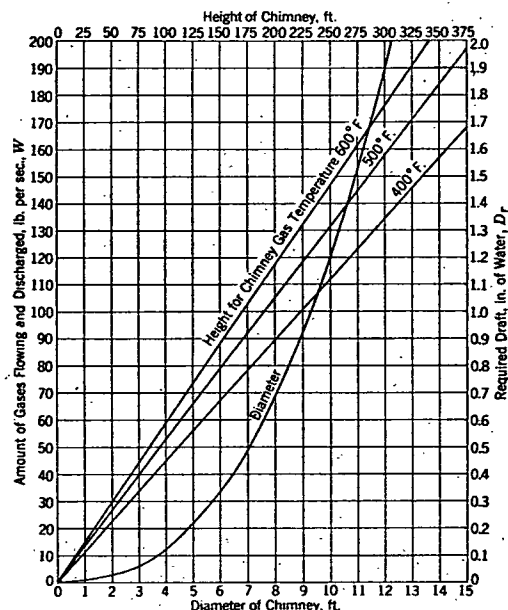


Equations 6, 7 and 8 can of course be simplified if values are assumed for some of the factors in it. Some typical figures for boiler plants are:

Average chimney gas temperature 500 F.....	$T_g = 960$ F absolute
Average atmospheric temperature 62 F.....	$T_a = 522$ F absolute
Average coefficient of friction 0.016.....	$f = 0.016$
Average chimney, gas density, 0 F, 1 Atmosphere.....	$W_g = 0.09$ lb per cubic foot
Barometer reading, sea level.....	$B_o = 29.92$ in. Hg



Diameter values also for gas temperatures of 400, 500 and 600 F.

FIG. 3. ECONOMICAL CHIMNEY SIZES

When these values are substituted in Equations 8, 7 and 6 respectively, the results are:

$$V_a = 13.7W^{1/5} \quad (9)$$

$$D = 1.5W^{2/5} \quad (10)$$

$$H = 190D \quad (11)$$

Fig. 3 gives the economical chimney sizes for various amounts of gases flowing and for required draft intensities computed from Equations 9, 10 and 11. They are based on the operating factors used in reducing Equations 6, 7 and 8 to their simpler form. The sizes shown by the curves in the chart should be used for general operating conditions only, or where the required data necessary for an exact determination are difficult or impossible to secure. Whenever it is possible to secure accurate data, or the anticipated operating conditions are fairly well known, the required size should be determined from Equations 6, 7 and 8.

FACTORS AFFECTING REQUIRED DRAFT

The foregoing considerations deal with chimney size selection when the required draft and flue gas volume and temperature are known. The required draft is, of course, equal to the sum of all the resistances to gas flow from the ash pit door to and including the chimney connection.

Fig. 4 presents information on the fuel-bed draft loss for various kinds of coal burned at different rates and rough generalizations can be given for the losses in the flue passages of boiler or furnace, but, on account of the great differences in such devices, more reliable data on their flue gas volume temperature and flue resistance should be obtained for design purposes from their respective manufacturers.

Flue gases encounter resistance to flow in breechings or smoke pipes and this can probably be treated with sufficient accuracy by means of the

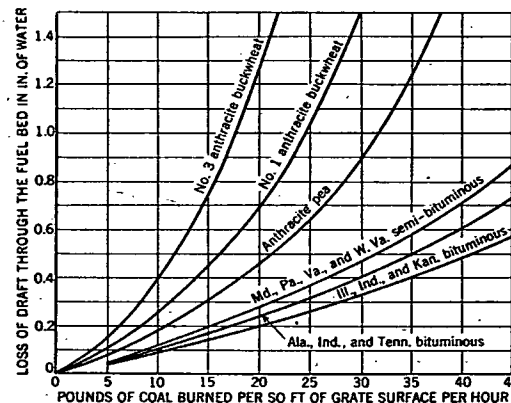


FIG. 4. DRAFT REQUIRED AT DIFFERENT RATES OF COMBUSTION FOR VARIOUS KINDS OF COAL

method used for air ducts. (See Chapter 41.) The friction in straight ducts can be estimated by means of the last terms of Equations 2 and 3.

Also, the temperature of flue gases falls during passage through breechings or flue pipes. For uninsulated surfaces this probably can be adequately estimated by assuming a loss of heat from the flue gas of 3 Btu per hour per square foot for each Fahrenheit degree temperature difference between the gases and surrounding air.

DOMESTIC CHIMNEYS

The height of a chimney for a residence or apartment is generally limited by the height of the building since it is desirable to have the chimney architecturally congruous with the building. The height desirable from an architectural viewpoint and the location of the chimney may be disadvantageous to the operation of the boiler or furnace and it is therefore important that the manufacturer of the fuel burning appliance to be installed be consulted in regard to the adequacy of the chimney. A chimney in order to provide satisfactory performance must have adequate height