heat loss per square foot of insulated pipe is somewhat dependent upon the pipe size it cannot be said that the data given by this figure is exact for all pipe sizes, but it is known that it is sufficiently so for all practical purposes in the heating and ventilating field. These curves are exact for 3-in. pipe. Similar curves for flat surfaces and surfaces of large radius, such as boilers, tanks, heaters, and ducts, are given in Fig. 54. When coverings are used other than those for which curves are given reference should be made to Table 84 which gives the conductivities of the various materials. That curve should then be used which represents the covering the conductivity of which is the nearest to the conductivity of the covering to be used. If greater accuracy is desired, interpolation may be resorted to.

Example.—What is the heat loss through a pipe covering of conductivity 0.9 at 200 deg. temperature difference? The conductivity of air cell is 0.802, and that of vitrified air cell is 1.087. The heat loss through air cell is 132 B.t.u., that through vitrified air cell is 165 B.t.u., so the heat loss through the covering under consideration is given by

$$\frac{X-132}{165-132}=\frac{0.9-0.802}{1.087-0.802}$$

or $X = 143$ B.t.u. per sq. ft. of pipe per hr.

While 1-in. thick covering is economically sufficient for most purposes in connection with heating and ventilating piping, greater thicknesses should be used on all boilers, piping, tanks, etc., where high pressure steam is used. Table 85 shows the thickness of covering required for maximum net saving with coal at $4 per ton.

TABLE 85. THICKNESS OF COVERING FOR MAXIMUM NET SAVING WITH COAL AT $4 PER TON

PIPE SIZE IN.	HOT WATER IN.	5 LB. IN.	100–200 LB. IN.	200 LB. AND 150 DEG. FAHR. SUPERHEAT IN.
¾	1	1	1½	2
1½	1	1	1½	2
3	1	1	2	2
6	1	1½	2	3
12	1	1½	2½	3½
Flat	1½	2	3	4

When coverings thicker than 1 in. are used the losses vary considerably for the different thicknesses and reference must be made to the handbooks of the various manufacturers as lengthy tables are required for each thickness and kind of covering.

RADIATING SURFACE OF PIPES

In order to use the curves in Fig. 53 it is necessary to know the number of square feet of radiating surface in 1 linear ft. of pipe. Table 86 gives this data for the various standard pipe sizes.

TABLE 86. RADIATING SURFACE IN 1 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	1.455
¾	0.274	2½	0.751	6	1.733
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

THICKNESS OF MAGNESIA COVERINGS

Magnesia coverings are not made exactly 1 in. thick, but their thickness varies with the size pipe for which they are intended. This is done for the reason that it has been demonstrated that the larger the pipe the more economical it is in the long run to use a thicker covering. The thickness for different pipe sizes are given in Table 87.

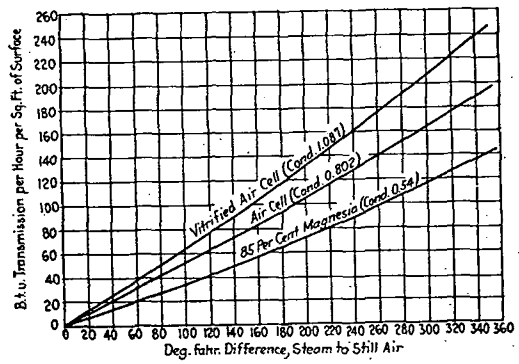

FIG. 54. HEAT TRANSMISSION IN B.T.U. PER HOUR PER SQUARE FOOT OF FLAT INSULATED SURFACE. (1 IN. COVERING)

Coverings made in thicknesses as shown in Table 87 are known as *Standard Thick* coverings. Since these thicknesses do not vary greatly from 1 in., the curves of heat loss for 1-in. thick coverings in Fig. 53 can be used in the case of standard thick coverings without error or practical

TABLE 87. THICKNESS OF MAGNESIA COVERINGS FOR VARIOUS PIPE SIZES

PIPE SIZE IN.	THICKNESS IN.
½ to 1½ incl.	⅞
2 to 3½ "	1 1/32
4 to 6 "	1⅛
7 to 10 "	1¼
12 "	1½