

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

$$\text{Thermal Conductivity, } k = 0.26 \left( \frac{\text{BTU} \cdot \text{in}}{\text{hr} \cdot \text{ft}^2 \cdot ^\circ\text{F}} \right)$$

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

Pipe OD	Thermal Resistance, R					
	Insulation Thickness					
	0.5	1	1.5	2	2.5	3
1/2	3.169	7.738	13.097	19.014	25.362	32.062
1	2.666	6.338	10.664	15.475	20.674	26.195
1 1/2	2.456	5.703	9.507	13.742	18.329	23.213
2	2.339	5.332	8.810	12.676	16.864	21.328
2 1/2	2.265	5.087	8.339	11.944	15.845	20.004
3	2.213	4.912	7.998	11.406	15.090	19.014
3 1/2	2.175	4.781	7.738	10.992	14.504	18.242
4	2.146	4.678	7.533	10.664	14.035	17.621
4 1/2	2.122	4.597	7.368	10.396	13.651	17.109
5	2.104	4.529	7.231	10.173	13.330	16.679
5 1/2	2.088	4.473	7.116	9.985	13.057	16.312
6	2.075	4.426	7.018	9.824	12.822	15.996
6 1/2	2.064	4.385	6.933	9.684	12.618	15.719
7	2.054	4.350	6.859	9.561	12.438	15.476
7 1/2	2.046	4.319	6.794	9.453	12.279	15.260
8	2.039	4.291	6.737	9.357	12.138	15.067
8 1/2	2.032	4.267	6.685	9.271	12.010	14.893
9	2.026	4.245	6.639	9.193	11.895	14.735
9 1/2	2.021	4.225	6.597	9.123	11.791	14.592
10	2.016	4.207	6.559	9.059	11.696	14.462
10 1/2	2.012	4.191	6.525	9.000	11.609	14.342
11	2.008	4.176	6.493	8.947	11.529	14.232
11 1/2	2.004	4.163	6.464	8.897	11.455	14.130
12	2.001	4.150	6.437	8.852	11.387	14.035

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.