U. S. Department of Commerce
Frederick B. Dent
Secretary

National Bureau of Standards
Richard W. Roberts, Director

National Bureau of Standards Certificate

Standard Reference Material 797

Electrical Resistivity - Electrolytic Iron

J. G. Hust and P. J. Giarratano

Electrical Resistivity (ρ) as a Function of Temperature
(6 to 1000 K)

T(K)	ρ(nΩ·m)	T(K)	ρ(nΩ·m)	T(K)	ρ(nΩ·m)	T(K)	ρ(nΩ·m)
6	3.87	55	5.85	160	39.1	600	333
7	3.87	60	6.54	170	43.2	650	387
8	3.85	65	7.37	180	47.5	700	445
9	3.85	70	8.32	190	51.8	750	508
10	3.85	75	9.38	200	56.1	800	576
12	3.87	80	10.56	220	65.2	850	649
14	3.89	85	11.88	240	74.4	900	728
16	3.90	90	13.27	260	84.2	950	811
18	3.90	95	14.76	280	94.3	1000	901
20	3.92	100	16.32	300	104		
25	3.99	110	19.69	350	132		
30	4.10	120	23.30	400	164		
35	4.26	130	27.07	450	200		
40	4.50	140	31.0	500	240		
45	4.84	150	35.0	550	284		
50	5.28						

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
April 29, 1975

J. Paul Cali, Chief
Office of Standard Reference Materials

(Revision of certificate dated 5-13-74 to extend temperature range from 280 to 1000 K)

(over)

This SRM is available in the form of 0.64 cm diameter rods in several lengths. SRM's 797-1 797-2, and 797-3 are 5, 10, and 15 cm long, respectively Longer continuous lengths can be obtained by special order.

Measurements

Low-temperature (below ambient) characterization data consist of thermal conductivity, electrical resistivity, and thermopower measurements on one specimen; liquid helium and ice point electrical resistivity measurements on about twenty specimens in various states of heat treatment; and other characterization data such as hardness, grain size, density and composition [1]. The homogeneity of this electrolytic iron as determined from these data is determined to be excellent for an SRM of electrical resistivity. The effect of material variability on electrical resistivity is no larger than ±1%.

High-temperature (above ambient) data presented by Fulkerson et al. [2] on an iron similar to this electrolytic iron, along with Matthiessen's rule correlations with ingot iron were used as a basis for the recommended values above 300 K. The low temperature NBS data were correlated with the high-temperature data to produce the smoothed certified values of electrical resistivity

The estimated uncertainties of the certified values, including material variability, are 1% below 280 K and 2% above 280 K.

[1] J. G. Hust and P. J. Giarratano Standard Reference Materials: Thermal Conductivity and Electrical Resistivity Standard Reference Materials: Electrolytic Iron SRM's 734 and 797 and 4 to 1000 K, Nat. Bur. Stand. Special Publication 260-50 (1975).

[2] W. Fulkerson, J. P. Moore, and D. L. McElroy Comparison of the Thermal Conductivity, Electrical Resistivity, and Seebeck Coefficient of a High purity Iron and an Armco Iron to 1000 °C, J. Appl. Phys. 37 No. 7, 2639-2653 (1966).