EFFECT OF AIR VELOCITY ON SURFACE LOSSES

The rate of heat loss from a surface maintained at constant temperature is greatly increased by air circulation over the surface. Fig. 8 is based on Langmuir's equations (*Trans. Am. Electro-Chem. Soc.*, Vol. 23). Other investigators have shown even greater increases in rates of heat loss from bare surfaces due to air velocity.

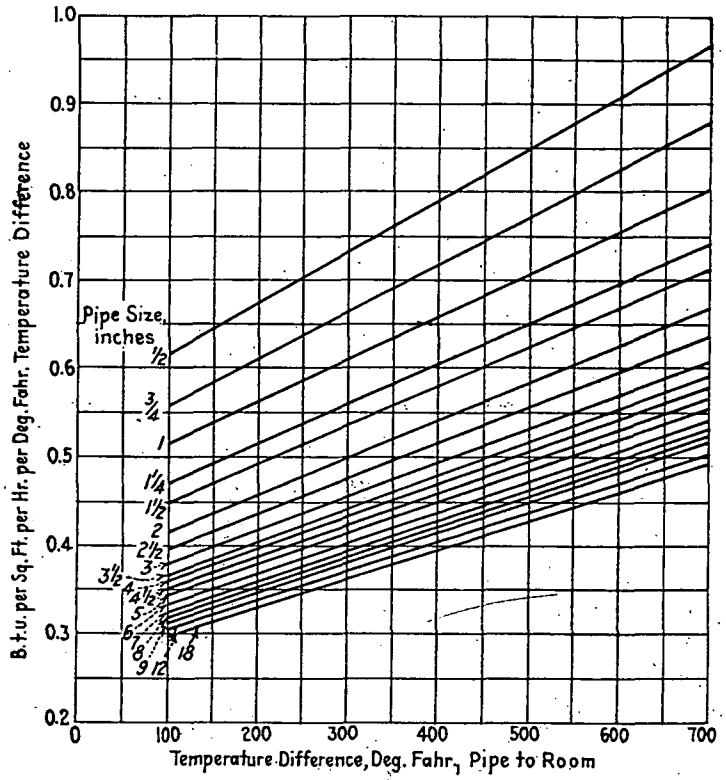

FIG. 5. HEAT LOSS THROUGH 1 IN. THICK COVERING

In the case of well-insulated surfaces the increases in losses due to air velocity are very small as compared with increases shown above for bare surfaces, because of the fact that air flowing over the surface of the insulation can increase only the rate of heat transfer from surface to air, and cannot change the internal resistance to heat flow inherent in the insulation itself. The maximum increase in loss due to air velocity ranges from about 30 per cent in the case of 1 in. thick insulation, to about 10 per cent in the case of 3 in. thick insulation, provided that the insulation is thoroughly sealed so that air can flow only over the surface.

If the conditions are such that the air may circulate through cracks and crevices in the insulation, the increases may be far greater than those given above. Therefore, it is essential that insulation be sealed as tightly as possible. Pipe insulation out-of-doors should be provided with a weather-proof jacket, and other outdoor insulation should be thoroughly weather-proofed.

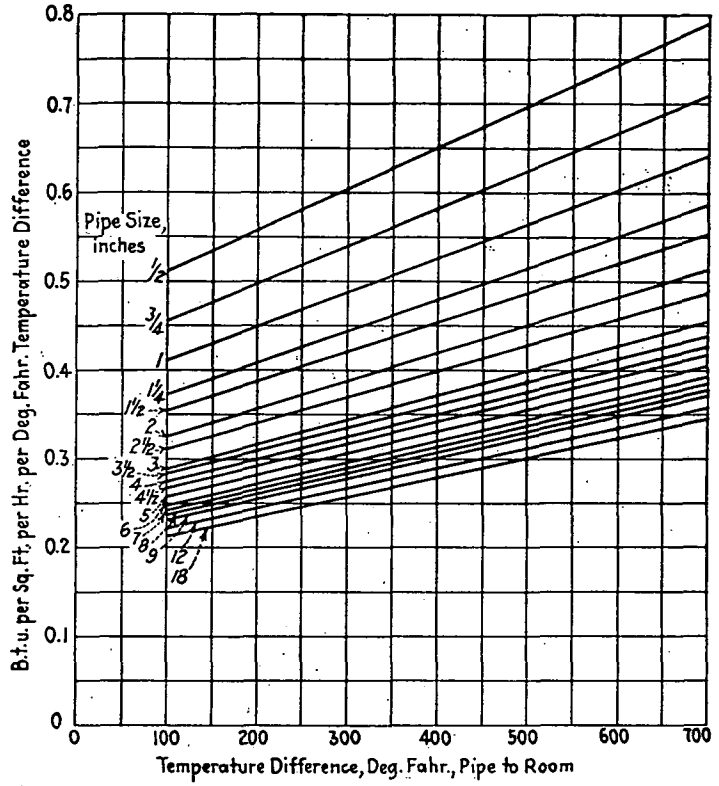

FIG. 6. HEAT LOSS THROUGH 1½ IN. THICK COVERING

ECONOMIC THICKNESS OF INSULATION

Table 6 shows the thickness of insulation which are ordinarily used for various temperature conditions. Where a thorough analysis of economic thickness is desired, this may be accomplished through the use of the chart, Fig. 9.

The dotted line on the chart illustrates its use in solving a typical example. In order to use the chart, start at the lower left hand corner and proceed to the right to a point representing the given number of hours of operation per year; then proceed vertically to the line representing the given value of heat; thence horizontally, to the right, to the line repre-