



## Thermal Conductivity, k to Thermal Resistance, R for Pipe Insulation

$$\text{Thermal Conductivity, } k = 0.25 \left( \frac{\text{BTU} \cdot \text{in}}{\text{hr} \cdot \text{ft}^2 \cdot {}^\circ\text{F}} \right)$$

$$R = \frac{r_2 \ln \left( \frac{r_2}{r_1} \right)}{k}$$

$r_1$  = Uninsulated pipe radius in inches

$r_2$  = Insulated pipe radius in inches

Pipe OD	Thermal Resistance, R					
	Insulation Thickness					
	0.5	1	1.5	2	2.5	3
1/2	3.296	8.047	13.621	19.775	26.377	33.344
1	2.773	6.592	11.090	16.094	21.501	27.243
1 1/2	2.554	5.931	9.888	14.292	19.062	24.142
2	2.433	5.545	9.163	13.183	17.539	22.181
2 1/2	2.355	5.290	8.673	12.422	16.479	20.804
3	2.301	5.108	8.318	11.862	15.693	19.775
3 1/2	2.262	4.972	8.048	11.432	15.084	18.972
4	2.231	4.866	7.835	11.090	14.597	18.326
4 1/2	2.207	4.780	7.662	10.812	14.197	17.793
5	2.188	4.711	7.520	10.580	13.863	17.346
5 1/2	2.172	4.652	7.400	10.384	13.579	16.965
6	2.158	4.603	7.298	10.217	13.335	16.636
6 1/2	2.147	4.560	7.210	10.071	13.123	16.348
7	2.137	4.524	7.133	9.944	12.936	16.095
7 1/2	2.128	4.491	7.066	9.831	12.771	15.870
8	2.120	4.463	7.006	9.731	12.623	15.669
8 1/2	2.113	4.437	6.952	9.642	12.491	15.488
9	2.107	4.415	6.904	9.561	12.371	15.325
9 1/2	2.102	4.394	6.861	9.488	12.263	15.176
10	2.097	4.376	6.821	9.421	12.164	15.040
10 1/2	2.092	4.359	6.785	9.360	12.073	14.916
11	2.088	4.343	6.753	9.305	11.990	14.801
11 1/2	2.085	4.329	6.722	9.253	11.913	14.695
12	2.081	4.316	6.694	9.206	11.842	14.597
Flat Sheet	2.000	4.000	6.000	8.000	10.000	12.000

Do not use this formula to compare "R" values that have been calculated for flat sheets with "R" values calculated for radial surfaces. These are not the same. The "R" values for sheet insulations are a measure of the material's ability to retard heat flow perpendicular with the surface. To calculate this, simply divide the thickness of the material by the thermal conductivity. This is not the case when determining the "R" value for a pipe. The heat flow is not just straight-through; it is a radial heat flow.