CONDUCTIVITIES OF INSULATING MATERIALS

The conductivities, in B.t.u. per square foot per hour per inch thick per degree fahr. temperature difference, of various insulating materials are given in Table 87. It should be emphasized that in this table all variables due to differences in thickness, different pipe sizes, and different air conditions, are eliminated.

TABLE 86. RADIATING SURFACE PER LINEAR FOOT OF PIPE

Pipe Size In.	Surface Sq. Ft.	Pipe Size In.	Surface Sq. Ft.	Pipe Size In.	Surface Sq. Ft.
½	0.22	2	0.622	5	1.456
¾	0.275	2½	0.753	6	1.734
1	0.344	3	0.917	8	2.257
1¼	0.435	3½	1.047	10	2.817
1½	0.498	4	1.178	12	3.338

TABLE 87. CONDUCTIVITIES OF VARIOUS INSULATING MATERIALS

	Conductivity	Temp. Diff. at which Conductivity was Determined Deg. Fahr.	Authority	Year
Asbestos-Sponge Felted	0.468	300	*Trans. A. S. M. E.*, Vol. 37, p. 968	1915
Wool Felt	0.521	300	"	1915
85% Magnesia	0.54	300	*Trans. A. S. M. E.*, Vol. 40, p. 667	1918
Carocel	0.54	300	*Trans. A. S. M. E.*, Vol. 37, p. 968	1915
Nonpareil H. P.	0.543	300	"	1915
Plastic, 85% Magnesia	0.587	300	"	1915
Asbestocel	0.596	300	"	1915
Expanded Asbestos	0.598	300	"	1915
Indented	0.686	300	"	1915
Molded Asbestos	0.778	300	"	1915
Air Cell	0.802	300	"	1915
Vitribestos	1.087	300	"	1915
Asbestos Fire Belt	1.093	300	"	1915
Corkboard	0.304	36	TRANS. A. S. H. & V. E., Vol. 26, p. 406	1920
Hair Felt	0.246	36	"	1920

TABLE 88. PROPER THICKNESS OF INSULATIONS FOR MAXIMUM NET SAVING

Steam Pressures (Lb. Gage)	Steam Temperatures (Deg. Fahr.)	Thickness of Insulation		
		Pipe larger than 4 in.	Pipes 2 in. to 4 in.	Pipes ¼ in. to 1½ 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.
Higher Pressure or Superheat	388 to 500	2½ in.	2 in.	1½ in.
Higher Pressure or Superheat	500 to 600	3 in.	2½ in.	2 in.

ECONOMICAL THICKNESS OF INSULATION

Table 88 (TRANS. A. S. H. & V. E., Vol. 26, p. 377) shows the thicknesses of insulation which will give most economical results under average conditions.

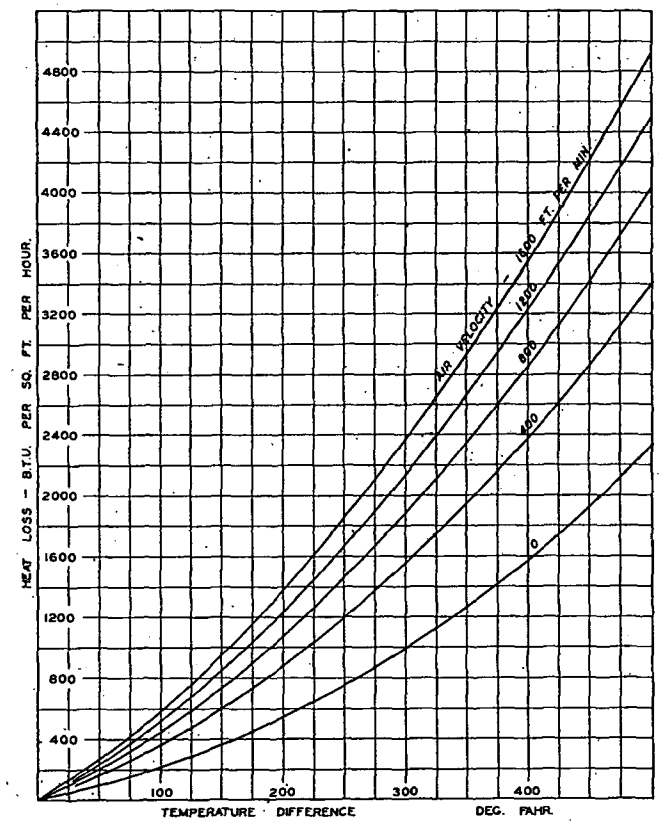


FIG. 70. HEAT LOSSES FROM SURFACES EXPOSED TO VARIOUS AIR VELOCITIES

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. 70 (*Iron & Steel Engineer*, July, 1925), 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.