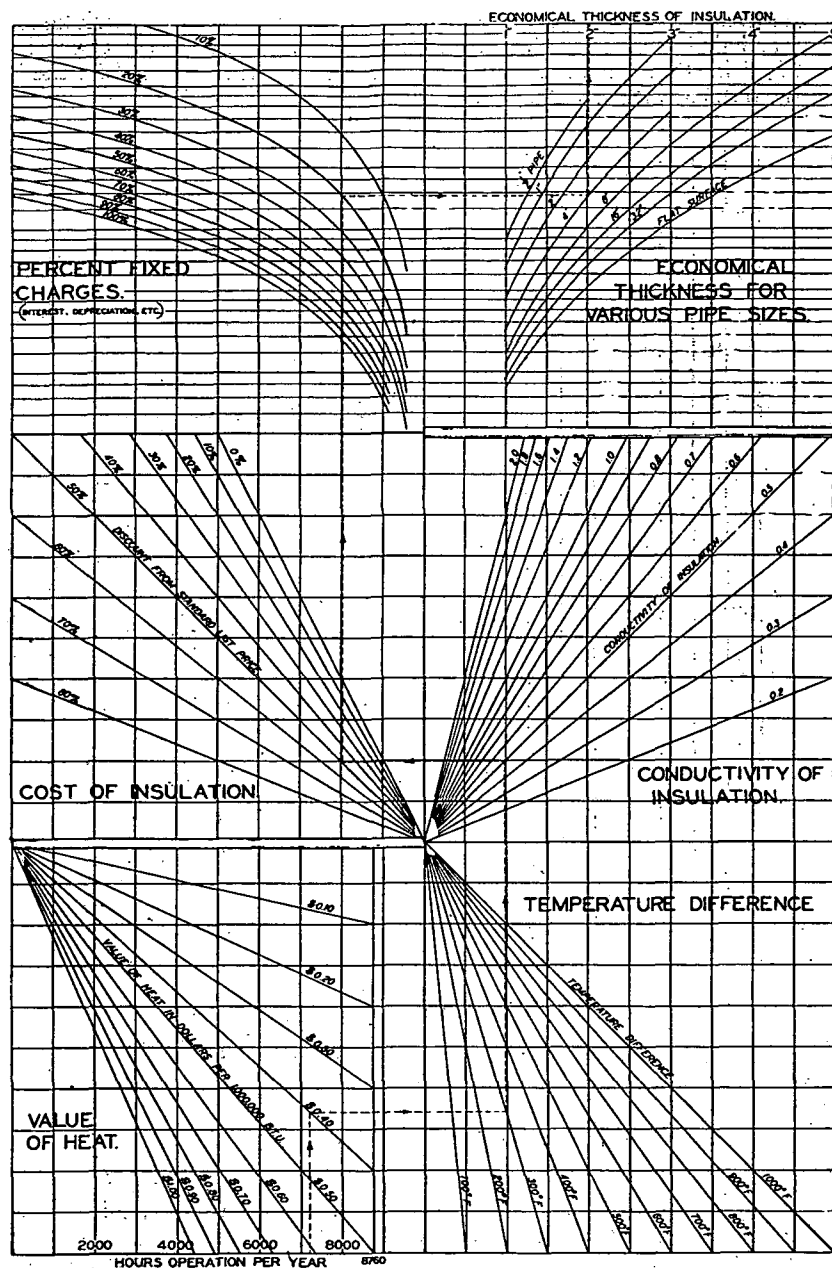




(L. B. McMillan, Proc. National Dist. Heating Ass'n., Vol. 18, p. 131.)

FIG. 4. CHART FOR DETERMINING ECONOMICAL THICKNESS OF INSULATION

In the case of well-insulated surfaces the increases in losses due to air velocity are very small as compared with increases shown 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. Therefore, it is essential that insulation be sealed as tightly

TABLE 11. THICKNESSES OF INSULATION ORDINARILY USED INDOORS^a

STEAM PRESSURES (LB GAGE) OR CONDITION	STEAM TEMPERATURES DEGREES FAHRENHEIT	THICKNESS OF INSULATION		
		Pipes Larger Than 4 in.	Pipes 2 in. to 4 in.	Pipes 1½ in. to 1¼ in.
0 to 25	212 to 267	1 in.	1 in.	1 in.
25 to 100	267 to 338	1½ in.	1 in.	1 in.
100 to 200	338 to 388	2 in.	1½ in.	1 in.
Low Superheat	388 to 500	2½ in.	2 in.	1½ in.
Medium Superheat	500 to 600	3 in.	2½ in.	2 in.
High Superheat	600 to 700	3½ in.	3 in.	2 in.

^aAll piping located outdoors or exposed to weather is ordinarily insulated to a thickness ½ in. greater than shown in this table, and covered with a waterproof jacket.

as possible. Pipe insulation out-of-doors should be provided with a weather-proof jacket, and other outdoor insulation should be thoroughly weather-proofed.

ECONOMIC THICKNESS OF PIPE INSULATION

Table 11 shows the thicknesses of insulation which ordinarily are 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. 4.

The dotted line on the chart illustrates its use in solving a typical example. In using the chart, start with the scale at the left bottom margin 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 representing the given temperature difference; thence vertically to the line representing the conductivity of the given material; thence horizontally, 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 right, to the curve representing the given pipe size; thence vertically to the scale at the top right margin where the economical thickness may be read off directly. The dotted line on the chart illustrates its use in solving a typical example.