

National Bureau of Standards Certificate

Standard Reference Material 735

Thermal Conductivity - Austenitic Stainless Steel

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Thermal Conductivity (λ) as a Function of Temperature
(5 to 1200 K)

T(K)	λ ($\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)	T(K)	λ ($\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)
5	0.466	100	9.25
6	0.565	110	9.65
7	0.676	120	9.99
8	0.796	130	10.3
9	0.921	140	10.6
10	1.05	150	10.9
12	1.32	160	11.1
14	1.58	170	11.4
16	1.86	180	11.6
18	2.13	190	11.9
20	2.40	200	12.1
25	3.07	250	13.2
30	3.72	300	14.3
35	4.34	350	15.3
40	4.92	400	16.2
45	5.47	450	17.1
50	5.98	500	17.9
55	6.45	600	19.3
60	6.88	700	20.6
65	7.28	800	21.9
70	7.64	900	23.0
75	7.97	1000	24.1
80	8.27	1100	25.1
85	8.55	1200	26.1
90	8.80		
95	9.04		

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J. Paul Cali, Chief
Office of Standard Reference Materials

(Revision of certificate dated 3-24-72 to extend temperature range from 280 to 1200K)

(over)

This SRM is available in the form of rods in several sizes. SRM 735-S is 0.64 cm in diameter and 30 cm long. SRM's 735-M1 and 735-M2 are 1.27 cm in diameter and 15 and 30 cm long, respectively. SRM 735-L1 and 735-L2 are 3.4 cm in diameter and 5 and 10 cm long, respectively. Longer continuous lengths can be obtained by special order.

Measurements

Based on low temperature (below ambient) thermal conductivity, electrical resistivity, and thermopower measurements on three specimens; liquid helium and ice-point electrical resistivity measurements on twenty specimens; and other characterization data such as composition hardness, density, and grain size [1], the homogeneity of this lot of austenitic stainless steel was determined to be excellent for an SRM of thermal conductivity. These measurements indicate that the effect of material variability on thermal conductivity is no larger than $\pm 1\%$.

High temperature (above ambient) data, recently reported by Fitzer [2] as a result of the AFML^a - AGARD^b reference program, form the basis for extending the temperature range of this SRM to 1200K. These data have been analyzed and correlated with the low temperature data [1] to obtain the certified values of thermal conductivity.

The estimated uncertainties of the data, including material variability, are: 2% below 100K, increasing to 3% at ambient temperature, and 5% above ambient.

- [1] Hust, J. G., and Giarratano, P. J., Standard Reference Materials: Thermal Conductivity and Electrical Resistivity Standard Reference Materials: Austenitic Stain-Steel, SRM's 735 and 798, From 4 to 1200K, Nat. Bur. Stand. Special Publication 260-46 (1975).
- [2] Fitzer, E., Thermophysical Properties of Solid Materials, Advisory Report 12 (1967); Advisory Report 38 (1972); Report 606 (1972), AGARD, NATO, France.

a - AFML (Air Force Materials Laboratory)

b - AGARD (Advisory Group for Aerospace Research and Development, NATO)