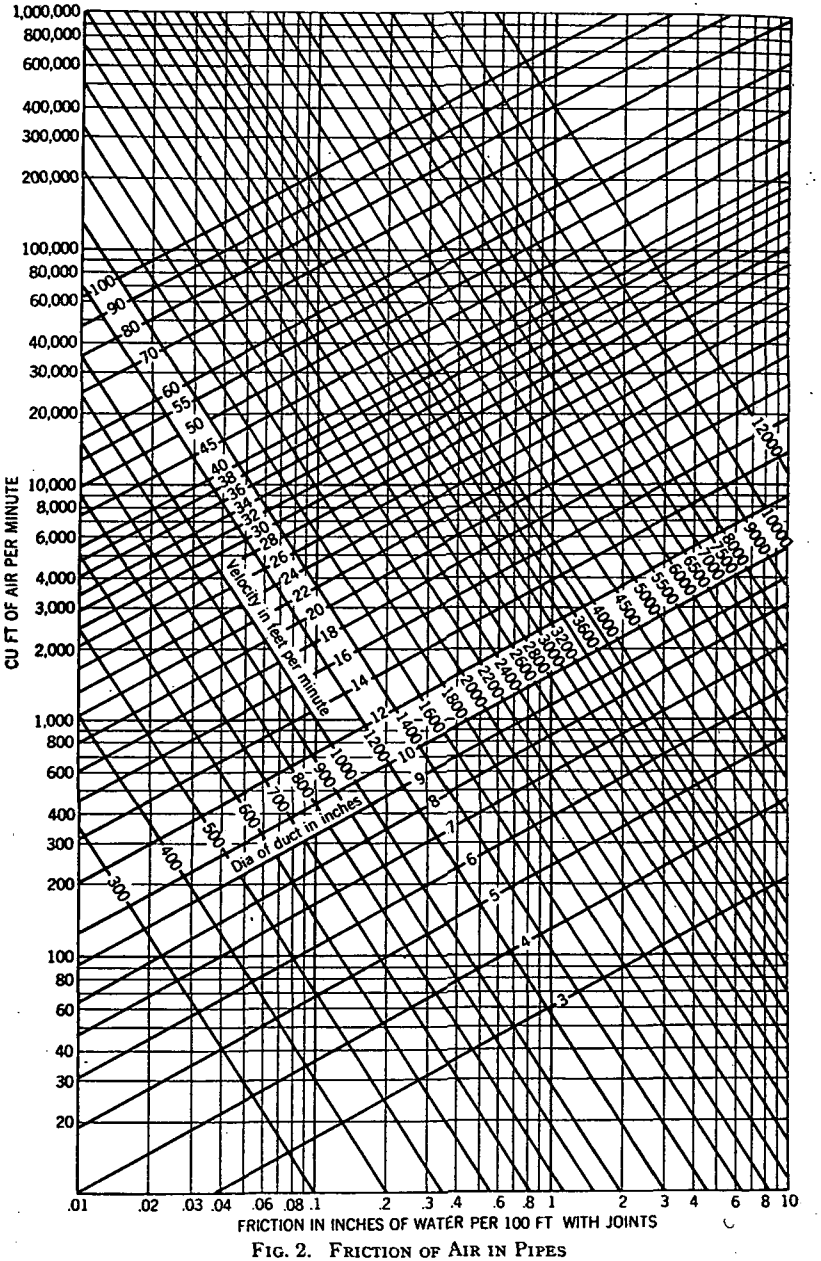


FIG. 2. FRICTION OF AIR IN PIPES

serious error. The correction equation would then be simplified to the following:

$$H_A = H_S \times S \tag{6}$$

Example 1. Assume that it is desired to circulate 10,000 cfm of air through 75 ft of 24 in. diameter pipe. Find 10,000 cfm on the right scale of Fig. 2 and move horizontally left to the diagonal line marked 24 in. The other intersecting diagonal shows that the velocity in the pipe is 3200 fpm. Directly below the intersection it is found that the friction per 100 ft is 0.41 in.; then for 75 ft the friction will be 0.75 × 0.41 = 0.31 in. In a like manner any two variables may be determined by the intersection of the lines representing the other two variables.

Circular Equivalents of Rectangular Ducts

Where rectangular ducts are used it is frequently desirable to know the equivalent diameter of round pipe to carry the same capacity and have

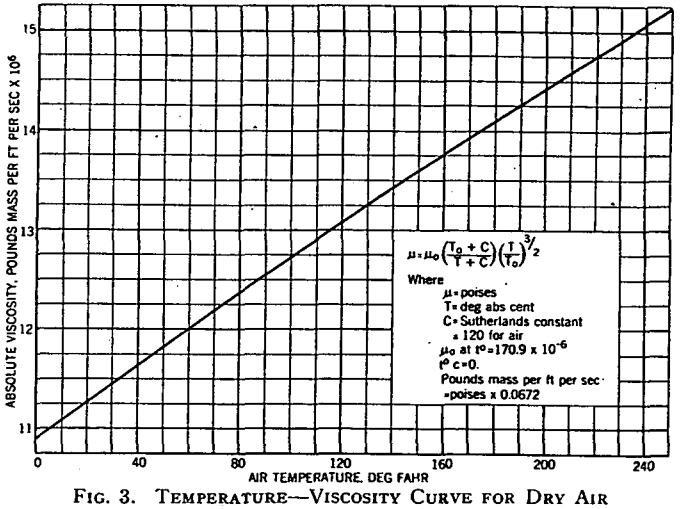


FIG. 3. TEMPERATURE—VISCOSITY CURVE FOR DRY AIR

the same friction per foot of length. Table 1 gives directly the circular equivalents of rectangular ducts for equal friction and capacity, which are based on values determined from Equation 7:

$$d = 1.265 \sqrt[5]{\frac{(a\,b)^3}{a+b}} \tag{7}$$

where

a = one side of rectangular pipe, feet or inches.

b = other side of rectangular pipe, feet or inches.

d = equivalent diameter of round pipe for equal friction per foot of length to carry the same capacity, feet or inches.

Rectangular equivalents of round ducts are also given in the curves of Fig. 4 which are plotted from data based on Formula 7. To use the chart, locate the curve giving the diameter of the round duct. The width and height of an equivalent rectangular duct may then be read as abscissa and ordinate of any point of the curve.