UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-

REPORT OF CALIBRATION

International Temperature Scale of 1990

Standard Platinum Resistance Thermometer
Hart Scientific Model 5699
Serial Number 0159

Submitted by:
ICL Calibration Laboratories, Inc.
Stuart, FL 34994

This standard platinum resistance thermometer (SPRT) was calibrated with an AC bridge operating at a frequency of 30 Hz and with continuous measuring currents of 1.0 mA and 1.414 mA. In accordance with the International Temperature Scale of 1990 (ITS-90) that was officially adopted by the Comite´ International des Poids et Mesures (CIPM) in September 1989, the subranges from 83.8058 K to 273.16 K and 273.15 K to 692.677 K, with the following fixed points and their stated expanded uncertainties ($k = 2$), were used to calibrate the thermometer. For a description of the uncertainties, see NISTIR 5319, 16 pp., (1994), entitled "*Assessment of Uncertainties of Calibration of Resistance Thermometers at the National Institute of Standards and Technology.*"

Fixed Point		Temperature		Expanded Uncertainty where $k = 2$
		T_{90} (K)	t_{90} (°C)	(mK)
Ar	TP	83.8058	−189.3442	0.08
Hg	TP	234.3156	−38.8344	0.15
H_2O	TP	273.16	0.01	0.02
Sn	FP	505.078	231.928	0.24
Zn	FP	692.677	419.527	0.41

The following values were determined for the coefficients of the pertinent deviation functions of the ITS-90, as given in the attached material describing the scale. The attached tables were generated using these values.

Coefficients for Zero-Power Dissipation Calibration				Coefficients for 1 mA Calibration			
a_4 =	−8.1949689E-05	a_8 =	−1.0087772E-04	a_4 =	−8.4240654E-05	a_8 =	−1.0147545E-04
b_4 =	−1.6559779E-06	b_8 =	−7.2796096E-06	b_4 =	−2.3376083E-06	b_8 =	−7.7646210E-06

The resistance of this thermometer at 273.16 K was calculated to be 25.4670 Ω at zero-power dissipation and 25.4670 Ω at 1 mA. During calibration, the resistance at 273.16 K changed by the equivalent of 0.3 mK at zero-power dissipation and 0.3 mK at 1 mA.

This thermometer is satisfactory as a defining instrument of the ITS-90 in accordance with the criteria that $W(302.9146\ K) \geq 1.118\ 07$ or $W(234.3156\ K) \leq 0.844\ 235$.

For the Director,
National Institute of Standards and Technology

Dean C. Ripple
Leader, Thermometry Group
Process Measurements Division

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