

sending the given temperature difference: thence vertically to the line representing the conductivity of the given material; thence horizontally,

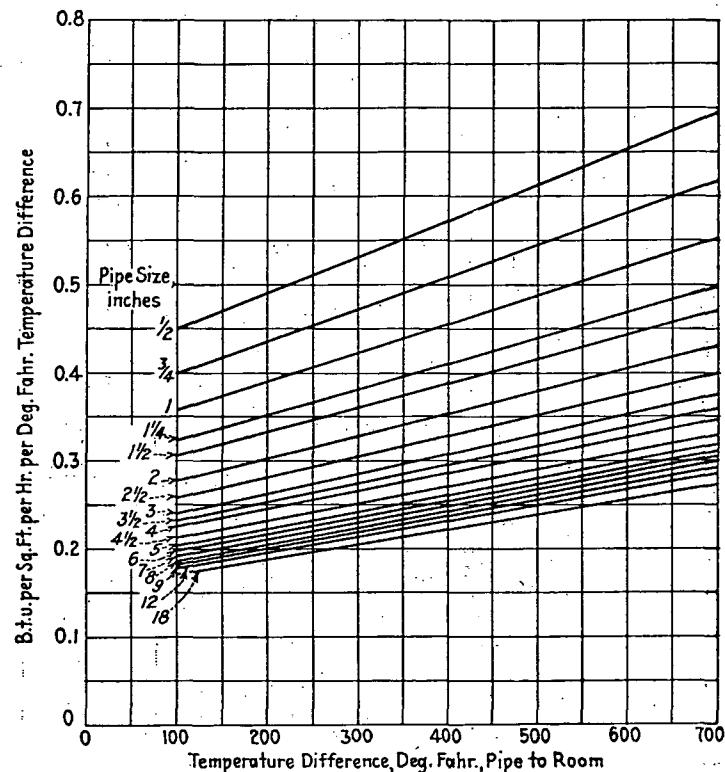


FIG. 7. HEAT LOSS THROUGH 2 IN. THICK COVERING

to the left, to the line representing the given discount on that material; thence vertically to the curve representing the required per cent return on the investment; thence horizontally, to the left, to the curve representing the given pipe size; thence vertically to the scale at the top of the sheet where the economical thickness may be read off directly. The dotted line on the chart illustrates its use in solving a typical example.

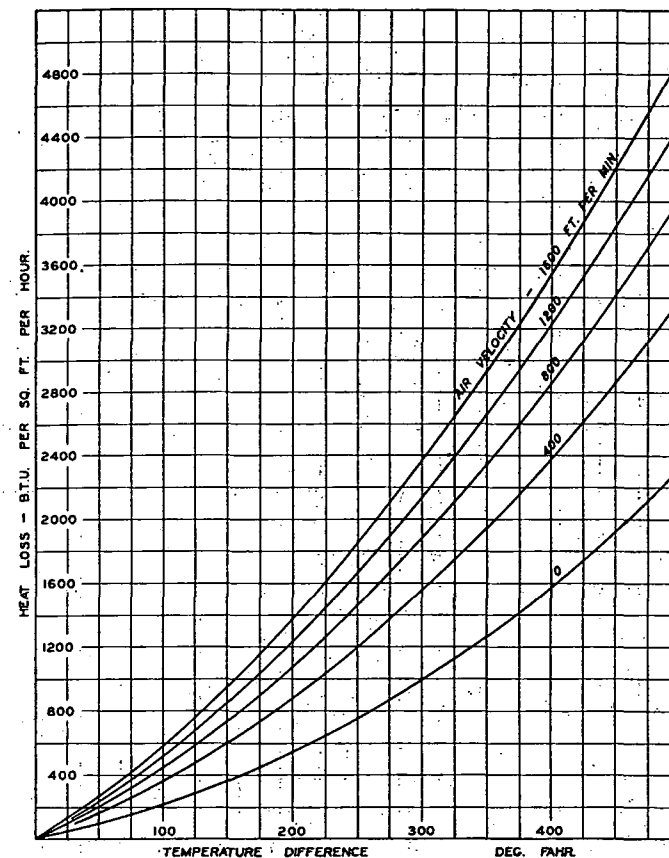
It is impossible to determine accurately the economic thickness of insulation to use for an underground installation owing to the many variables which are present such as depth of line, conductivity of ground, moisture conditions, etc. However, it is considered good practice to insulate underground lines with approximately $\frac{1}{2}$ in. less thickness of insulation than for above ground installations under similar operating conditions.

It is necessary to keep the insulation absolutely dry if the efficiency is to be maintained, therefore, precautions should be taken to thoroughly

weather-proof the insulation and to provide a drainage system for the water which may get into the conduit.

HEAT LOSSES FROM BARE FITTINGS

Very often, even where pipes are thoroughly insulated, flanges and fittings are left bare due to the belief that the losses from these parts are



(L. B. McMillan, *Iron and Steel Engineer*, July 1925.)

FIG. 8. HEAT LOSSES FROM SURFACES EXPOSED TO VARIOUS AIR VELOCITIES

not large. However, the fact that a pair of 10-in. standard flanges having an area of 3.43 sq. ft. would lose, at 100 lb. steam pressure, an amount of heat equivalent to more than a ton of coal per year shows the necessity for insulating such surfaces. Table 3 shows the areas of both standard and extra heavy flanged fittings including the accompanying flanges bolted to the fittings.