

TABLE 1. WARM AIR DUCT SYSTEM COMBINATIONS OF PARTS SELECTED AS STANDARD

COMBINATION No.	STACK SIZE IN.	BRANCH PIPE SIZE, IN.		REGISTER SIZE, IN. (SEE FIGS. 1 AND 2)				REQUIRED INCREASE IN WIDTH OF TRUNK DUCT, IN.
		ROUND	REC- TANGULAR	BASE- BOARD, OR LOW SIDEWALL	HIGH SIDEWALL		FLOOR REGIS- TERS ^a	
					For throws less than 13 ft	For throws more than 13 ft		
1	2	3	4	5	6	7	8	9
41	10 x 3¼	6	4 x 8	10 x 6	10 x 6	10 x 4	8 x 10 ^a	1
42	10 x 3¼	6	4 x 8	10 x 6	10 x 6	10 x 4	8 x 10 ^a	2
43	12 x 3¼	7	5 x 8	12 x 6	12 x 6	12 x 4	9 x 12 ^a	3
44	14 x 3¼	8	6 x 8	14 x 6	14 x 6	14 x 4	9 x 12 ^a or longer	4
45	10 x 3¼ (2-Stacks)	9	8 x 8	(2) 10 x 6 or (1) 24 x 6	(2) 10 x 6 or (1) 24 x 6	(2) 10 x 4 or (1) 24 x 4	10 x 12 ^a	6
46	12 x 3¼ (2-Stacks)	10	10 x 8	(2) 12 x 6 or (1) 30 x 6	(2) 12 x 6 or (1) 30 x 6	(2) 12 x 4 or (1) 30 x 4	12 x 14 ^a	7

^aUse these items only when the building construction or capacity requirements necessitate the use of floor registers. The sizes listed for floor registers correspond to the standard sizes for gravity warm-air systems, except for the sizes of the floor box collars. The use of standard blind boxes is suggested.

SIMPLIFIED METHOD OF DESIGNING DOMESTIC FORCED-AIR SYSTEMS

A simplified method for selecting the combinations of branches, boots, stacks, and registers, is given in the Code and Manual (Textbook section No. 7) of the *National Warm Air Heating and Air Conditioning Association*. In this method the sizes of the branch ducts are obtained from two tables giving their Btu capacities. The proper combination of parts for each branch can be determined if the following information is available.

- Location of room, that is, whether on first or second story.
- Actual length of basement duct from bonnet to boot, in feet.
- Btu loss from room to be heated.
- Equivalent lengths in feet of all fittings and of the register. Fig. 3 shows the values of equivalent lengths of fittings commonly used for domestic systems.

This simplified method is applicable to structures having heat losses not in excess of approximately 150,000 Btu per hour. The capacities shown in Tables 3 and 4 are based upon the most reliable data pertaining to friction losses and temperature drops in ducts. They are also based upon a 100 deg temperature rise of the air, and a static pressure available for overcoming friction losses in the external duct system alone of 0.20 in. water gage. The use of this method assumes that the fan in the fan-furnace assembly will be capable not only of overcoming the resistance of the external duct system alone, but also the resistances imposed by the blower inlet, the filter, and the furnace casing.

TABLE 2. RETURN-AIR DUCT SYSTEM COMBINATIONS OF PARTS SELECTED AS STANDARD

COMBINATION No.	RETURN-AIR INTAKE SIZE, IN.		RISER SIZE, IN. WHERE STACK IS. USED IN STUD SPACE	BRANCH PIPE SIZE, IN.		WHEN JOIST LINING IS USED ^a NUMBER OF JOIST SPACES LINED AND MINIMUM DEPTH OF SPACE REQUIRED	REQUIRED INCREASE IN WIDTH OF TRUNK DUCT (FOR 8 IN. DEPTH OF DUCT), IN.
	BASE- BOARD	FLOOR ^a		ROUND	REC- TANGULAR		
1	2	3	4	5	6	7	8
51	10 x 6	6 x 10 or 4 x 14	10 x 3¼ ^c	6	4 x 8	1 space of 3 in. depth	1
52	10 x 6	6 x 10 or 4 x 14	10 x 3¼ ^c	6	4 x 8	1 space of 3 in. depth	2
53	12 x 6	6 x 12 or 6 x 14	12 x 3¼ ^d	7	5 x 8	1 space of 4 in. depth	3
54	14 x 6	6 x 14	14 x 3¼ ^d	8	6 x 8	1 space of 5 in. depth	4
55	24 x 6 -or- 30 x 6	6 x 30	Two stacks each 10 x 3¼ ^c	9	8 x 8	1 space of 6 in. depth or 2 spaces of 3 in. depth	6
56	30 x 6	6 x 30	Two stacks 12 x 3¼ ^d	10	10 x 8	1 space of 7 in. depth or 2 spaces of 4 in. depth	7
57		8 x 30		12	15 x 8	1 space of 9 in. depth or 2 spaces of 5 in. depth	11

^aUse these items only when building construction, or capacities, requires the use of floor intakes. The sizes listed correspond to standard sizes for gravity installations, except floor box collars. The use of standard blind boxes is suggested.

^bBased on 14 in. space between joists. Use full depth of joist, except when joist depth is less than minimum depth required, in which case a drop pan must be used. This may occur when two or more return ducts are connected to the same joist space.

^cIf it is desired to use 14 in. x 3 3/4 in. stud space, it makes no difference whether this space has protruding keys or not.

^dIf it is desired to use 14 in. x 3 3/4 in. stud space, the plaster base must be smooth, without any protruding plaster keys to interfere with the flow of air.

The combination numbers shown in the right hand column of Tables 3 and 4 correspond to those given in Tables 1 and 2.

Tables 3 and 4 are also applicable for the selection of the return air branches. A depth of 8 in. has been adopted as the standard for the trunk ducts. The width of a trunk duct serving two branches is determined by adding to the width of the remote branch the value shown in column 9 of Table 1, or column 8 of Table 2.

For buildings having a heat loss in excess of 150,000 Btu per hour the design procedure may be that given in the Technical Code, Fourth Edition, of the *National Warm Air Heating and Air Conditioning Association*. Air duct sizes and air distribution may also be calculated in accordance with data given in Chapters 40 and 41.

COOLING METHODS

A slight cooling effect may be obtained under certain conditions by the use of the cooler basement air. A more positive cooling effect may be