

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

COMBI- NATION 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.

of any system to avoid turbulence and to minimize resistance. Sharp elbows, angles, and offsets should be avoided. Three types of dampers are commonly used. *Volume dampers* are used to completely cut off or reduce the flow through pipes. *Splitter dampers* are used where a branch is taken off from a main trunk. *Squeeze dampers* are used for adjusting the volume of air flow and resistance through a given duct. It is essential that a damper with positive locking device be provided for each main or duct branch. Labels placed on ducts should indicate the room being served. Damper positions should be marked for summer and winter operation, and to avoid tampering.

Ducts

The ducts may be either round or rectangular in cross section. The radii of elbows should preferably be not less than one and one-half times the pipe diameter for round pipes, or the equivalent round pipe size in the case of rectangular ducts. Warm air ducts passing through cold spaces, or where located in exposed walls, should have 1/2 to 2 in. of insulation.

Special attention should be given to the problem of noise elimination. The metal duct connection to and from the furnace casing and fan housing should be broken by strips of canvas. Motors and mountings must be carefully selected for quiet operation. Electrical conduit and water piping must not be fastened to, nor make contact with fan housing. Installation of a fan directly under a cold air grille is usually not recommended.

STANDARD COMBINATIONS OF PARTS

The combinations of parts selected as standard by the *National Warm Air Heating and Air Conditioning Association* are shown in Tables 1 and 2. A method for selecting these combinations is indicated in the following section *Simplified Method of Designing Domestic Forced-Air Systems*.

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

COMBI- NATION 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, require 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 1/4 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 1/4 in. stud space, the plaster base must be smooth, without any protruding plaster keys to interfere with the flow of air.

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.