

b. Portable. Sheet metal casings including casing tops shall be made of galvanized sheets, not lighter than 26 U. S. Standard Gauge. They shall fit the castings and casing rings closely, so as to be dust tight, and shall be securely fastened to the front. The casing shall be lined from the upper casing ring down to a line on a level with the grate.

c. When side collars are used the casing top must be of sufficient height so that the largest warm air pipe can be taken from side without ovaling. In no case shall a distance less than eight (8") inches be maintained between the top of any furnace and the top of casing or bonnet.

d. Any furnace, the casing top of which shall come within sixteen (16") inches of a combustible floor, ceiling or joist, shall be protected by a metal shield, extending not less than eighteen (18") inches beyond the casing of said furnace. This shield shall be suspended at least two inches below wood work, allowing free air space between shield and woodwork. No furnace casing or top, coming nearer than six (6") inches of ceiling or joists shall be allowed in any case.

e. Openings for side casing collars shall be cut into the casing top, so that the tops of all openings are on a level. Casing collars shall be fitted into place with a proper flange, or bead on the outside and drawn up on the inside, making a dust-tight joint. All collars shall be of same size as the warm air pipes to which they are to be connected.

f. Brick set, cement or hollow tile casings shall be constructed as follows: Walls shall be not less than eight (8") inches in thickness, and shall be constructed air tight. Rectangular casing shall be, with least inside dimensions, the same as that of the portable casing of a corresponding size of furnace. Walls shall be carried to the same height as the portable walls, allowing not less than eight (8") inches between the top of the furnace and the bottom of the top cover. After placing the collars for the warm air pipes, continue the masonry up even with the top of the collars, lay spacing rods of bar iron on edge or angle irons across the furnace top, cover these with sheet iron, cover the sheet iron with masonry and run the side walls four (4") inches above the masonry bed. A galvanized iron casing bonnet may be used on brick set furnaces.

Provisions shall be made in the walls for a manhole to give ingress to heater.

Warm Air Pipes in Basement

Section 5. a. All warm air pipes shall be made of bright tin not lighter than IC, or galvanized iron. Side seams shall be locked seams. All joints shall be either double seamed or lapped not less than one and one-quarter ($1\frac{1}{4}$ ") inches and such joints shall be beaded and soldered or riveted. All pipes shall be properly secured to ceiling or joist. No solder or riveted joint is required where round pipe slips over the casing collar. Any pipe twelve (12") inches or greater in diameter shall not be made of material lighter than IX tin or No. 26 U. S. Standard Gauge galvanized iron.

Note 12.—It is recommended that all warm air pipes in the basement shall have an upward pitch of not less than one (1") inch per running foot.

b. No warm air pipe shall run within one (1") inch of any woodwork unless such woodwork is covered with asbestos paper and the paper covered with tin or iron.

c. All warm air pipes in the basement shall be provided with dampers not more than two feet from the casing.

d. Where warm air pipes pass through a masonry wall, a metal thimble shall be provided; having a diameter at least 1 in. greater than the pipe, and pipe supported in such a manner that the air space is uniform on all sides.

Wall Stacks

Section 6. a. Single Stacks. All single wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin or galvanized iron and shall be covered with not less than one thickness of 12 lbs. per one hundred (100) sq. ft. of asbestos paper. All studding and other woodwork facing said pipe shall be lined with metal and metal lath used in place of wood lath. An air space of not less than three-eighths ($\frac{3}{8}$ ") of an inch shall be allowed on the two sides nearest the vertical studs. All such pipes shall be braced in a proper manner so as not to obstruct the flow of air but to retain the full capacity throughout. All joints shall be locked and held in place by means of lugs, or straps. No joint shall depend wholly upon solder to make it tight.

b. Double Stacks. All double wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin, not lighter than IC or galvanized iron and shall be made double, from and including the boot or foot piece in basement to the top of each and every stack and register head on all floors. There shall be continuous uniform air space of not less than five-sixteenths ($\frac{5}{16}$ ") of an inch, which must be maintained between the outer and inner walls of all such pipes and fittings of all kinds, styles and descriptions; such pipes, heads, boots and other fittings to be of the styles, or equal to those accepted by the *National Board of Fire Underwriters*.

All pipes and fittings either single or double must be secured firmly in place by lugs or straps attached to the outer walls of stacks and fittings, and no nails shall be driven through these stacks or fittings at any point. No wall pipes or fittings shall be used which depend wholly on soldered joints. The various members shall be so made that all joints are locked and soldered and the several members shall be attached to each other with slip joints, which are, for the purpose intended, air tight.

Registers

Section 7. a. When baseboard or wall registers are used, they shall be properly and permanently attached to the stack head in such a manner that will prevent any leakage of air between the head and the register.

b. Floor registers shall be provided either with register borders, or double register boxes of tin or galvanized iron with an air space of not less than five-sixteenths ($\frac{5}{16}$ ") of an inch between inner and outer boxes.

c. Registers for warm air and warm air pipes shall not be located in outside walls. The warm air registers in the various rooms shall be located in or near the inside walls in all cases.

Air Supply to Furnace

Section 8. a. The air supply to furnace for warm air heating plants may be taken from outside or from within the building or may be taken partially from outside and partially from within. In no case, however, shall air be supplied to any furnace from any basement or furnace room.

b. The cold air intake or return where air is taken from within the building shall have a net area throughout its entire length of not less than the combined net area of all warm air pipes leading from the furnace. This may be maintained in one or more ducts.

c. When the cold air supply is taken wholly from the outside of the building the supply duct at its most contracted area must equal or exceed eighty (80%) per cent of the combined area of all warm air pipes leading from the furnace.

d. Cold air ducts shall be constructed of metal, tile or other incombustible material having smooth inner surface and shall maintain a constant net area throughout their entire length and shall be made air tight. Where a boot or shoe is connected to the casing at the base, the opening shall not extend higher than a line on the level of the grate of the furnace. The width of the shoe shall be of proper measurement to make the area at least equal to that of the round or square pipe to which it is connected.

e. Wherever the space between joists is used to convey cold air overhead, the joists and all wooden surfaces between such joists shall be lined with metal and a sheet metal pan constructed to extend not less than six (6") inches below said joists. The connection from this pan to the boot or shoe shall be made of galvanized iron not lighter than No. 26 U. S. Standard Gauge, and shall have a transition collar, the top area of which shall be at least 10 per cent greater than the area of the connecting pipe.

f. The cold air face or faces shall be made of wood, or metal. When set in floors the top of same shall be flush with floor. Where cold air face is placed in a seat or side wall (whether furnished by owner, general contractor or furnace contractor) the open work of face must extend to within at least one (1") inch of the floor line.

The free area of cold air faces shall be at least 10 per cent in excess of the free area of the duct or ducts to which they are connected.

Note 13.—The effective area of a vertical cold air face lies within twelve (12") inches of the floor line, hence, the capacity of any vertical cold air face shall be determined by multiplying the base line in inches by not to exceed twelve (12") inches in height and deducting for the grills or cross bars.