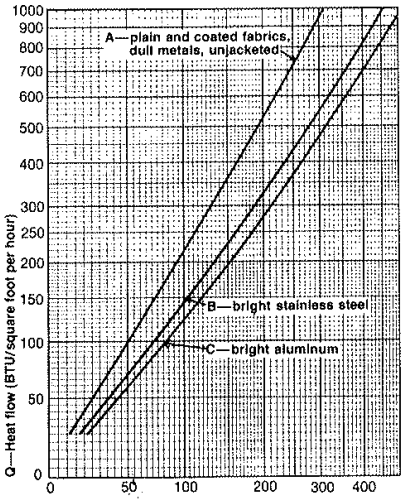
Constants for Determining Thermal Conductivity and Unit Heat-Transfer Rate for Some Common Insulating Materials

$$k = A' + B'T + C'T^2 + D'T^3 \quad (T = °F)$$

Insulation	A′	B′	C′	D′	Temperature range, °F
Asbestos with diatomaceous earth	0.2858	3.709×10^{-4}			32-660
Calcium silicate ASTM C533-80 Class 1	0.3504	5.196×10^{-4}			100-700
Monolithic calcium silicate cement	0.651	3.437×10^{-4}			32-1022
White fiberglass blankets with binder					
density = 3.0 lb/ft^3	0.2037	6.161×10^{-6}	1.403×10^{-6}	-5.0×10^{-10}	50-800
density = 6.0 lb/ft^3	0.2125	-2.325×10^{-4}	1.797×10^{-6}	-7.97×10^{-10}	50-900
Rigid fiberglass sheet					
ASTM C-547-77 Class 1	0.2391	9.192×10^{-4}	6.942×10^{-10}		11-121
ASTM C-547-77 Class 2	0.2782	1.226×10^{-3}			37-204
ASTM C-612-77 Class 1	0.2537	3.051×10^{-4}	1.950×10^{-6}		0-250
ASTM C-612-77 Class 3	0.2631	2.301×10^{-4}	1.614×10^{-6}		0-275
density = 4.0 lb/ft^3	0.2113	3.857×10^{-4}	1.20×10^{-6}		0-300
density = 6.0 lb/ft^3	0.1997	2.557×10^{-4}	9.048×10^{-7}		0-300
Cellular glass foam					
ASTM C-552-79 Class 1	0.3488	5.038×10^{-4}	1.144×10^{-7}	7.172×10^{-10}	-300-500
Mineral wool					
Basaltic rock blanket, 9 lb/ft^3	0.2109	3.382×10^{-4}	5.495×10^{-7}		0-800
Basaltic rock blanket, 12 lb/ft^3	0.2798	9.508×10^{-5}	6.478×10^{-7}		0-800
Metallic slag block, 6 lb/ft^3	0.1076	5.714×10^{-4}	3.124×10^{-7}		0-600
Metallic slag block, 18 lb/ft^3	0.3190	8.870×10^{-5}	2.174×10^{-7}		0-1200
Mineral-wool-based-cement	0.4245	6.293×10^{-4}	-1.638×10^{-7}	3.533×10^{-10}	0-950
Preformed expanded perlite					
ASTM C-610-74	0.3843	3.0×10^{-4}	2.2381×10^{-7}		50-750
Expanded perlite-based cement	0.6912	5.435×10^{-4}			50-650
Expanded polystyrene block					
ASTM C-578-69 GR2	0.1711	2.760×10^{-4}	1.796×10^{-6}	-3.997×10^{-9}	-58-110
Polyurethane, 2.2 lb/ft^3					
aged 720 days at 77°F and 50% relative humidity	0.1662	-4.094×10^{-4}	-5.273×10^{-6}	2.534×10^{-8}	-58-32
(85% closed cell)	0.1516	-3.370×10^{-4}	7.153×10^{-6}	-2.858×10^{-8}	32-122
new polyurethane	0.1271	-2.490×10^{-4}	-7.962×10^{-7}	4.717×10^{-8}	-58-32
(95% closed cell)	9.72×10^{-2}	7.813×10^{-4}	-7.152×10^{-6}	2.858×10^{-8}	32-122
Exfoliated vermiculite (insulating cement)					
Aislagreen*	0.480	6.0×10^{-4}			0-1200
ASTM C-196-77	0.8474	5.071×10^{-4}			0-1200

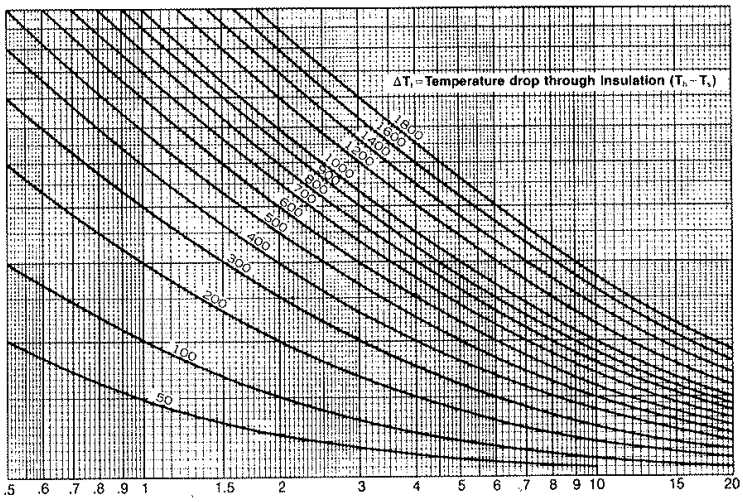
Heat Flow Through Insulation

6-15a



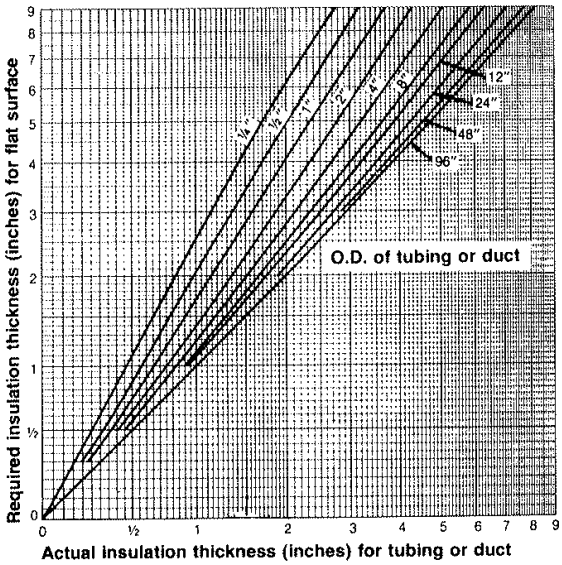
ΔT_f = Difference between outside surface temperature and ambient air temperature

6-15b

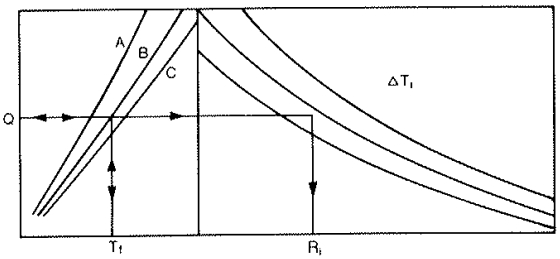


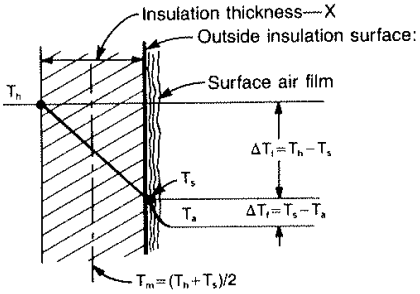
R_i = Required thermal resistance of insulation ($X/_k$)

6-15c



How to Use Figs. 6-15 a & b





Courtesy John Mansville