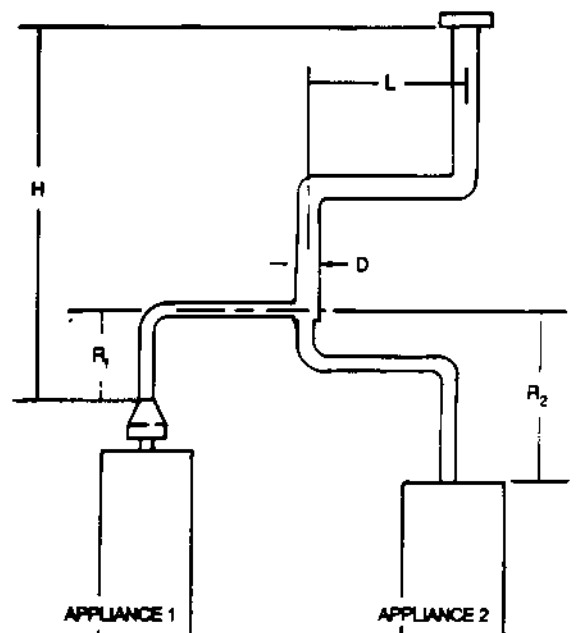


FIGURE 8



### VENT TABLES

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

**TABLE 1**

Height Lateral H (ft)		L (ft)		Vent and Connector Diameter - D													
				3"		4"		5"		6"		7"		8"		9"	
				Appliance Input Rating in Thousands of Btu Per Hour													
		FAN		FAN		FAN		FAN		FAN		FAN		FAN			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
6	0	0	78	0	152	0	251	0	375	0	524	0	698	0	897		
	2	13	51	18	97	27	157	32	232	44	321	53	425	63	543		
	4	21	49	30	94	39	153	50	227	66	316	79	419	93	536		
	6	25	46	36	91	47	149	59	223	78	310	93	413	110	530		
8	0	0	84	0	165	0	276	0	415	0	583	0	780	0	1006		
	2	12	57	16	109	25	178	28	263	42	365	50	483	60	619		
	5	23	53	32	103	42	171	53	255	70	356	83	473	99	607		
	8	28	49	39	98	51	164	64	247	84	347	99	463	117	596		
10	0	0	88	0	175	0	295	0	447	0	631	0	847	0	1096		
	2	12	61	17	118	23	194	26	289	40	402	48	533	57	684		
	5	23	57	32	113	41	187	52	280	68	392	81	522	95	671		
	10	30	51	41	104	54	176	67	267	88	376	104	504	122	651		
15	0	0	94	0	191	0	327	0	502	0	716	0	970	0	1263		
	2	11	69	15	136	20	226	22	339	38	475	45	633	53	815		
	5	22	65	30	130	39	219	49	330	64	463	76	620	90	800		
	10	29	59	40	121	51	206	64	315	84	445	99	600	116	777		
	15	35	53	48	112	61	195	76	301	98	429	115	580	134	755		
20	0	0	97	0	202	0	349	0	540	0	776	0	1057	0	1384		
	2	10	75	14	149	18	250	20	377	33	531	41	711	50	917		
	5	21	71	29	143	38	242	47	367	62	519	73	697	86	902		
	10	28	64	38	133	50	229	62	351	81	499	95	675	112	877		
	15	34	58	46	124	59	217	73	337	94	481	111	654	129	853		
	20	48	52	55	116	69	206	84	322	107	464	125	634	145	830		
30	0	0	100	0	213	0	374	0	587	0	853	0	1173	0	1548		
	2	9	81	13	166	14	283	18	432	27	613	33	826	42	1072		
	5	21	77	28	160	36	275	45	421	58	600	69	811	82	1055		
	10	27	70	37	150	48	262	59	405	77	580	91	788	107	1028		
	15	33	64	44	141	57	249	70	389	90	560	105	765	124	1002		
	20	56	58	53	132	66	237	80	374	102	542	119	743	139	977		
	30	NR	NR	73	113	88	214	104	346	131	507	149	702	171	929		
50	0	0	101	0	216	0	397	0	633	0	932	0	1297	0	1730		
	2	8	86	11	183	14	320	15	497	22	715	26	975	33	1276		
	5	20	82	27	177	35	312	43	487	55	702	65	960	77	1259		
	10	26	76	35	168	45	299	56	471	73	681	86	935	101	1230		
	15	59	70	42	158	54	287	66	455	85	662	100	911	117	1203		
	20	NR	NR	50	149	63	275	76	440	97	642	113	888	131	1176		
	30	NR	NR	69	131	84	250	99	410	123	605	141	844	161	1125		
100	0	NR	NR	0	218	0	407	0	665	0	997	0	1411	0	1908		
	2	NR	NR	10	194	12	354	13	566	18	831	21	1155	25	1536		
	5	NR	NR	26	189	33	347	40	557	52	820	60	1141	71	1519		
	10	NR	NR	33	182	43	335	53	542	68	801	80	1118	94	1492		
	15	NR	NR	40	174	50	321	62	528	80	782	93	1095	109	1465		
	20	NR	NR	47	166	59	311	71	513	90	763	105	1073	122	1438		
	30	NR	NR	NR	NR	78	290	92	483	115	726	131	1029	149	1387		
	50	NR	NR	NR	NR	NR	NR	147	428	180	651	197	944	217	1288		

## VENT TABLES

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

**TABLE 1 (Cont'd)**

Height: Lateral H (ft)		L (ft)		Vent and Connector Diameter - D															
				10"		12"		14"		16"		18"		20"		22"		24"	
				Appliance Input Rating in Thousands of Btu Per Hour															
		FAN		FAN		FAN		FAN		FAN		FAN		FAN		FAN			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
6	0	0	1121	0	1645	0	2267	0	2983	0	3802	0	4721	0	5737	0	6853		
	2	75	675	103	982	138	1346	178	1769	225	2250	296	2782	360	3377	426	4030		
	4	110	668	147	973	191	1338	242	1761	300	2242	390	2774	469	3370	555	4023		
	6	128	661	171	967	219	1330	276	1753	341	2235	437	2767	523	3363	618	4017		
8	0	0	1261	0	1838	0	2571	0	3399	0	4333	0	5387	0	6555	0	7838		
	2	71	770	98	1124	130	1543	168	2030	212	2584	278	3196	336	3882	401	4634		
	5	115	758	154	1110	199	1528	251	2013	311	2563	398	3180	476	3863	562	4612		
	8	137	746	180	1097	231	1514	289	2000	354	2552	450	3163	537	3850	630	4602		
10	0	0	1377	0	2036	0	2825	0	3742	0	4782	0	5955	0	7254	0	8682		
	2	68	852	93	1244	124	1713	161	2256	202	2868	264	3556	319	4322	378	5153		
	5	112	839	149	1229	192	1696	243	2238	300	2849	382	3536	458	4301	540	5132		
	10	142	817	187	1204	238	1669	298	2209	364	2818	459	3504	546	4268	641	5099		
15	0	0	1596	0	2380	0	3323	0	4423	0	5678	0	7099	0	8665	0	10393		
	2	63	1019	86	1495	114	2062	147	2719	186	3467	239	4304	290	5232	346	6231		
	5	105	1009	140	1476	182	2041	229	2696	283	3442	355	4278	426	5204	501	6222		
	10	135	977	177	1446	227	2009	283	2639	346	3402	432	4234	510	5159	599	6175		
	15	155	953	202	1418	257	1978	318	2623	385	3363	479	4192	564	5115	665	6129		
20	0	0	1756	0	2637	0	3701	0	4948	0	6376	0	7988	0	9785	0	11753		
	2	59	1150	81	1694	107	2343	139	3097	175	3955	220	4916	269	5983	321	7154		
	5	101	1133	135	1674	174	2320	219	3071	270	3926	337	4885	403	5950	475	7119		
	10	130	1105	172	1641	220	2282	273	3029	334	3880	413	4835	489	5896	573	7063		
	15	150	1078	195	1609	248	2245	306	2988	372	3835	459	4786	541	5844	631	7007		
	20	167	1052	217	1578	273	2210	335	2948	404	3791	495	4737	585	5792	689	6953		
30	0	0	1977	0	3004	0	4252	0	5725	0	7420	0	9341	0	11483	0	13848		
	2	54	1351	74	2004	98	2786	127	3696	159	4734	199	5900	241	7194	285	8617		
	5	96	1332	127	1981	164	2759	206	3666	252	4701	312	5863	373	7155	439	8574		
	10	125	1301	164	1944	209	2716	259	3617	316	4647	386	5803	456	7090	535	8505		
	15	143	1272	187	1908	237	2674	292	3570	354	4594	431	5744	507	7026	590	8437		
	20	160	1243	207	1873	260	2633	319	3523	384	4542	467	5686	548	6964	639	8370		
	30	195	1189	246	1807	305	2553	369	3433	440	4442	540	5574	635	6842	739	8239		
50	0	0	2231	0	3441	0	4934	0	6711	0	8774	0	11129	0	13767	0	16694		
	2	41	1620	66	2431	86	3409	113	4534	141	5864	171	7339	209	8980	251	10788		
	5	90	1600	118	2406	151	3380	191	4520	234	5826	283	7295	336	8933	394	10737		
	10	118	1567	154	2366	196	3332	243	4464	295	5763	355	7224	419	8855	491	10652		
	15	136	1536	177	2327	222	3285	274	4409	330	5701	396	7155	463	8779	542	10570		
	20	151	1505	195	2288	244	3239	300	4356	361	5641	433	7086	506	8704	586	10488		
	30	183	1446	232	2214	287	3150	347	4253	412	5523	494	6953	577	8557	672	10328		
100	0	0	2491	0	3925	0	5729	0	7914	0	10485	0	13454	0	16817	0	20578		
	2	30	1975	44	3027	72	4313	95	5824	120	7591	138	9577	169	11803	204	14264		
	5	82	1955	107	3002	136	4282	172	5797	208	7548	245	9528	293	11748	341	14204		
	10	108	1923	142	2961	180	4231	223	5737	268	7478	318	9447	374	11658	436	14105		
	15	126	1892	163	2920	206	4182	252	5678	304	7409	358	9367	418	11569	487	14007		
	20	141	1861	181	2880	226	4133	277	5619	330	7341	387	9289	452	11482	523	13910		
	30	170	1802	215	2803	265	4037	319	5505	378	7209	446	9136	514	11310	592	13720		
	50	241	1688	292	2637	350	3856	415	5289	486	6956	572	8841	659	10979	752	13354		

## VENT TABLES

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

**TABLE 2**

Height Lateral H (ft)		L (ft)		Vent and Connector Diameter - D																			
				3"		4"		5"		6"		7"		8"		9"		10"		12"			
				Appliance Input Rating in Thousands of Btu Per Hour																			
		FAN		FAN		FAN		FAN		FAN		FAN		FAN		FAN		FAN		FAN			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
6	0	38	77	59	151	85	249	126	373	165	522	211	695	267	894	371	1118	537	1639				
	2	39	51	60	96	85	156	123	231	159	320	201	423	251	541	347	673	498	979				
	4	NR	NR	74	92	102	152	146	225	187	313	237	416	295	533	409	664	584	971				
	6	NR	NR	83	89	114	147	163	220	207	307	263	409	327	526	449	656	638	962				
8	0	37	83	58	164	83	273	123	412	161	580	206	777	258	1002	360	1257	521	1852				
	2	39	56	59	108	83	176	121	261	155	363	197	482	246	617	339	768	486	1120				
	5	NR	NR	77	102	107	168	151	252	193	352	245	470	305	604	418	754	598	1104				
	8	NR	NR	90	95	122	161	175	243	223	342	280	458	344	591	470	740	665	1089				
10	0	37	87	57	174	82	293	120	444	158	628	202	844	253	1093	351	1373	507	2031				
	2	39	61	59	117	82	193	119	287	153	400	193	531	242	681	332	849	475	1242				
	5	52	56	76	111	105	185	148	277	190	388	241	518	299	667	409	834	584	1224				
	10	NR	NR	97	100	132	171	188	261	237	369	296	497	363	643	492	808	688	1194				
15	0	36	93	56	190	80	325	116	499	153	713	195	966	244	1259	336	1591	488	2374				
	2	38	69	57	136	80	225	115	337	148	473	187	631	232	812	319	1015	457	1491				
	5	51	63	75	128	102	216	144	326	182	459	231	616	287	795	392	997	562	1469				
	10	NR	NR	95	116	128	201	182	308	228	438	284	592	349	768	470	966	664	1433				
20	0	35	96	54	200	78	346	114	537	149	772	190	1053	238	1379	326	1751	473	2631				
	2	37	74	56	148	78	248	113	375	144	528	182	708	227	914	309	1146	443	1689				
	5	50	68	73	140	100	239	141	363	178	514	224	692	279	896	381	1126	547	1665				
	10	NR	NR	93	129	125	223	177	344	222	491	277	666	339	866	457	1092	646	1626				
30	0	34	99	53	211	76	372	110	584	144	849	184	1168	229	1542	312	1971	454	2996				
	2	37	80	55	164	76	281	109	429	139	610	175	823	219	1069	296	1346	424	1999				
	5	49	74	72	157	98	271	136	417	171	595	215	806	269	1049	366	1324	524	1971				
	10	NR	NR	91	144	122	255	171	397	213	570	265	777	327	1017	440	1287	620	1927				
50	0	33	99	51	213	73	394	105	629	138	928	176	1292	220	1724	295	2223	428	3432				
	2	36	84	53	181	73	318	104	495	133	712	168	971	209	1273	280	1615	401	2426				
	5	48	80	70	174	94	308	131	482	164	696	204	953	257	1252	347	1591	496	2396				
	10	NR	NR	89	160	118	292	162	461	203	671	253	923	313	1217	418	1551	589	2347				
100	0	NR	NR	112	148	145	275	199	441	244	646	299	894	363	1183	481	1512	668	2299				
	2	NR	NR	NR	NR	176	257	236	420	285	622	345	866	415	1150	544	1473	741	2251				
	5	NR	NR	NR	NR	NR	NR	315	376	373	573	442	809	521	1086	674	1399	892	2159				
	10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR				
100	0	NR	NR	49	214	69	403	100	659	131	991	166	1404	207	1900	273	2479	395	3912				
	2	NR	NR	51	192	70	351	98	563	125	828	158	1152	196	1532	259	1970	371	3021				
	5	NR	NR	67	186	90	342	125	551	156	813	194	1134	240	1511	322	1945	460	2990				
	10	NR	NR	85	175	113	324	153	532	191	789	238	1104	293	1477	389	1905	547	2938				
100	0	NR	NR	132	162	138	310	188	511	230	764	281	1075	342	1443	447	1865	618	2888				
	2	NR	NR	NR	NR	168	295	224	487	270	739	325	1046	391	1410	507	1825	690	2838				
	5	NR	NR	NR	NR	231	264	301	448	355	685	418	988	491	1343	631	1747	834	2739				
	10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR				

## VENT TABLES

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

**TABLE 3**

**Vent Connector Capacity**

Vent Height H (ft) Connector Rise R (ft)		Vent Connector Diameter - D																	
		3"		4"		5"		6"		7"		8"		9"		10"			
		Appliance Input Rating Limits in Thousands of Btu Per Hour																	
		FAN		FAN		FAN		FAN		FAN		FAN		FAN		FAN			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
6	1	22	37	35	66	46	106	58	164	77	225	92	296	109	376	128	466		
	2	23	41	37	75	48	121	60	183	79	253	95	333	112	424	131	526		
	3	24	44	38	81	49	132	62	199	82	275	97	363	114	463	134	575		
8	1	22	40	35	72	49	114	64	176	84	243	100	320	118	408	138	507		
	2	23	44	36	80	51	128	66	195	86	269	103	356	121	454	141	564		
	3	24	47	37	87	53	139	67	210	88	290	105	384	123	492	143	612		
10	1	22	43	34	78	49	123	65	189	89	257	106	341	125	436	146	542		
	2	23	47	36	86	51	136	67	206	91	282	109	374	128	479	149	596		
	3	24	50	37	92	52	146	69	220	94	303	111	402	131	515	152	642		
15	1	21	50	33	89	47	142	64	220	88	298	110	389	134	493	162	609		
	2	22	53	35	96	49	153	66	235	91	320	112	419	137	532	165	658		
	3	24	55	36	102	51	163	68	248	93	339	115	445	140	565	167	700		
20	1	21	54	33	99	46	157	62	246	86	334	107	436	131	552	158	681		
	2	22	57	34	105	48	167	64	259	89	354	110	463	134	587	161	725		
	3	23	60	35	110	50	176	66	271	91	371	113	486	137	618	164	764		
30	1	20	62	31	113	45	181	60	288	83	391	103	512	125	649	151	802		
	2	21	64	33	118	47	190	62	299	85	408	105	535	129	679	155	840		
	3	22	66	34	123	48	198	64	309	88	423	108	555	132	706	158	874		
50	1	19	71	30	133	43	216	57	349	78	477	97	627	120	797	144	984		
	2	21	73	32	137	45	223	59	358	81	490	100	645	123	820	148	1014		
	3	22	75	33	141	46	229	61	366	83	502	103	661	126	842	151	1043		
100	1	18	82	28	158	40	262	53	442	73	611	91	810	112	1038	135	1285		
	2	19	83	30	161	42	267	55	447	75	619	94	822	115	1054	139	1306		
	3	20	84	31	163	44	272	57	452	78	627	97	834	118	1069	142	1327		

**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	FAN	FAN	FAN	FAN	FAN	FAN	FAN	FAN	FAN	FAN	
		+FAN	+NAT	+FAN	+NAT	+FAN	+NAT	+FAN	+NAT	+FAN	+NAT	+FAN	+NAT	+FAN	+NAT
6		92	81	140	116	204	161	309	248	404	314	547	434	672	520
8		101	90	155	129	224	178	339	275	444	348	602	480	740	577
10		110	97	169	141	243	194	367	299	477	377	649	522	800	627
15		125	112	195	164	283	228	427	352	556	444	753	612	924	733
20		136	123	215	183	314	255	475	394	621	499	842	688	1035	826
30		152	138	244	210	361	297	547	459	720	585	979	808	1209	975
50		167	153	279	244	421	353	641	547	854	706	1164	977	1451	1188
100		175	163	311	277	489	421	751	658	1025	873	1408	1215	1784	1502

## VENT TABLES

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

**TABLE 3 (Cont'd)**

**Vent Connector Capacity**

Vent Height H (ft)		Connector Rise R (ft)		Vent Connector Diameter - D													
				12"		14"		16"		18"		20"		22"		24"	
				Appliance Input Rating Limits in Thousands of Btu Per Hour													
		FAN		FAN		FAN		FAN		FAN		FAN		FAN			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
6	2	174	764	223	1046	281	1371	346	1772	NA	NA	NA	NA	NA	NA		
	4	180	897	230	1231	287	1617	352	2069	NA	NA	NA	NA	NA	NA		
	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
8	2	186	822	238	1126	298	1478	365	1920	NA	NA	NA	NA	NA	NA		
	4	192	952	244	1307	305	1719	372	2211	471	2737	560	3319	662	3957		
	6	198	1050	252	1445	313	1902	380	2434	478	3018	568	3665	669	4373		
10	2	196	870	249	1195	311	1570	379	2049	NA	NA	NA	NA	NA	NA		
	4	201	997	256	1371	318	1804	387	2332	486	2887	581	3502	686	4175		
	6	207	1095	263	1509	325	1989	395	2556	494	3169	589	3849	694	4593		
15	2	214	967	272	1334	336	1760	408	2317	NA	NA	NA	NA	NA	NA		
	4	221	1085	279	1499	344	1978	416	2579	523	3197	624	3881	734	4631		
	6	228	1181	286	1632	351	2157	424	2796	533	3470	634	4216	743	5035		
20	2	223	1051	291	1443	357	1911	430	2533	NA	NA	NA	NA	NA	NA		
	4	230	1162	298	1597	365	2116	438	2778	554	3447	661	4190	772	5005		
	6	237	1253	307	1726	373	2287	450	2984	567	3708	671	4511	785	5392		
30	2	216	1217	286	1664	367	2183	461	2891	NA	NA	NA	NA	NA	NA		
	4	223	1316	294	1802	376	2366	474	3110	619	3840	728	4681	847	5606		
	6	231	1400	303	1920	384	2524	485	3299	632	4080	741	4976	860	5961		
50	2	206	1479	273	2023	350	2659	435	3548	NA	NA	NA	NA	NA	NA		
	4	213	1561	281	2139	359	2814	447	3730	580	4601	709	5569	851	6633		
	6	221	1631	290	2242	369	2951	461	3893	594	4808	724	5826	867	6943		
100	2	192	1923	254	2644	326	3490	402	4707	NA	NA	NA	NA	NA	NA		
	4	200	1984	263	2731	336	3606	414	4842	523	5982	639	7254	769	8650		
	6	208	2035	272	2811	346	3714	426	4968	539	6143	654	7453	786	8892		

**Common Vent Capacity**

Vent Height H (ft)		Common Vent Diameter - D													
		12"		14"		16"		18"		20"		22"		24"	
		Combined Appliance Input Rating in Thousands of Btu Per Hour													
		FAN +FAN	FAN +NAT	FAN +FAN	FAN +NAT	FAN +FAN	FAN +NAT	FAN +FAN	FAN +NAT	FAN +FAN	FAN +NAT	FAN +FAN	FAN +NAT	FAN +FAN	FAN +NAT
6		900	696	1284	990	1735	1336	2253	1732	2838	2180	3488	2677	4206	3226
8		994	773	1423	1103	1927	1491	2507	1936	3162	2439	3890	2998	4695	3616
10		1076	841	1542	1200	2093	1625	2727	2113	3444	2665	4241	3278	5123	3957
15		1247	986	1794	1410	2440	1910	3184	2484	4026	3133	4971	3862	6016	4670
20		1405	1116	2006	1588	2722	2147	3561	2798	4548	3552	5573	4352	6749	5261
30		1658	1327	2373	1892	3220	2538	4197	3326	5303	4193	6539	5157	7940	6247
50		2024	1640	2911	2347	3964	3183	5184	4149	6567	5240	8116	6458	9837	7813
100		2569	2131	3732	3076	5125	4202	6749	5509	8597	6986	10681	8648	13004	10499

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## VENT TABLES

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

**TABLE 4**

**Vent Connector Capacity**

Vent Height H (ft)		Connector Rise R (ft)		Vent Connector Diameter - D															
				3"		4"		5"		6"		7"		8"		9"		10"	
				Appliance Input Rating Limits in Thousands of Btu Per Hour															
		FAN		FAN		FAN		FAN		FAN		FAN		FAN		FAN			
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
6	1	NR	NR	NR	NR	NR	NR	NR	NR	207	223	262	293	325	373	447	463		
	2	NR	NR	NR	NR	NR	NR	168	182	215	251	271	331	334	422	458	524		
	3	NR	NR	NR	NR	121	131	174	198	222	273	279	361	344	462	468	574		
15	1	NR	NR	79	87	116	138	177	214	238	291	312	380	397	482	556	596		
	2	NR	NR	83	94	121	150	185	230	246	314	321	411	407	522	568	646		
	3	NR	NR	87	100	127	160	193	243	255	333	331	438	418	557	579	690		
30	1	47	60	77	110	113	175	169	278	226	380	296	497	378	630	528	779		
	2	50	62	81	115	117	185	177	290	236	397	307	521	389	662	541	819		
	3	54	64	85	119	122	193	185	300	244	412	316	542	400	690	555	855		
50	1	46	69	75	128	109	207	162	336	217	460	284	604	364	768	507	951		
	2	49	71	79	132	114	215	170	345	226	473	294	623	376	793	520	983		
	3	53	72	83	136	119	221	178	353	235	486	304	640	387	816	535	1013		

**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	NAT	FAN	FAN	NAT	FAN	FAN	NAT	FAN	FAN	NAT	FAN	FAN	NAT
		+FAN	+NAT	+NAT	+FAN	+NAT	+NAT	+FAN	+NAT	+NAT	+FAN	+NAT	+NAT	+FAN	+NAT	+NAT
6	1	89	78	81	136	113	100	200	158	144	304	244	194	398	310	252
	2	98	87	71	151	126	113	218	173	159	331	269	218	436	342	288
10	1	106	94	78	163	137	120	237	189	175	357	292	238	467	369	309
	2	121	108	79	189	159	140	275	221	200	416	343	276	544	434	377
20	1	131	118	80	208	177	153	305	247	228	463	383	306	606	487	400
	2	145	132	81	236	202	177	350	286	273	533	446	379	703	570	477
50	1	159	145	82	268	233	200	406	337	326	622	529	438	833	686	560
	2															

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## EXAMPLES USING SINGLE APPLIANCE VENTING TABLES

### Example 1: Single Draft-Hood-Equipped Appliance

Suppose that 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. What size vent should be used assuming (a) a 5-Ft lateral single-wall metal vent connector is used with two 90° elbows, (b) a 5-Ft lateral single-wall metal vent connector is used with three 90° elbows in the vent system?

#### Solution

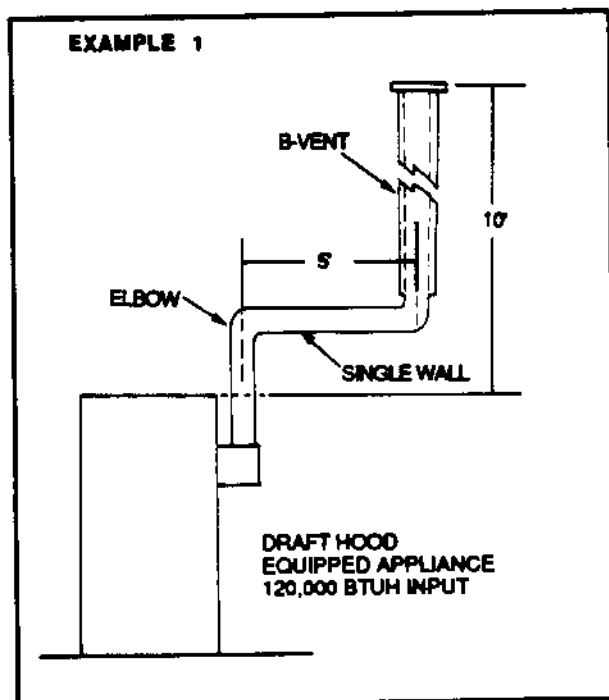
Table 2 should be used to solve this problem because single-wall metal vent connectors are being used with a Type B vent. Refer to Figure 4 of Typical Applications.

- (a) Read down the first column in Table 2 until the row associated with a 10-Ft height and 5-Ft lateral is found. Read across this row until a vent capacity greater than 120,000 Btu/hr is located in the shaded columns labeled "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° elbows are used in the vent system, then the maximum vent capacity listed in the tables must be reduced by 10 percent (see Note 6). 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:

$$122,000 \times .90 = 110,000 \text{ for 5" Vent}$$

From Table 2 - Select 6" Vent

$186,000 \times .90 = 167,000$ ; This is greater than the required 120,000, therefore use a 6" Vent



### Example 2: Single Fan-Assisted Appliance

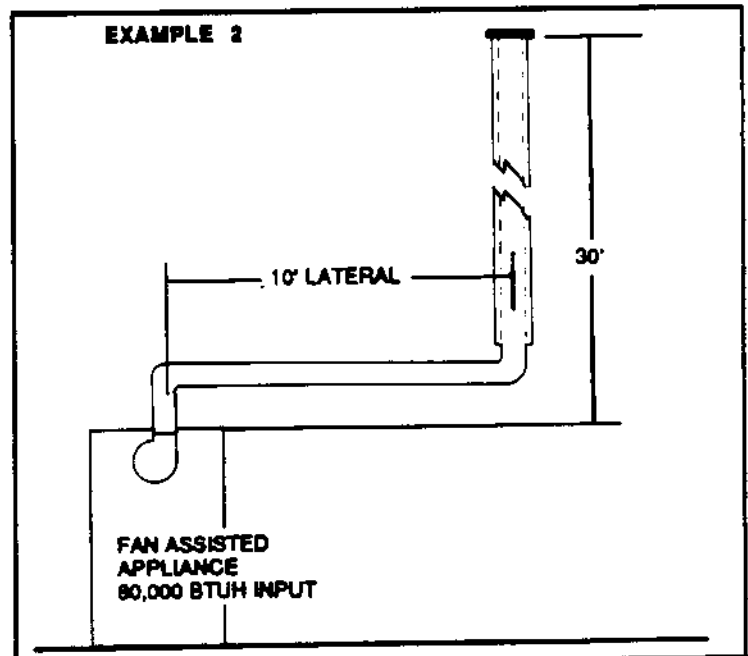
Suppose an installer has an 80,000 Btu/hr input fan-assisted appliance that must be installed using 10 feet of lateral connector attached to a 30-Ft high Type B vent. Two 90° elbows are needed for the installation. Can a single-wall metal vent connector be used for this application?

#### Solution

Table 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-Ft height and a 10-Ft 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") 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 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 1 shows that for a 30-Ft high vent with 10 feet of lateral, the acceptable range of vent capacities for a 4 inch diameter vent attached to a fan-assisted appliance are between 37,000 Btu/hr and 150,000 Btu/hr.



## EXAMPLES USING COMMON VENTING TABLES

### Example 3: Common Venting Two Draft-Hood Appliances

Suppose 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 and 3 feet for the furnace. Assume single-wall metal connectors will be used with Type B vent. What size connectors and combined vent should be used in this installation?

**Solution -** (Table 4 applies in this example)

Table 4 should be used to size single-wall metal vent connectors attached to Type B vertical vent. In the vent connector capacity Table 4, find the row associated with a 30-Ft vent height. For a 2-Ft 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 vent 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-Ft rise, read across the appropriate row to find that a 5 inch diameter vent connector has a maximum capacity of 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.

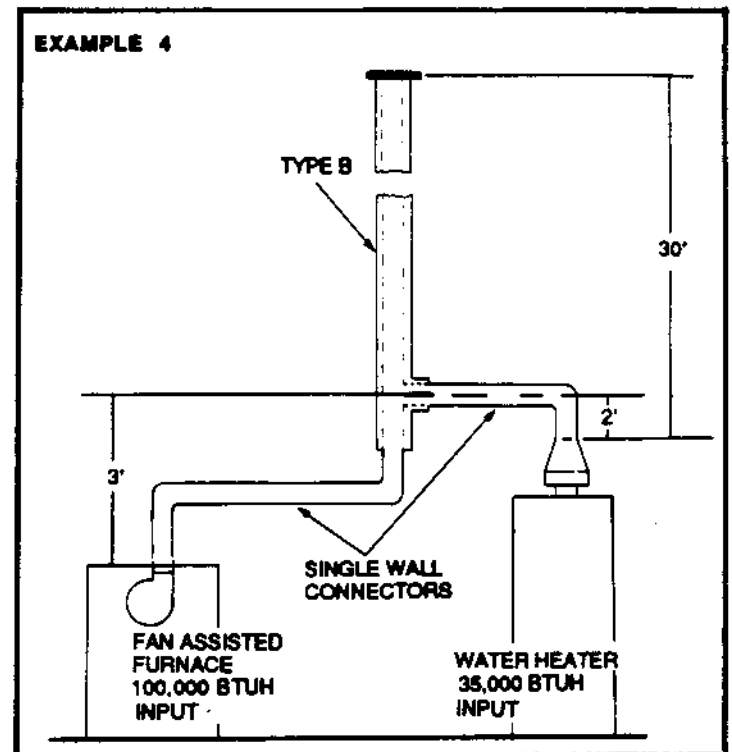
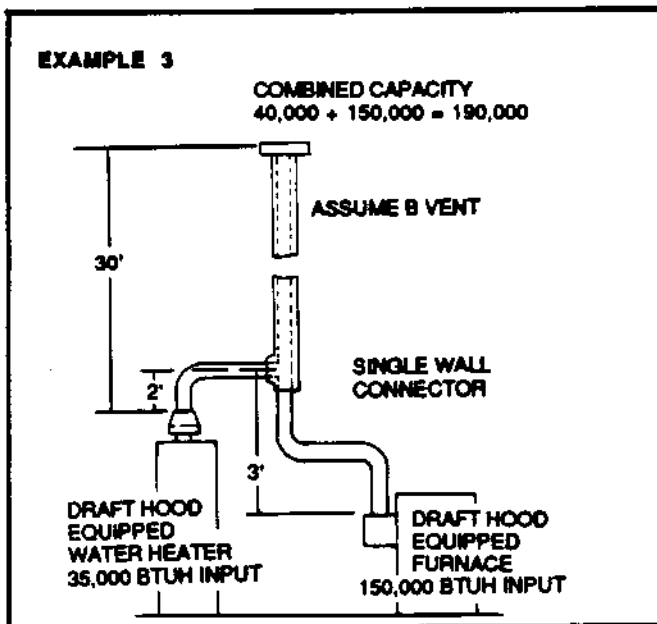
For the capacity of the combined vent, the lower portion of Table 4 should be used. The combined vent capacity required is 185,000 Btu/hr. Table 4 shows that the combined vent capacity of a 6 inch diameter vent with a 30-Ft vent height is 257,000 Btu/hr. This is more than adequate to handle the 35,000 Btu/hr input water heater and the 150,000 Btu/hr input furnace.

### Example 4: Common Venting a Draft Hood Water Heater with a Fan-Assisted Furnace

In this case, a 35,000 Btu/hr input draft-hood-equipped water heater with a 2 foot connector rise is to be common vented with a 100,000 Btu/hr fan-assisted furnace with a 3-Ft connector rise. The common vent consists of a 30-Ft rise of Type B vent. What are the recommended vent diameters for each connector and the common vent?

**Solution -** (Table 4)

**Water Heater Vent Connector Diameter.** Let us assume the installer would like to use a single-wall metal vent connector. Using Table 4, Vent Connector Capacity, read down the Total Vent Height "H" column to 30 feet and read across the 2-Ft 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.** Again, let us assume the installer would like to use a single-wall metal vent connector. Using Table 4, Vent Connector Capacity, read down the Total Vent Height "H" column to 30 feet and across the 3-ft 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. If the furnace would have had an input rating of 80,000 Btu/hr, then a Type B vent connector (see Table 4) would have to be used 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 4, 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.