

U. S. Department of Commerce
Frederick B. Dent
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National Bureau of Standards
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National Bureau of Standards Certificate

Standard Reference Material 798

Electrical Resistivity - Austenitic Stainless Steel

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Electrical Resistivity (ρ) as a Function of Temperature (5 to 1200 K)

T (K)	ρ ($\mu\Omega\cdot\text{cm}$)	T (K)	ρ ($\mu\Omega\cdot\text{cm}$)
5	59.3	250	76.8
10	59.3	300	81.1
15	59.3	350	85.3
20	59.3	400	89.0
25	59.3	450	92.3
30	59.4	500	95.3
40	59.7	600	100.6
50	60.1	700	105.1
60	60.7	800	109.1
70	61.3	900	112.6
80	62.1	1000	115.8
100	63.8	1100	118.8
120	65.6	1200	121.4
140	67.4		
160	69.2		
180	71.0		
200	72.7		

This SRM is available in the form of 0.64 cm diameter rods of three lengths. SRM 798-1 is 5 cm long, 798-2 is 10 cm long, and 798-3 is 15 cm long.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.

Washington, D. C. 20234
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J. Paul Cali, Chief
Office of Standard Reference Materials

(Revision of certificate dated 5-13-74 to extend temperature range from 280 to 1200K)

(over)

Measurements

Based on low temperature (below ambient) electrical resistivity, thermal conductivity, 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 electrical resistivity. These measurements show that the effect of material variability on electrical resistivity is less than $\pm 1\%$.

High temperature (above ambient) data, recently reported by Fitzer [2] as a result of the AFML^a – AGARD^b reference material 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 electrical resistivity.

The estimated uncertainties of the data, including material variability, are: 1% below ambient and 2% above ambient temperature.

[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)