Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

0822

Accredited to ISO/IEC 17025:2017

Chamois Metrology Limited

Issue No: 080 **Issue date:** 21 August 2020

Unit 8 The Centre
Holywell Business Park
Northfield Road
Southam
Warwickshire
CV47 0FP

Contact: Mr A Garthwaite
Tel: +44 (0)1926 812066
Fax: +44 (0)1926 813569
E-Mail: lab@chamois.net
Website: www.chamois.net

Calibration performed by the Organisations at the locations specified below

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address Unit 8 The Centre Holywell Business Park Northfield Road Southam Warwickshire CV47 0FP	**Local contact** Mr A Garthwaite	Mass calibration Electrical calibration Pressure calibration Temperature calibration Dimensional calibration	UK
Address Metrology division Unit K2 M7 Business Park Newhall Naas County Kildare Ireland	**Local contact** Mr P Kinsella Tel. +353 (0) 45 896660 Fax. +353 (0) 45 896713 Email: info@classictechnology.ie	Pressure calibration Electrical calibration Temperature calibration Mass calibration Humidity calibration	IRE

Site activities performed away from the locations listed above:

Location details		Activity	Location code
The customer's site or premises must be suitable for the nature of the particular calibrations undertaken and will be the subject of contract review arrangements between the laboratory and the customer	**Local contact** Mr A Garthwaite	Pressure calibration	Site

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
PRESSURE Gas pressure (absolute)			Methods consistent with EURAMET CG3 and CG17	UK & Site
Calibration of pressure measuring instruments and gauges	2 Pa to 160 Pa 160 Pa to 1.4 kPa 1.4 kPa to 15.7 kPa 15.7 kPa to 710 kPa 710 kPa to 27.6 MPa 27.6 MPa to 41.4 MPa	10 % 0.0040 % + 32 Pa 0.0030 % + 1.0 Pa 0.0025 % + 1.0 Pa 0.0025 % + 10 Pa 0.0045 % + 10 Pa	Calibration of pressure measuring devices with an electrical output may be undertaken.	
Gas pressure (gauge)				
Calibration of pressure measuring instruments and gauges and “Pressure equivalent” calibration of Dead Weight Testers (pressure balances supplied with an associated mass set) and Effective area calibration of Dead Weight Testers	- 100 kPa to - 3.5 kPa - 3.5 kPa to 0 Pa 0 Pa to 1.4 kPa 1.4 kPa to 15.7 kPa 15.7 kPa to 710 kPa 710 kPa to 27.6 MPa 27.6 MPa to 41.4 MPa	0.0035 % 0.0095 % + 0.60 Pa 0.0040 % + 0.50 Pa 0.0022 % + 0.030 Pa 0.0017 % 0.0025 % 0.0045 %	Calibrations may also be performed over an environmental temperature range of -10 °C to +150 °C, with an uncertainty of ± 1 °C on the reported temperature. There will be an additional pressure uncertainty of ± (30 ppm + 0.030 Pa).	
Gas pressure (differential)				
Calibrations of differential pressure devices with low and high pressure ports at a common mode pressure of 3.5kPa	6 Pa to 10 kPa (Line pressure 3.5 kPa)	0.010 % + 0.060 Pa		
Calibration of pressure indicating instruments and gauges	0 Pa to (7 - line pressure) MPa (Line pressure 200 kPa to 7 MPa)	0.000060 % of line pressure, plus 0.0035 % of differential pressure, plus 5.0 Pa	Differential pressure cells may be calibrated using digital communications protocols	
	7 MPa to (27.6 - line pressure) MPa (Line pressure 7 MPa to 27.6 MPa)	0.000060 % of line pressure, plus 0.0035 % of differential pressure, plus 10 Pa	Calibrations may also be performed over an environmental temperature range of +2 °C to +8 °C with an uncertainty of ± 1 °C on the reported temperature.	
	0 Pa to (41.4 - line pressure) MPa (Line pressure 27.6 MPa to 41.4 MPa)	0.000065 % of line pressure, plus 0.0060 % of differential pressure, plus 16 Pa		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
PRESSURE (cont'd)				
Hydraulic pressure (gauge)				UK & Site
Calibration of pressure measuring instruments and gauges. "Pressure equivalent" calibration of Dead Weight Testers (Pressure balance with associated mass set). Effective area calibration of Dead Weight Testers.	137 kPa to 200 kPa 200 kPa to 7 MPa 7 MPa to 172 MPa 172 MPa to 345 MPa 345 MPa to 500 MPa	0.0040 % + 14 Pa 0.0035 % + 14 Pa 0.0035 % + 0.24 ppm/MPa 0.0080 % 0.015 %		
Hydraulic pressure (absolute)				
Calibration of pressure measuring instruments and gauges.	200 kPa to 7 MPa 7 MPa to 172 MPa 172 MPa to 345 MPa 345 MPa to 500 MPa	0.0040 % + 28 Pa 0.0035 % + 0.24 ppm/MPa + 15 Pa 0.0080 % 0.015 %		
Hydraulic pressure (differential)				
Calibration of pressure indicating instruments and gauges	0 Pa to (172 - line pressure) MPa (Line pressure 1.7 MPa to 172 MPa)	0.000060 % of line pressure plus 0.0055 % of differential pressure plus 20 Pa		
MASS	Nominal value (g) 26 000 20 000 10 000 5 000 2 000 1 000 500 200 100 50 20 10 5 2 1 0.5 0.2 0.1 0.05 0.02 0.01 0.005 0.002 0.001	(mg) 26 20 10 5.0 2.0 1.0 0.50 0.20 0.10 0.060 0.050 0.040 0.032 0.024 0.020 0.016 0.012 0.010 0.0080 0.0060 0.0050 0.0040 0.0040 0.0040	Intermediate values can be calibrated with an uncertainty not less than that interpolated from the next higher and lower nominal value in the table. Calibrations can be given in other units as required. Calibration by substitution	UK

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL				UK
All electrical measurements a carried out using the method of direct comparison or transfer to laboratory reference standards unless otherwise determined in the remarks column.				
DC Voltage	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1050 V	10 ppm + 0.5 μV 10 ppm + 1.0 μV 10 ppm + 10 μV 10 ppm + 200 μV 10 ppm + 2.0 mV	All electrical values can be sourced or measured by comparison unless otherwise stated	
DC Current	0 μA to 200 μA 200 μA to 2 mA 2 mA to 20 mA 20 mA to 100 mA 100 mA to 200 mA 200 mA to 2 A 2 A to 20 A	20 ppm + 1.0 nA 20 ppm + 10 nA 20 ppm + 75 nA 40 ppm + 150 nA 35 ppm + 0.70 μA 250 ppm + 30 μA 500 ppm + 1.0 mA	Using nominal 10 Ω shunt	UK
DC Current	100 mA to 202 mA 202 mA to 2.02 A 2.02 A to 20 A 20 A to 1000 A	62 ppm + 5.5 μA 90 ppm + 72 μA 330 ppm + 8.0 mA 0.22 % + 100 mA	These values can be sourced Simulation using multi turn coil	
DC Resistance	0 Ω to 2 Ω 2 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 2 kΩ 2 kΩ to 20 kΩ 20 kΩ to 200 kΩ 200 kΩ to 2 MΩ 2 MΩ to 20 MΩ 20 MΩ to 200 MΩ 200 MΩ to 1 GΩ	15 ppm + 20 μΩ 15 ppm + 20 μΩ 15 ppm + 150 μΩ 15 ppm + 1.0 mΩ 15 ppm + 15 mΩ 15 ppm + 100 mΩ 15 ppm + 1.5 Ω 20 ppm + 20 Ω 400 ppm + 500 Ω 0.35 %+ 12 kΩ		
AC VOLTAGE	1 mV to 200 mV *20 Hz to 55 Hz* *55 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz* 200 mV to 2 V *20 Hz to 55 Hz* *55 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz* *100 kHz to 500 kHz*	 150 ppm + 15 μV 120 ppm + 15 μV 350 ppm + 16 μV 600 ppm + 20 μV 140 ppm + 40 μV 120 ppm + 40 μV 260 ppm + 40 μV 350 ppm + 100 μV 0.65 % + 15 mV		UK

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
AC VOLTAGE (cont'd)				
	2 V to 20 V			
	20 Hz to 55 Hz	150 ppm + 260 µV		
	55 Hz to 10 kHz	140 ppm + 260 µV		
	10 kHz to 30 kHz	260 ppm + 330 µV		
	30 kHz to 100 kHz	550 ppm + 1.2 mV		
	100 kHz to 500 kHz	0.65 % + 120 mV		
	20 V to 200 V			
	20 Hz to 10 kHz	140 ppm + 7.0 mV		
	10 kHz to 30 kHz	260 ppm + 7.0 mV		
	30 kHz to 100 kHz	600 ppm + 15 mV		
	200 V to 1 kV			
	45 Hz to 10 kHz	200 ppm + 25 mV		
	10 kHz to 30 kHz	380 ppm + 30 mV		
AC CURRENT	20 µA to 200 µA			
	55 Hz to 5 kHz	0.050 % + 50 nA		
	5 kHz to 10 kHz	0.060 % + 50 nA		
	200 µA to 2 mA			
	55 Hz to 10 kHz	0.050 % + 500 nA		
	2 mA to 20 mA			
	55 Hz to 10 kHz	0.050 % + 5.0 µA		
	20 mA to 200 mA			
	55 Hz to 10 kHz	0.050 % + 50 µA		
	200 mA to 2 A			
	55 Hz to 1 kHz	0.060 % + 500 µA		
	2 A to 20 A			
	55 Hz to 1 kHz	0.060 % + 4.0 mA		
AC CURRENT	25 µA to 200 µA			UK
	40 Hz to 45 Hz	0.17 % + 410 nA	These values can be sourced	
	45 Hz to 1 kHz	0.080 % + 390 nA		
	200 µA to 2 mA			
	40 Hz to 45 Hz	0.18 % + 1.0 µA		
	45 Hz to 1 kHz	0.075 % + 0.70 µA		
	2 mA to 20 mA			
	40 Hz to 45 Hz	0.18 % + 1.1 µA		
	45 Hz to 1 kHz	0.073 % + 7.4 µA		
	20 mA to 200 mA			
	40 Hz to 45 Hz	0.18 % + 120 µA		
	45 Hz to 1 kHz	0.077 % + 86 µA		
	200 mA to 2 A			
	40 Hz to 45 Hz	0.18 % + 1.1 mA		
	45 Hz to 1 kHz	0.085 % + 770 µA		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
AC CURRENT (Cont'd)				UK
	2 A to 20 A			
	40 Hz to 45 Hz	0.16 % + 11 mA		
	45 Hz to 100 Hz	0.037 % + 6.6 mA		
	20 A to 100 A *at 50 Hz*	0.22 % + 100 mA	Simulation using a multi turn coil	
	100 A to 1000 A *at 50 Hz*	0.22 % + 400 mA		
AC RESISTANCE				
55 Hz to 1 kHz	30 µΩ to 10 mΩ	26 µΩ		
	10 mΩ to 100 mΩ	0.26 %		
	100 mΩ to 1 Ω	0.26 %		
	1 Ω to 10	0.16 %		
	10 Ω to 100 Ω	0.16 %		
	100 Ω to 1 k Ω	0.16 %		
CAPACITANCE				
	1 nF	29 pF	For the calibration of measuring devices	
	10 nF	61 pF		
	20 nF	99 pF		
	50 nF	220 pF		
	100 nF	370 pF		
	1 µF	5.1 nF		
	10 µF	78 nF		
FREQUENCY			Frequency may also be expressed in terms of time; 1/f, for repetitive signals or in other units such as revolutions per minute.	UK
	10 MHz Clock frequency	1.0 parts in 10^8		
	10 mHz to 80 MHz	5.0 parts in 10^8	Calibration of measuring devices	
	1 mHz to 80 MHz	5.0 parts in 10^8 + 5.0 µHz	Calibration of sources	
TIME INTERVAL	0 s to 1 day	100 ms	Manually triggered single events.	UK
RPM	60 RPM to 60000 RPM	50 ppm + 0.01 RPM	Generate	UK

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
OSCILLOSCOPES				
Vertical deflection coefficients				UK
DC	30 mV to 300 mV 300 mV to 120 V	1.1 % 0.30 %	Square-wave & DC signals appropriate for the calibration of oscilloscope vertical deflection coefficients	
Peak to Peak Voltage *1 kHz*	30 mV to 300 mV 300 mV to 6 V	1.3 % 0.70 %		
Horizontal deflection coefficients				
Time	10 ns to 1 s	0.10 %	Pulse markers The uncertainties quoted above are based on the readout resolution of typical oscilloscopes.	
ELECTRICAL SIMULATION OF TEMPERATURE Thermocouple capabilities listed below are given for type T Base and Type S Noble, using EMF sensitivity values as listed in BS EN 60584-1:2013. Other Thermocouple types can be calibrated, the uncertainties will correspond to the appropriate sensitivities listed. Calibrations which include the internal reference junction (CJC) are available for types: J, K, N, T, E, R, S, B & C				UK
Base Metal Thermocouples Noble Metal Thermocouples	-200 °C to +1400 °C 0 °C to 500 °C 500 °C to 1800 °C	0.050 °C 0.080 °C 0.050 °C	Excluding automatic CJC	
Base Metal Thermocouples Noble Metal Thermocouples	-200 °C to +1400 °C 0 °C to 500 °C 500 °C to 1800 °C	0.17 °C 0.26 °C 0.25 °C	Including automatic CJC	
Cold Junction Compensation	0 °C to 30 °C	0.15 °C		
Resistance thermometers by simulation Values below are based upon a PT100. Other resistance thermometer types, including thermocouples with a defined resistance scale can also be calibrated based on the resistance capabilities listed above.				
Resistance thermometer simulation	-200 °C to 830 °C	0.0050 °C		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE				
Temperature indicators and recorders, with temperature sensor(s)	0.01 °C (Water Triple Point) -95 °C to 140 °C 140 °C to 150 °C 150 °C to 660 °C	0.0050 °C 0.055 °C 0.080 0.10 °C	Fixed point Calibrations within both metal and liquid media	UK
Resistance thermometers	0.01 °C (Water Triple Point) -95 °C to 140 °C 140 °C to 150 °C 150 °C to 660 °C	0.0050 °C 0.055 °C 0.080 °C 0.10 °C	Calibrations within both metal and liquid media	
Thermocouples Base Metal	-95 °C to 0 °C 0 °C to 30 °C 30 °C to 660 °C	0.40 °C 0.10 °C 0.40 °C	Calibrations within both metal and liquid media	
Noble Metal Type R and S Type B	 0 °C to 660 °C 0 °C to 660 °C	 0.40 °C 0.70 °C	 Calibrations within both metal and liquid media	
Metal Block Calibrators and portable liquid baths	-100 °C to 250 °C 250 °C to 660 °C	0.050 °C 0.13 °C	Includes axial, radial and stability information	
LENGTH			NOTES	UK
Orifice plates	BS EN ISO 5167-2:2003 Bore d diameter 10 to 700	 8	RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED	
Micrometers, External	BS 870:2008 0 to 125	Heads:2.0 between any two points	The uncertainty quoted is for the departure from either flatness, straightness, parallelism, or squareness, i.e. the distance separating the two parallel planes which just enclose the surface under consideration.	
Calliper gauges (inc. Vernier, dial and digital)	BS 887:2008 0 to 150	Overall performance 20		
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 100	 1.0		
Length gauges, flat and spherical ended	0 to 100 BS 870:2008	1.0 + (8.0 x length in m)		
ANGLE				
Squares, blade type	BS 939:2007 50 to 300	3.0 (see note)		
Spirit levels	BS 3509:1962 and BS 958:1968 5 seconds of arc to 60 minutes of arc nominal sensitivity	Mean sensitivity 10 % of nominal Minimum 0.50 seconds of arc		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
FORM				
Straightedges Cast iron, Steel and Granite	BS 5204:Part 1:1975 BS 5204:Part 2:1977 0 to 1800	1.0 + (2.0 x length in m) (see note)		UK
PRESSURE			Calibration of pressure measuring devices with an electrical output may be undertaken.	IRE
Gas pressure (absolute)				
Calibration of pressure measuring instruments and gauges	1.4 kPa to 710 kPa 710 kPa to 10.1 MPa	0.0050 % + 2.0 Pa 0.0050 % + 20 Pa	Methods consistent with EURAMET CG3	
Gas pressure (gauge)				
Calibration of pressure measuring instruments and gauges	-100 kPa to -1.4 kPa 1.4 kPa to 10 MPa	0.0050 % 0.0050 %		
Gas pressure (differential)				
Calibrations of differential pressure devices with low and high pressure ports at a common mode pressure of 3.5 kPa	6 Pa to 10 kPa (Line pressure 3.5 kPa)	0.010 % + 0.060 Pa		
Hydraulic pressure (gauge)				
Calibration of pressure measuring instruments and gauges	358 kPa to 3.5 MPa 3.5 MPa to 111.5 MPa	0.0090 % + 30 Pa 0.0075 %		IRE
Hydraulic pressure (absolute)				
Calibration of pressure measuring instruments and gauges	458 kPa to 3.6 MPa 3.6 MPa to 111.6 MPa	0.0090 % + 50 Pa 0.0075 % + 20 Pa		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
MASS	Nominal value (g)	(mg)		IRE
	20 000	10	Intermediate values can be calibrated with an uncertainty not less than that interpolated from the next higher and lower nominal value in the table.	
	10 000	5.3		
	5 000	2.7		
	2 000	1.0		
	1 000	0.53		
	500	0.27		
	200	0.10		
	100	0.053	Calibrations can be given in other units as required.	
	50	0.033		
	20	0.027		
	10	0.020	Calibration by substitution	
	5	0.017		
	2	0.013		
	1	0.010		
	0.5	0.0083		
	0.2	0.0067		
	0.1	0.0053		
	0.05	0.0040		
	0.02	0.0033		
	0.01	0.0027		
	0.005	0.0020		
	0.002	0.0020		
	0.001	0.0020		
ELECTRICAL				
DC VOLTAGE	0 mV to 200 mV	10 ppm + 1.5 μV		IRE
	200 mV to 2 V	10 ppm + 1.5 μV		
	2 V to 20 V	10 ppm + 10 μV		
	20 V to 200 V	10 ppm + 200 μV		
	200 V to 1 kV	10 ppm + 2.0 mV		
DC CURRENT	0 μA to 200 μA	20 ppm + 1 nA		IRE
	200 μA to 2 mA	20 ppm + 10 nA		
	2 mA to 20 mA	20 ppm + 75 nA		
	20 mA to 40 mA	50 ppm + 150 nA	Using nominal 10 Ω shunt	
	40 mA to 200 mA	35 ppm + 700 nA		
	200 mA to 2 A	250 ppm + 30 μA		
	2 A to 20 A	500 ppm + 1.0 mA		
	100 mA to 202 mA	130 ppm + 6.6 μA	Calibration of measuring devices by comparison	
	202 mA to 2.02 A	150 ppm + 180 μA		
	2.02 A to 20 A	420 ppm + 1.5 mA		
	20 A to 1500 A	0.22 % + 100 mA	Simulation using a multi turn coil	

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
DC RESISTANCE	0 Ω to 2 Ω	15 ppm + 20 μΩ		IRE
	2 Ω to 20 Ω	15 ppm + 20 μΩ		
	20 Ω to 200 Ω	15 ppm + 150 μΩ		
	200 Ω to 2 kΩ	15 ppm + 1.0 mΩ		
	2 kΩ to 20 kΩ	15 ppm + 15 mΩ		
	20 kΩ to 200 kΩ	15 ppm + 100 mΩ		
	200 kΩ to 2 MΩ	15 ppm + 1.5 Ω		
	2 MΩ to 20 MΩ	20 ppm + 20 Ω		
	20 MΩ to 200 MΩ	400 ppm + 500 Ω		
	200 MΩ to 1 GΩ	0.35 % + 12 kΩ		
AC VOLTAGE	1 mV to 200 mV			IRE
	20 Hz to 55 Hz	150 ppm +15 μV	AC Values can be sourced or measured by comparison up to 1 kHz, above that frequency is for measurement only.	
	55 Hz to 10 kHz	120 ppm + 15 μV		
	10 kHz to 30 kHz	350 ppm + 16 μV		
	30 kHz to 100 kHz	600 ppm + 20 μV		
	200 mV to 2 V			
	20 Hz to 55 Hz	140 ppm + 40 μV		
	55 Hz to 10 kHz	120 ppm + 40 μV		
	10 kHz to 30 kHz	260 ppm + 40 μV		
	30 kHz to 100 kHz	350 ppm + 100 μV		
	100 kHz to 500 kHz	0.65 % + 15 mV		
AC VOLTAGE	2 V to 20 V			IRE
	20 Hz to 55 Hz	150 ppm + 260 μV		
	55 Hz to 10 kHz	140 ppm + 260 μV		
	10 kHz to 30 kHz	260 ppm + 330 μV		
	30 kHz to 100 kHz	550 ppm + 1.2 mV		
	100 kHz to 500 kHz	0.75 % + 120 mV		
	20 V to 200 V			
	20 Hz to 10 kHz	140 ppm + 7 mV		
	10 kHz to 30 kHz	260 ppm + 7 mV		
	30 kHz to 100 kHz	600 ppm + 15 mV		
	200 V to 1 kV			
	50 Hz to 10 kHz	200 ppm + 25 mV		
	10 kHz to 30 kHz	380 ppm + 30 mV		
AC CURRENT				IRE
	10 μA to 200 μA			
	55 Hz to 5 kHz	0.050 % + 50 nA		
	5 kHz to 10 kHz	0.060 % + 50 nA		
	200 μA to 2 mA			
	55 Hz to 10 kHz	0.050 % + 500 nA		
	2 mA to 20 mA			
	55 Hz to 10 kHz	0.050 % + 5.0 μA		
	20 mA to 200 mA			
	55 Hz to 10 kHz	0.050 % + 50 μA		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
AC CURRENT (cont'd)	200 mA to 2 A *55 Hz to 10 kHz*	0.085 % + 500 μA		IRE
	2 A to 20 A *55 Hz to 5 kHz*	0.20 % + 5.0 mA		
	25 μA to 202 μA *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.28 % + 420 nA 0.099 % + 390 nA	Calibration of measuring devices by comparison	
	202 μA to 2.02 mA *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.22 % + 1.2 μA 0.094 % + 0.80 μA		
	2.02 mA to 20.2 mA *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.23 % + 12 μA 0.094 % + 7.9 μA		
	20.2 mA to 202 mA *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.22 % + 120 μA 0.94 % + 90 μA		
	202 mA to 2.02 A *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.25 % + 1.2 mA 0.11 % + 0.11 mA		
	2.02 A to 20 A *40 Hz to 45 Hz* *45 Hz to 999 Hz*	0.34 % + 13 mA 0.073 % + 4.4 mA		
	20 A to 100 A, *40 Hz to 60 Hz*	0.25 % + 100 mA	Simulation using a multi turn coil	
	100 A to 1500 A, *40 Hz to 60 Hz*	0.25 % + 400 mA		
CAPACITANCE				IRE
	1 nF 10 nF 20 nF 50 nF 100 nF 1 μF 10 μF 100 μF 1 mF 10 mF	29 pF 58 pF 92 pF 190 pF 360 pF 5.1 nF 74 nF 840 nF 13 μF 130 μF	Calibration of measuring devices by comparison	
FREQUENCY	0.01 Hz to 50 MHz	5.0 parts in 10^8	Frequency may also be expressed in terms of time; 1/f, for repetitive signals or in other units such as revolutions per minute.	IRE

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
RPM (Revolutions per minute)	2 rpm to 10 rpm 10 rpm to 100 rpm 100 rpm to 1000 rpm 1 000 rpm to 10 000 rpm 10 000 rpm to 100 000 rpm	10 ppm + 0.00050 rpm 10 ppm + 0.0020 rpm 10 ppm + 0.020 rpm 10 ppm + 0.20 rpm 10 ppm + 2.0 ppm		IRE
TIME INTERVAL	Longer than 100 ms	2.0 ppm + 20 ms	Manually triggered single events.	IRE
	Longer than 80 ns	2.0 ppm + 80 ns	Electronically triggered single events	IRE
RCD				
Trip current	2 mA to 3 A *20 ms to 190 ms*	5.8 % + 240 µA		IRE
	2 mA to 3 A *190 ms to 5 s*	1.4 % + 80 µA		
Trip time	20 ms to 400 ms 400 ms to 5 s	1.0 ms 10 ms		
AC resistance for Loop 50 Hz			Laboratory loop 0.20 Ω	IRE
Nominal Ranges	0.2 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ	0.6% + 4.8 mΩ 0.6% + 19 mΩ 0.6% + 36 mΩ		
Earth Bond Resistance	0 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ	0.60 % + 4.8 mΩ 0.60 % + 19 mΩ 0.60 % + 36mΩ		IRE
Earth bond current 50 Hz	10 mA to 500 mA 100 mA to 10 A 10 A to 30 A	1.8 % + 7.0 mA 1.8 % + 70 mA 1.8 % + 70 mA		
Load	0.13 kVA	6.0 %		
Leakage Current At nominal 240 V 50 Hz	2 mA to 8 mA	1.8 % + 11 µA		IRE
Insulation Test Voltage	50 V to 1000 V	1.2 % + 950 mV		
Insulation Resistance	10 kΩ to 100 kΩ 101 kΩ to 1 MΩ 1.01 MΩ to 10 MΩ 10.1 MΩ to 100 MΩ 101 MΩ to 1 GΩ 1.01 GΩ to 10 GΩ	0.12 % + 200 mΩ 0.12 % 1.2 % 1.2 % 1.4 % 7.0 %		
AC Voltage				
Nominal 50 Hz	100 V to 400 V	0.25 % + 160 mV		IRE

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
Continuity Resistance	20 mΩ to 1000 Ω	0.30 % + 30 mΩ		IRE
Continuity Current At a nominal 1 Ω	10 mA to 300 mA	1.6 % + 0.80 mA		
ELECTRICAL SIMULATION OF TEMPERATURE Thermocouple capabilities listed below are given for type T Base and Type C Noble, using EMF sensitivity values as listed in BS EN 60584-1:2013. Other Thermocouple types can be calibrated, the uncertainties will correspond to the appropriate sensitivities listed. Calibrations which include the internal reference junction (CJC) are available for types: J, K, N, T, E, R, S, B & C				
Base Metal Thermocouples	-200 °C to +1400 °C	0.10 °C	Excluding automatic CJC	
Noble Metal Thermocouples	0 °C to 2315 °C	0.10 °C		
Base Metal Thermocouples	-200 °C to +1400 °C	0.25 °C	Including automatic CJC	
Noble Metal Thermocouples	500 °C to 1800 °C	0.26 °C		
Cold Junction Compensation	0 °C to 30 °C	0.15 °C		
Resistance thermometers by simulation Values below are based upon a PT100. Other resistance thermometer types, including thermocouples with a defined resistance scale can also be calibrated based on the resistance capabilities listed above.				
Resistance thermometer simulation	-200 °C to 840 °C	0.0050 °C		IRE

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE				IRE
Temperature indicators and recorders, with temperature sensor(s)	0.01 °C (Water Triple Point) -196 °C (LN2) -95 °C to -80 °C -80 °C to +300 °C 300 °C to 450 °C 450 °C to 650 °C	0.0030 °C 0.015 °C 0.025 °C 0.015 °C 0.027 °C 0.094 °C	In a range of liquid and metal media baths	
Platinum Resistance Thermometers (4 wire)	0.01 ºC (Water Triple Point) -196 °C (LN2) -95 °C to -80 °C -80 °C to +300°C 300 °C to 450 °C 450 °C to 650 °C	0.0030 ºC 0.015 °C 0.025 °C 0.015 °C 0.027 °C 0.094 °C	In a range of liquid and metal media baths	
Metal Block Calibrators and portable liquid baths	-100 °C to +100 °C 100 °C to 300 °C 300 °C to 420 °C 420 °C to 650 °C 0 °C	0.030 °C 0.038 °C 0.15 °C 0.16 °C 0.020 °C	Suitable zero reference baths	
HUMIDITY				
Dew-point	-25 °C to +60 °C	0.17 °C	Calibrations undertaken in an air chamber	IRE
Temperature sensors in air	0 °C to 60 °C	0.10 °C		
Relative humidity	Example conditions *At 0 ℃:* 10 %rh to 90 %rh *At 23 ℃:* 5 %rh to 95 %rh *At 60 ℃:* 5 %rh to 90 %rh	Corresponding to above dew-point and temperature uncertainties 0.20 %rh to 1.1 %rh 0.20 %rh to 1.1 %rh 0.20 %rh to 0.80 %rh		
END				

Appendix - Calibration and Measurement Capabilities

Introduction

The definitive statement of the accreditation status of a calibration laboratory is the Accreditation Certificate and the associated Schedule of Accreditation. This Schedule of Accreditation is a critical document, as it defines the measurement capabilities, ranges and boundaries of the calibration activities for which the organisation holds accreditation.

Calibration and Measurement Capabilities (CMCs)

The capabilities provided by accredited calibration laboratories are described by the Calibration and Measurement Capability (CMC), which expresses the lowest uncertainty of measurement that can be achieved during a calibration. If a particular device under calibration itself contributes significantly to the uncertainty (for example, if it has limited resolution or exhibits significant non-repeatability) then the uncertainty quoted on a calibration certificate will be increased to account for such factors. The CIPM-ILAC definition of the CMC is as follows:

A CMC is a calibration and measurement capability available to customers under normal conditions:
(a) as published in the BIPM key comparison database (KCDB) of the CIPM MRA; or
(b) as described in the laboratory's scope of accreditation granted by a signatory to the ILAC Arrangement.

The CMC is normally used to describe the uncertainty that appears in an accredited calibration laboratory's schedule of accreditation and is the uncertainty for which the laboratory has been accredited using the procedure that was the subject of assessment. The CMC is calculated according to the procedures given in M3003 and is normally stated as an expanded uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of $k = 2$. An accredited laboratory is not permitted to quote an uncertainty that is smaller than the published CMC in certificates issued under its accreditation.

The CMC may be described using various methods in the Schedule of Accreditation:

As a single value that is valid throughout the range.
As an explicit function of the measurand or of a parameter (see below).
As a range of values. The range is stated such that the customer can make a reasonable estimate of the likely uncertainty at any point within the range.
As a matrix or table where the CMCs depend on the values of the measurand and a further quantity.
In graphical form, providing there is sufficient resolution on each axis to obtain at least two significant figures for the CMC.

Expression of CMCs - symbols and units

In general, only units of the SI and those units recognised for use with the SI are used to express the values of quantities and of the associated CMCs. Nevertheless, other commonly used units may be used where considered appropriate for the intended audience. For example, the term "ppm" (part per million) is frequently used by manufacturers of test and measurement equipment to specify the performance of their products. Terms like this may be used in Schedules of Accreditation where they are in common use and understood by the users of such equipment, providing their use does not introduce any ambiguity in the capability that is being described.

When the CMC is expressed as an explicit function of the measurand or of a parameter, this often comprises a relative term (e.g., percentage) and an absolute term, i.e. one expressed in the same units as those of the measurand. This form of expression is used to describe the capability that can be achieved over a range of values. Some examples are shown below. It should be noted that these expressions are *not* mathematical formulae but are instead written in a commonly used shorthand for expressing uncertainties - therefore, for purposes of clarity, an indication of how they are to be interpreted is also provided below.

DC voltage, 100 mV to 1 V: 0.0025 % + 5.0 µV

Over the range 100 mV to 1 V, the CMC is 0.0025 %·V + 5.0 µV, where V is the measured voltage.

Hydraulic pressure, 0.5 MPa to 140 MPa: 0.0036 % + 0.12 ppm/MPa + 4.0 Pa

Over the range 0.5 MPa to 140 MPa, the CMC is $0.0036\ \%\cdot p + (0.12\cdot 10^{-6}\cdot p\cdot 10^{-6}) + 4.0$ Pa, where p is the measured pressure in Pa.

It should be noted that the percentage symbol (%) simply represents the number 0.01. In cases where the CMC is stated only as a percentage, this is to be interpreted as meaning percentage of the measured value or indication.

Thus, for example, a CMC of 1.5 % means $1.5 \cdot 0.01 \cdot i$, where i is the instrument indication.