

than 12 in. The walls shall be properly bonded, or tied with non-corrosive metal anchors. In dwellings and buildings of like heating requirements the thickness of the chimney walls may be reduced to not less than $3\frac{3}{4}$ in. when lined with a flue lining conforming to the Code requirements.

(h) Required flue linings shall be made of fire clay or other refractory clay to withstand the action of flue gases and to resist, without softening or cracking, the temperatures to which they will be subjected, but not less than 2,000 F, or of cast-iron of approved quality, form and construction. Approved corrosion resistant linings may be used in flues for gas appliances.

(i) Required clay flue linings shall be not less than $\frac{5}{8}$ in. thick for the smaller flues and increasing in thickness for the larger flues.

(j) Flue linings shall be built ahead of the construction of the chimney as it is carried up, carefully bedded one on the other in mortar as hereinafter specified with close fitting joints left smooth on the inside.

(k) Flue linings shall start from a point not less than 8 in. below the intake. They

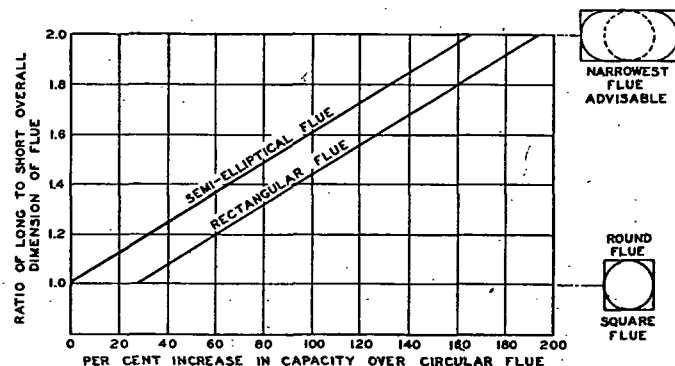


FIG. 7. CAPACITY OF A RECTANGULAR FLUE OR A SEMI-ELLIPTICAL FLUE, WITH SEMI-CIRCULAR ENDS HAVING ITS MINIMUM WIDTH EQUAL TO THE DIAMETER OF A CIRCULAR FLUE, COMPARED WITH THE CAPACITY OF THE CIRCULAR FLUE.

shall extend, as nearly vertically as possible, for the entire height of the chimney. It is recommended that flue linings be extended 4 in. above the top or cap of the chimney.

(l) Only Portland cement mortar, cement lime mortar or fire clay mortar shall be used in setting flue linings.

For gas appliances the Building Code specifies lined chimneys and metal smoke stacks for all appliances which may be converted readily to the use of solid or liquid fuel and also for all boilers and furnaces except those having a flue gas temperature not exceeding 550 F at the outlet of the draft hood when burning gas at the manufacturer's rating and which may therefore be connected to Type B vent piping. Approved Type B vent piping is non-combustible, corrosion resistant piping of adequate strength and heat insulating value, and having bell and spigot or other acceptable joints. Fig. 6 may be used for selection of vent pipe size.

Important points to be considered in the use of Type B vent piping are:

1. Type B flues must be plainly and permanently marked, at the point where the vent connection enters the flue: For use of gas appliances only.
2. Type B vent material should not be used for external chimney flues and external runs of it should not exceed 3 ft outside the building roof. When this requirement makes it necessary to cross over through attic space, the piping should be pitched not less than 45 deg.
3. Because of the small size and low temperature, Type B vents should be provided with a vent cap with wire screening to prevent building of birds' nests.

4. Each appliance should have the equivalent of a 4 in. diameter Type B vent, even though the appliance may have a 3 in. flue collar. A typical minimum vertical flue size for a frame dwelling is 6 in. in diameter or equivalent.

5. When several floor furnaces are to be vented, it is acceptable practice to connect each of these by means of 4 in. vents to a common 6 in. vertical vent. Lateral piping must have adequate pitch, $\frac{1}{4}$ in. per foot, and should not exceed 20 ft in horizontal length.

6. An alternate method of connecting several appliances is to run separate Type B vents to the attic and then to connect them by means of cross-over piping and Y fittings to a common vertical vent passing through the roof. This reduces the number of holes in the roof.

All flue mortar for flues or vent pipes from gas burning appliances shall be acid resisting.

GENERAL CONSIDERATIONS FOR CHIMNEYS

The draft of domestic chimneys may be subject to a variety of influences not usually encountered in power chimneys⁷. Horizontal winds have an aspirating effect as they cross the chimney and are an aid to draft. However, surrounding objects, such as trees or other buildings, may

TABLE 4. EQUIVALENT FLUE PIPE SIZES^a

DIAMETER OF HORIZONTAL RUNS	SIZE OF FLUE						
	3	4	5	6	8	10	12
3	1	2	3	5	9	12	22
4		1	2	3	5	7	11
5			1	2	3	4	7
6				1	2	3	5
8					1	2	3

^aComfort Heating (American Gas Association).

affect the direction of the wind at the chimney top and may even direct it down the chimney, tending to reduce the draft or even to cause it to be negative. Although the chimney should extend well above the highest part of the roof, it is impracticable to carry it much beyond this point.

It is also important to consider the source of the air supply for proper combustion. Usually the boiler or furnace is located in the basement. When the furnace room has windows or doors opening to the outside on two or more sides of the house, the leakage of air will be sufficient for combustion, even though the windows and doors may be shut. If, however, the leakage is not sufficient to prevent an appreciable drop of pressure in the furnace room below that of the air outside, the chimney draft will be reduced by the difference between the atmospheric pressure outside and that inside the boiler room. In case the boiler room is fairly tight and is open to the outside on only one side of the house, then the draft will be affected in windy weather even with windows or doors open. If the wind is blowing toward the boiler room the draft will be increased, but if blowing in the opposite direction the draft may be decreased.

It is not to be assumed that increasing the cross-section area of a chimney will always effect a cure for poor draft. The opposite result may be experienced because of the cooling effect of the larger area. This reduces the theoretical draft and the velocity of the gases, and affords a greater opportunity for counter currents in the chimney. Sometimes the only practical remedy for a chimney with bad draft, when the chimney is of the proper size and is affected by conditions beyond control, is to resort to mechanical draft. This can often be done at small expense and the arrangement can be such that the fan or blower need be operated only when conditions are bad.