

Guide to the Realization of the ITS-90

Platinum Resistance Thermometry

APPENDIX 3: *Summary of typical ranges of Type B standard uncertainties of the calibration of SPRTs at the fixed points*



Consultative Committee for Thermometry
under the auspices of the
International Committee for Weights and Measures

Appendix 3

Summary of typical ranges of Type B standard uncertainties of the calibration of SPRTs at the fixed points

Source of uncertainty	Fixed point											
	e-H ₂	Ne	O ₂	Ar	Hg	H ₂ O	Ga	In	Sn	Zn	Al	Ag
Fixed point effects												
Hydrostatic pressure	5-10	5-20	5-20	15-160	30-100	5-20	5-60	15-160	10-100	10-150	10-150	30-300
Gas pressure					0-20	0-20	0-200	5-500	5-300	5-400	10-700	10-600
Impurities	5-10	5-40	10-200	10-100	5-50	5-100	5-40	50-500	100-500	50-500	300-3000	800-3000
Isotopic composition	5-65	5-150				5-35						
Strain, crystal defects	10-50	10-50	10-50	10-50		10-300						
Static thermal effects	5-50	5-50	5-50	5-50	5-20	5-10	5-20	5-100	10-100	10-150	15-400	20-1000
Dynamic thermal effects	5-50	5-50	5-50	5-50								
Extrapolation to the liquidus point	5-50	10-50	5-50	10-250	3-160	3-50	5-115	6-230	6-230	10-280	10-300	100-300
SPRT effects												
Oxidation					5-40	5-400	5-500	20-850	40-1000	100-1100		
Strain, vacancies, contamination										0-50	20-200	200-2000
Insulation leakage					0-20	0-100	0-20				2-50	100-3000
Resistance measurement												
Standard resistor stability	0-2	0-5	0-10	0-20	5-100	5-100	5-100	5-200	5-200	5-300	5-500	7-700
Misc. cable effects	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100	0-100
Bridge errors	10-70	10-15	10-500	10-500	10-500	10-500	10-500	10-500	10-500	15-500	15-600	15-700
Self-heating correction	5-200	5-200	5-200	5-200	5-200	5-200	5-200	5-200	5-200	5-200	5-200	5-200
TOTAL	20-250	50-300	20-550	20-550	50-550	20-600	15-600	100-1250	120-1250	200-1350	500-2000	800-4000

Summary of typical ranges of Type B standard uncertainties of the calibration of SPRTs at the fixed-points (in μK). (The table refers to the resistance value, i.e. propagation of the uncertainty from the TPW, which has to be considered for the ratio W , is not included.) These ranges consider recent literature data, the results of international intercomparisons, the estimates for the standard uncertainty of the current best practical fixed-point realisation listed in Table 1 of *Guide Chapter 1 Introduction*, and the Calibration and Measurement Capabilities of metrological institutes given in the [BIPM KCDB database](#). The table gives only a snapshot of possible orders of magnitude and is of course anyway work in progress.

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