Rev. Sci. Instrum., 41, 6, 884-5 (1970)

FAST-RW 70-0213

TABLE I. Characteristics of various fast carbon thermometers.

Solution	R/R_{245}			$\frac{1}{R}\frac{dR}{dT}$		
	77 K	4.2	1	77 K	4.2	1
Aquablak B	4.17	262	2100	0.018	0.303	1.18
K	4.30	30.1	2360	0.016	0.300	0.965
G	1.4	3.56	5.63	0.005	0.086	0.250
M	1.55	5.5	10.3	0.006	0.090	0.270
Aquablak B& Aquadag (1:1)	1.48	5.12	9.2	0.007	0.106	0.382
Aquablak K& Aquadag (1:1)	2.08	9.6	19.2	0.007	0.105	0.412
Aquablak B& Aquadag (3.1)	3.35	26	152	0.013	0.150	0.735

order of $10^4\,\Omega$ and yet obtain greater sensitivity than from straight solutions of Aquablak G or M. Although higher concentrations of the smaller sizes when mixed with Aquadag had a greater sensitivity, the relative resistance change rapidly approaches the value found for the smaller particle size. If, however, it was desired to have a thermometer sensitive above 4.2 K, then a mixture with a higher concentration of the smaller particle size would give suitable sensitivity and an operable resistance. Thus in temperature intervals in which standard size carbon blacks have either too low a sensitivity or too high a resistance, a mixture of particle sizes can be made which will enhance the sensitivity or reduce the total resistance.

Since the thermometers are constructed by painting or spraying aqueous solutions onto the sample, the resistance of the thermometer will change with the moisture in contact with the carbon surface. It was found that the total resistance of a given thermometer was reproducible to thermal cycling to within 10% when kept in a vacuum. There was little change in the sensitivity for a particular thermometer from thermal cycling. Care taken in making the carbon surface to be of equal width and length from the same solution insures the construction of thermometers with equivalent resistances and sensitivity.

* Work supported in part by the U. S. Army Research Office (Durham).

† Supported by National Science Foundation under Departmental Development Grant GU-2630.

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High Pressure Performance of an Nb_3Sn Ribbon Solenoid*

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(Received 4 March 1969; and in final form, 12 February 1970)

A LEVITATED superconducting hoop, operated in an isochoric (constant volume) environment, is being studied for possible applications in plasma confinement. Magnetic fields of 20–30 kG are desired at the surface of the multi-doughnut cryostat. In order to provide extended experimentation times, Nb_3Sn hoop coils operating in a thermal environment initially at 4.2 K and rising to about 10 K are required. The corresponding pressure rise in an isochoric vessel is 6 atm or more. The behavior of an Nb_3Sn ribbon solenoid at elevated temperatures and pressures has been studied.

The solenoid was wound of RCA Nb_3Sn 2.3 mm ribbon, clad with 0.05 mm copper per side. The solenoid had a bore of 2.86 cm, an outer diameter of 9.53 cm, and a length of 6.35 cm. It was layer wound with Mylar–copper–Mylar interleaving between layers, with a total of approximately 2500 turns. Quench parameters at 4.2 K and 1 atm were $I=170$ A, $H=61.5$ kG, and J (coil) $=20\,600$ A/cm^2.

The temperature dependence of the quench current at 1 atm was ascertained by charging the coil to a given current then inducing a temperature rise by lifting the coil out of the surrounding liquid helium bath. The temperature was monitored with a calibrated germanium resistance ther-

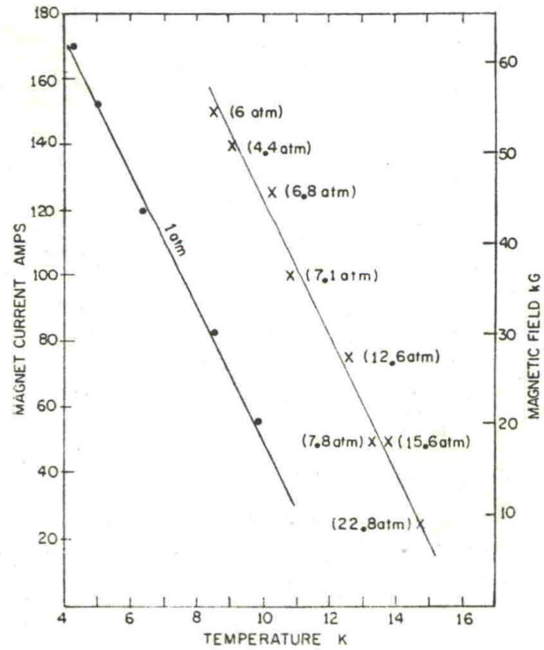

FIG. 1. Quench current vs temperature for Nb_3Sn ribbon solenoid. ●—Points taken at atmospheric pressure, X—points at the elevated pressure given.