Register and Grille Openings

Tests also conducted in Warm Air Research Residence No. 1 have indicated that comparable results are obtainable with either high side wall or baseboard registers, if proper registers and air velocities are selected. Baseboard registers should be of a deflecting-diffuser type which throw the air downward toward the floor and diffuse it at the same time. For baseboard registers, air temperatures under 125 F, and air velocities over 500 fpm, should be avoided as they may cause drafts.

High side wall registers must be of such type that the air is delivered horizontally or in a slightly downward direction, and must be so located as to avoid impingement of air on ceiling or wall. Directional flow diffusing

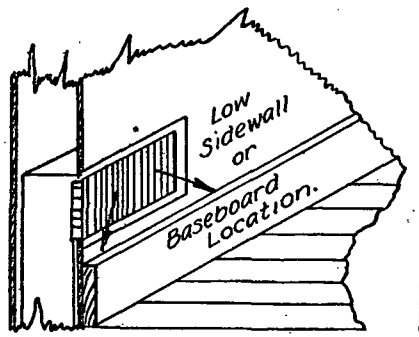

FIG. 1. RECOMMENDED TYPE OF BASE-BOARD AND LOW SIDEWALL REGISTERS[a]

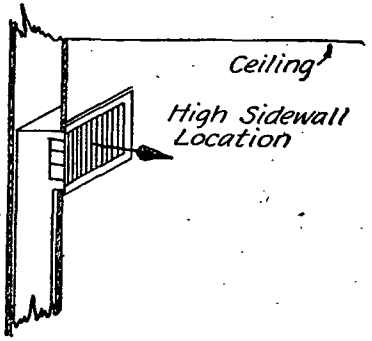

FIG. 2. RECOMMENDED TYPE OF HIGH SIDEWALL REGISTERS[b]

[a] Vertical bars with adjustable deflection, or fixed vertical bars with deflections to right and left not exceeding about 22 deg. For low sidewall location, the deflection for horisontal, multiple valve registers should not exceed 22 deg. For baseboard locations, the deflection for horizontal, multiple valve registers should not exceed about 10 deg.

[b] Horizontal valves, in back or front, to give downward deflections not to exceed from 15 to 22 deg.

type registers should be used to insure best results. Register air velocities should be such that the air velocity will be about 50 fpm three quarters of the distance from the register to the opposite wall.

Velocities through registers may be reduced by the use of registers larger than the connecting ducts. Diffusers should be used to spread the air uniformly over the register face. Basic rules for the location and selection of registers, together with explanations of factors affecting operation, are given[3] in Section B of Manual 7 of the *National Warm Air Heating and Air Conditioning Association*.

Registers should be well proportioned and decorated to harmonize with the trim. Air supply registers should be equipped with dampers, and all registers should be sealed against leakage around edges. The register types shown in Figs. 1 and 2 have been recommended as standard by the *National Warm Air Heating and Air Conditioning Association*.

Return air grilles may be located in hallways, near entrance doors, under windows, in exposed corners, or inside walls, depending on location of supply registers. Baseboard returns are preferable to floor grilles.

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	Rectangular	Base-board High or Low Sidewall	Floor Registers[a]	
1	2	3	4	5	6	7
41	10 x 3¼	6	4 x 8	10 x 6	8 x 10[a]	1
42	10 x 3¼	6	4 x 8	10 x 6	8 x 10[a]	2
43	12 x 3¼	7	5 x 8	12 x 6	9 x 12[a]	3
44	14 x 3¼	8	6 x 8	14 x 6	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	10 x 12[a]	5
46	12 x 3¼ (2-Stacks)	10	10 x 8	(2) 12 x 6 or (1) 30 x 6	12 x 14[a]	7

[a] Use 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 furnace systems, except for the sizes of the floor box collars. The use of standard blind boxes is suggested. A 12 x 5¼ in. stack may be used on Combination 45, and a 14 x 5¼ in. stack on Combination 46 with floor registers.

Dampers

Suitable dampers for air direction or volume control are essential to any duct system. Special care must be used, in the design 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 ducts. *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 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 the fan housing. Installation of a fan directly under a return air grille is usually avoided.