with asbestos cement or other incombustible material to make the openings gas and dust 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 (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, unless properly insulated with one-inch (1″) air cell covering or its equivalent.

d. Any furnace system having not more than two warm-air openings, at least one of these openings shall have a grille and the pipe thereto shall be without damper.

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 not occupied as living quarters.

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. No reverse incline or air trap will be allowed in any section thereof.

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 per cent (80%) 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 dust-tight. Horizontal rectangular return ducts shall have at least 10 per cent (10%) greater area than vertical connecting pipes. 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 top 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 over head, all bridging and bracing shall be removed and a sheet metal pan shall be constructed to extend not less than two inches (2″) 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 (10%) greater than the area of the connecting pipe.

Note 8.—To reduce friction, and for the sake of cleanliness it is recommended that the joists and all wooden surfaces between such joists shall be lined with metal.

f. When it is necessary to set the furnace over a pit and connect up cold air under the basement floor, such pit or cold-air trench shall not exceed eighteen inches (18″) in depth below the casing base-ring and the width of the trench or trenches shall be of proper measurement to make the area at least equal to the pipe to which it is connected. The connection between the cold-air pipe or duct and the underground pit shall be made with reverse transition joint as described in (*e*) of this section.

g. 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 inch (1″) of the floor line.

The free area of cold air faces shall be at least equal to the free area of the duct or ducts to which they are connected.

h. The effective area of a vertical cold air face lies within fourteen inches (14″) 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 fourteen inches (14″) in height and deducting for the grilles or cross bars.

i. When a fan is installed in the air supply duct of a gravity system the same net area of all ducts shall be maintained as calculated under Article 3, Sections 1, 2 and 3 and Article 4, Section 8–(*b*).

Smoke Pipes

Section 9. (*a*) The smoke pipe shall be as short and direct as consistent with the location of the furnace. It shall be made of metal not lighter than No. 24 U. S. standard gauge, and not less than the full size of the collar on the furnace throughout its entire length. It must have no opening for attaching any fireplace, stove, range, water heater, gas or ventilating connection. It shall be lock-seamed or riveted; all joints shall lap not less than one and one-half inches (1½″) and it shall be rigidly secured. Cast iron smoke pipe may be used.

b. All smoke pipes shall be provided with check dampers, placed on the side of the pipe or at the end of a tee; when cast iron smoke pipe dampers are used they must be placed between the check damper and the furnace and supported on both sides of the pipe.

c. Where the smoke pipe enters the flue, a thimble shall be cemented into the flue and the connections thereto made air-tight, see Article 5, (*c*). Should any smoke pipe come within eighteen inches (18″) of any combustible material, such combustible material must be covered with asbestos paper and a metal shield so fastened that a two-inch (2″) air space exists between this shield and the combustible material. This shield shall be no less in size than twice the diameter of the smoke pipe and of sufficient length to cover the combustible material at all points.

d. No smoke pipe shall project through any external wall or window. No furnace connection is to be made to a flue without a cast iron or steel cleanout having first been provided in the flue (not more than eight inches (8″) below the smoke pipe opening). The base of the flue shall be filled up to the bottom of the cleanout, all of which must be made air-tight.

Pipeless or One-Pipe Furnaces

Section 10. (*a*) When but one duplex grating is used for both warm air and cold air in a so-called pipeless furnace, the area of the cold-air intake shall be at least equal to the area of the warm-air outlet of the grating. Art. 4, Sec. 4, relative to casing shall not govern when this type of furnace is installed, but the following specification shall be followed: The inner and outer casing of this type of furnace may be made of either black or galvanized iron not lighter than No. 26 U. S. standard gauge. A uniform air space shall be maintained at all points between the inner and outer casing. In no case shall the top of the heater be allowed closer than twelve inches (12″) to any ceiling or joists above the furnace.

b. Where joists are cut to accommodate this furnace, headers shall be put in and braced.

c. Art. 3 for determining area of warm-air pipe shall not govern in figuring a pipeless furnace.

d. Where one warm-air register face is used and separate face or faces for cold air supply are used, then Art. 4, Secs. 5, 7 and 8 shall apply.

ARTICLE No. 5.—The following provisions shall be made by the owner or building contractor, in any building wherein a gravity warm-air heating system is to be installed.

Chimney

Provide a chimney for the furnace constructed in a manner to comply with the following specifications:

a. The chimney must be absolutely smoke tight throughout its entire length, and must extend at least three feet (3′) above a flat roof or two feet (2′) above the ridges of peak roofs.

b. If built of a single thickness of brick or of cement blocks, it shall be lined throughout its entire length with fire clay flue lining, having not less than three-quarter inch (¾″) thickness. Flue lining to be laid in mortar and made air-tight.