

The rate structures of many gas companies are so devised that additional uses of gas, such as hot-water supply, restaurant use and incineration are charged for at preferential rates if the main load is for building heating.

CHAPTER XV

HEAT INSULATION FOR PIPES AND SURFACES

Uninsulated Surfaces, Cold Surfaces, Hot Water and Steam Lines, Effective Air Velocity, Economic Thickness.

IN order to be able to estimate the savings that can be effected by insulating a hot-water or steam line with a specified covering, it is first necessary to know accurately the heat loss from the bare line.

HEAT LOSS FROM UNINSULATED SURFACES

Fig. 1 shows the loss in B.t.u. per square foot of bare pipe surface per hour per degree Fahrenheit temperature difference for various diameter pipes.

Table 1 gives the B.t.u. loss as well as the loss in dollars and cents and in pounds of coal per 100 lineal feet of bare pipe for temperatures up to 350 deg. fahr. Pounds of coal used are given per 100 lineal feet of pipe per month (assuming continuous use of the apparatus, 70 per cent boiler efficiency, and 13,000 B.t.u. per pound of coal). The *dollars* column represents the money value of the coal used per 100 lineal feet per month (assuming coal at \$4.00 per ton and boiler room expense at \$1.00 per ton).

The heat loss from bare pipes of various diameters up to 18 in. and at various temperatures can be calculated from the empirical equation

$$Q = 3320 \frac{77 + Td - 103 D^{0.11}}{103 D^{0.11} - Td + 1020}$$

where

Q = B.t.u. loss per hour per square foot of bare pipe surface.

D = outer diameter of pipe, in inches.

Td = temperature difference between pipe surface and air, deg. fahr.

The loss of heat per unit area from flat surfaces varies greatly with the size and position of the body. The loss from the surface in a horizontal position is entirely different for the same surface in a vertical position. Also, the loss is different for the same flat surface facing downward or upward. For these reasons a single equation or curve has not yet been obtained that will give accurately the heat loss from flat surfaces in various positions. However, until more experimental work has been conducted, it is suggested that the heat loss from flat bare iron surfaces

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