

Carrying Capacity

The Btu carrying capacities of the selected warm air and return air combinations are shown in Tables 6, 7 and 8:

Table 6—Combination Numbers 1 to 5—Warm Air Carrying Capacities to first story registers with 1 to 5 elbows and with leaders 4 to 24 ft long.

Table 7—Combination Numbers 11 to 16 and 21 to 24—Warm Air Carrying Capacities to second story registers with 1 to 5 elbows with leaders 4 to 24 ft long.

Table 8—Combination Numbers 31 to 38—Return Air Carrying Capacities for types A, B, C, D, E, and F return combinations.

TABLE 4. RETURN AIR DUCTS

COMBINATION NO.	DUCT DIA. IN.	AREA AT SHOE CONNECTION, SQ. IN.	METAL GRILLE SIZES			WHEN JOIST LINING IS USED ^a		WHEN DUCT IS USED	
			Choose One			No. of Joists Lined	Minimum ^a Depth, in.	Choose One	
			A	B	C				
31	10					1	7	14 x 6	12 x 8
32	12					1	9	22 x 6	16 x 8
33	14	170	6 x 30	8 x 24	12 x 14	1	12	28 x 6	22 x 8
34	16	220	8 x 30	10 x 24	14 x 16	2	8	28 x 8	22 x 10
35	18	280	10 x 30	12 x 24		2	10	36 x 8	28 x 10
36	20	340	12 x 30	14 x 24		2	12.5	36 x 10	30 x 12
37	22	420	14 x 30	18 x 24		2	15.0	42 x 10	36 x 12
38	24	500	18 x 30			2	18.0	42 x 12	36 x 14

^aBased on 14 in. space between joists.

^eUse full depth of joist except when joist depth is less than minimum depth required, when pan must be used.

TABLE 5. RESISTANCES OF WARM AIR BOOT COMBINATIONS EXPRESSED IN ELBOW EQUIVALENTS

WARM AIR BOOT	NAME OF COMBINATION	EQUIVALENT NO. OF 90-DEG ELBOWS
A	45-Deg Angle Boot and 45-Deg Elbow	1
B	90-Deg Angle Boot	1
C	Universal Boot and 90-Deg Elbow	1
D	End Boot	2
E	Offset Boot	2 1/2
F	45-Deg Angle	1/2
G	Floor Register—Second Story	3
H	Offset	3
I	Offset	2

Design Procedure

The steps to be taken in designing a gravity warm air duct system are:

1. Calculate the heat loss from each room as explained in Chapters 6, 8 and 14.
2. Prepare a layout showing (a) furnace, (b) chimney connection, (c) warm air registers (whether floor, baseboard or wall), (d) return air grilles.
3. Indicate on each warm air run (using symbols shown in Fig. 4): (a) whether the room to be heated is on the first or second story, (b) the approximate length of leader pipe in the basement, (c) the number of right angle elbows required, including the elbow at the boot connection (see Fig. 2), (d) whether the register is to be located in the floor, in the baseboard, or in the wall.
4. Show the number and proposed locations of return air grilles and the type of return air system (see Fig. 3).

TABLE 6. WARM AIR CARRYING CAPACITY, BTU DELIVERED, FIRST STORY REGISTERS
Length of Leader Pipe—in Feet

COMBINATION NO.	NO. OF ELBOWS	4 Ft	6 Ft	8 Ft	10 Ft	12 Ft	14 Ft	16 Ft	18 Ft	20 Ft	22 Ft	24 Ft
1	1	6,020	5,850	5,680	5,510	5,340	5,170	5,000	4,830	4,660	4,490	4,320
2	2	7,620	7,400	7,180	6,970	6,760	6,540	6,320	6,110	5,890	5,680	5,460
3	3	9,400	9,140	8,870	8,600	8,340	8,070	7,810	7,540	7,270	7,010	6,740
4	4	13,350	12,970	12,590	12,210	11,830	11,450	11,080	10,700	10,320	9,950	9,580
5	5	17,520	17,020	16,530	16,040	15,550	15,060	14,560	14,070	13,580	13,090	12,600
1	1	5,850	5,660	5,490	5,330	5,160	5,000	4,840	4,670	4,510	4,340	4,180
2	2	7,360	7,150	6,940	6,730	6,520	6,320	6,110	5,910	5,700	5,500	5,290
3	3	9,080	8,840	8,580	8,320	8,060	7,800	7,550	7,290	7,040	6,780	6,520
4	4	12,910	12,540	12,170	11,800	11,430	11,060	10,690	10,320	9,950	9,580	9,210
5	5	16,940	16,450	15,960	15,500	15,040	14,580	14,120	13,660	13,200	12,740	12,280
1	1	5,620	5,460	5,310	5,150	4,990	4,830	4,670	4,510	4,350	4,190	4,030
2	2	7,120	6,910	6,710	6,510	6,310	6,110	5,900	5,700	5,500	5,300	5,100
3	3	8,780	8,530	8,280	8,030	7,780	7,530	7,280	7,040	6,800	6,550	6,300
4	4	12,450	12,100	11,750	11,400	11,050	10,700	10,350	10,000	9,650	9,300	8,950
5	5	16,360	15,900	15,440	14,970	14,510	14,050	13,600	13,130	12,680	12,200	11,750
1	1	5,420	5,260	5,110	4,960	4,800	4,650	4,500	4,350	4,190	4,040	3,890
2	2	6,860	6,660	6,460	6,270	6,080	5,890	5,690	5,500	5,300	5,110	4,910
3	3	8,460	8,200	7,980	7,740	7,500	7,260	7,020	6,780	6,550	6,310	6,070
4	4	12,010	11,670	11,330	10,990	10,650	10,310	9,970	9,630	9,290	8,950	8,610
5	5	15,770	15,320	14,880	14,420	13,990	13,540	13,100	12,650	12,200	11,750	11,310
1	1	5,240	5,090	4,940	4,790	4,640	4,500	4,350	4,200	4,050	3,910	3,760
2	2	6,300	6,440	6,250	6,060	5,880	5,690	5,500	5,320	5,130	4,940	4,750
3	3	8,180	7,950	7,720	7,490	7,260	7,030	6,800	6,560	6,330	6,100	5,860
4	4	11,610	11,280	10,950	10,620	10,300	9,970	9,640	9,320	8,990	8,660	8,320
5	5	15,250	14,800	14,380	13,950	13,520	13,090	12,650	12,230	11,800	11,370	10,940

*Additional values for 0 and 7 elbows are given in original Manual.