


Schedule of Accreditation

issued by

United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <p>UKAS CALIBRATION</p> <p>0175</p> <p>Accredited to ISO/IEC 17025:2005</p>	<h3>Isothermal Technology Ltd</h3> <p>Issue No: 043 Issue date: 13 March 2009</p>	
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<p>Calibration performed at the above address only</p>		

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Best Measurement Capability Expressed as an Expanded Uncertainty ($k=2$)	Remarks
TEMPERATURE			
Platinum thermocouples			
Calibration by comparisons	-50 °C to 0 °C 0 °C to 50 °C 50 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1300 °C	0.5 °C 0.45 °C 0.4 °C 0.7 °C 1.7 °C	Thermocouples without a cold junction will have increased uncertainty
Calibrations at fixed points			
FP Tin	231.928 °C	0.4 °C	Note: FP = Freezing Point
FP Zinc	419.527 °C	0.4 °C	
FP Aluminium	660.323 °C	0.4 °C	
FP Silver	961.78 °C	0.4 °C	
Gold/Platinum thermocouples			
Calibration at fixed points			
TP Water	0.01 °C	0.06 °C	Note: TP = Triple Point FP = Freezing Point
FP Zinc	419.527 °C	0.05 °C	
FP Aluminium	660.323 °C	0.05 °C	
FP Silver	961.78 °C	0.05 °C	
Other thermocouples	0 °C to 1000 °C	0.10 °C	Including uncertainty of interpolation/extrapolation
	-196 °C	0.3 °C	
	-80 °C to 0 °C	0.25 °C	
	0 °C to 50 °C	0.1 °C	
	50 °C to 300 °C	0.25 °C	
	300 °C to 420 °C	0.30 °C	
	420 °C to 660 °C	0.4 °C	
	660 °C to 1100 °C	0.8 °C	
	1100 °C to 1300 °C	2.2 °C	
Compensating and extension cables	-25 °C to 200 °C	1 °C	



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Measured Quantity Instrument or Gauge	Range	Best Measurement Capability Expressed as an Expanded Uncertainty ($k=2$)	Remarks
TEMPERATURE (cont'd)			
Platinum resistance thermometers			
Calibration by comparisons	-80 °C to -40 °C -40 °C to +50 °C 50 °C to 156 °C 156 °C to 300 °C 300 °C to 420 °C 420 °C to 660 °C	7.0 mK 4.0 mK 5.0 mK 6.5 mK 20 mK 35 mK	
Calibration at fixed points			Uncertainty in the determination of $W(t_{90})$ used to calculate ITS-90 coefficients
See Note 1			
BP Nitrogen	-195.798 °C	5 mK	
TP Argon	-189.3442 °C	0.50 mK	
TP Mercury	-38.8344 °C	0.24 mK	
TP Water (See Note 3)	0.01 °C	0.07 mK	Note: TP = Triple Point FP = Freezing Point MP = Melting Point BP = Boiling Point
MP Gallium	29.7646 °C	0.15 mK	
FP Indium	156.5985 °C	1.0 mK	
FP Tin	231.928 °C	1.0 mK	
FP Zinc	419.527 °C	1.2 mK	
FP Aluminium	660.323 °C	2.0 mK	Note 1: Suitable only for HT/SPRTs with high stability. Includes extrapolation to zero power and immersion checks.
FP Silver	961.78 °C	7 mK	
See Note 2			
BP Nitrogen	-195.798 °C	10 mK	Note 2: Suitable for most SPRTs using nominal current.
TP Argon	-189.3442 °C	2.0 mK	
TP Mercury	-38.8344 °C	2.0 mK	
TP Water (See Note 3)	0.01 °C	1.0 mK	Note 3: Determination of $R(0.01^{\circ}\text{C})$
MP Gallium	29.7646 °C	1.0 mK	
FP Indium	156.5985 °C	2.0 mK	
FP Tin	231.928 °C	3.0 mK	
FP Zinc	419.527 °C	3.5 mK	
FP Aluminium	660.323 °C	10 mK	
FP Silver	961.78 °C	40 mK	



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TEMPERATURE (cont'd)			
Fixed point cells			
See Note 4			
TP Mercury	-38.8344 °C	0.22 mK	Note: TP = Triple Point FP = Freezing Point MP = Melting Point BP = Boiling Point Note 4: Suitable for optimal realisations. Includes 3 melts, 3 freezes, 2 intercomparisons. Note 5: Appropriate for slim cells. Includes 1 melt, 1 freeze, 1 intercomparison sequence using a monitor SPRT.
TP Water	0.01 °C	0.07 mK	
MP Gallium	29.7646 °C	0.07 mK	
FP Indium	156.5985 °C	0.65 mK	
FP Tin	231.928 °C	0.6 mK	
FP Zinc	419.527 °C	0.9 mK	
FP Aluminium	660.323 °C	1.1 mK	
FP Silver	961.78 °C	2.0 mK	
See Note 5			
TP Mercury	-38.8344 °C	1.0 mK	
TP Water	0.01 °C	0.5 mK	
MP Gallium	29.7646 °C	1.0 mK	
FP Indium	156.5985 °C	2.0 mK	
FP Tin	231.928 °C	2.0 mK	
FP Zinc	419.527 °C	2.0 mK	
FP Aluminium	660.323 °C	6 mK	
FP Silver	961.78 °C	30 mK	
Metal block calibrators and portable liquid baths	0 °C -80 °C to 0 °C 0 °C to 156 °C 156 °C to 300 °C 300 °C to 420 °C 420 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1300 °C	10 mK 25 mK 20 mK 35 mK 50 mK 65 mK 1.0 °C 3.0 °C	Suitable for zero reference baths
ELECTRICAL			
DC VOLTAGE			
Spot Values	± 10 mV ± 20 mV ± 50 mV ± 100 mV ± 250 mV ± 500 mV ± 1 V ± 2V	0.22 µV 0.25 µV 0.35 µV 0.5 µV 1.0 µV 1.4 µV 4.0 µV 5.5 µV	
Intermediate values	Up to 140 mV 140 mV to 1.4 V 1.4 V to 14 V	12 ppm + 0.6 µV 12 ppm + 1.3 µV 12 ppm + 12 µV	



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ELECTRICAL (cont'd)			
DC RESISTANCE	0.1 Ω to 10 Ω 10 Ω to 250 Ω 250 Ω to 1000 Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω	0.3 ppm + 0.1 $\mu\Omega$ 0.3 ppm + 2.5 $\mu\Omega$ 0.4 ppm + 10 $\mu\Omega$ 12 ppm 12 ppm	Resistors suitable for oil immersion can be measured over the range 10 °C to 30 °C
Spot Values			
Measure	1 Ω 25 Ω 100 Ω	0.083 ppm 0.073 ppm 0.072 ppm	
Generate	1 Ω 25 Ω 100 Ω	0.079 ppm 0.070 ppm 0.071 ppm	
AC RESISTANCE			The uncertainties can only be realised for resistors with suitable AC characteristics
2.5 Ω to 400 Ω 400 Ω to 1000 Ω	75 Hz 75 Hz	15 ppm 100 ppm	
Spot Value 25 Ω	75 Hz	5 ppm	
TEMPERATURE SIMULATION			
Temperature indicators and simulators, calibration by electrical simulation, for the following sensor types:			
Base metal thermocouple	-200 °C to 1600 °C	0.3 °C	including cold junction compensation
Noble metal thermocouple	-200 °C to 1760 °C	0.4 °C	including cold junction compensation
Resistance sensors (Pt100)	-200 °C to 800 °C	0.02 °C	

END