Schedule of Accreditation

issued by

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

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Accredited to ISO/IEC 17025:2017

Lambda Calibration Ltd

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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 Lambda Calibration Ltd Units 11-13 Chorley Central Business Park Stump Lane Chorley Lancashire PR6 0BL	**Local contact** Denise Catterall	Dimensional Electrical Pressure Torque Temperature	A

Site activities performed away from the locations listed above:

Location details		Activity	Location code
At customers premises	Denise Catterall	Dimensional Electrical Pressure	B

Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code

RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES
UNLESS OTHERWISE STATED

NOTES:

Note 1: The uncertainty quoted is for the departure from flatness, straightness, parallelism or squareness, i.e. the distance separating the two parallel planes which just enclose the surface under consideration.

Note 2: Single start, symmetrical thread forms only.

Note 3: Functional test of size using setting plugs calibrated with an expended uncertainty of 3.0 µm

Note 4: . Features and associated parts of these gauges can be measured to the uncertainties given for equivalent items listed in this schedule.

Note 5: The uncertainty quoted is for the application of the calibration torque and does not take into account the characteristics of the device being calibrated.

Note 6: Calibrations may also be given in lbf.in and lbf.ft

Note 7: . Simple height gauges
- vernier, dial and digital instruments designed only for measuring distances parallel to the beam.

Note 8: Conformance statements cannot be made against specifications whose magnitudes are smaller than the specified CMC values

Note 9: **Class C** uncertainties apply to the measurement of length of gauges by comparison with grade K standards of length of a similar material. Class C uncertainties apply to new and used grade 0, 1 and 2 gauges to BS 4311-1:2007 and BS EN ISO 3650:1999.

Note 10: Ancillery measurements made for completeness of calibration. Best CMC's are dependent on methodology and range.

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
LENGTH				
Gauge blocks		Class C (*See* Note 9)		A
Inch (Steel and Carbide)	BS 4311-1:2007 0.010 to 0.4 in 0.4 in to 1 in Size 2 in Size 3 in Size 4 in	C 3.0 4.0 5.0 μ inches 6.0 7.0		
Millimetre (Steel and Carbide)	BS EN ISO 3650:1999 0.5 to 10 10 to 25 Sizes 30, 40, 50 60, 70, 75 80, 90, 100	C 0.080 0.10 0.12 0.15 0.18		A
Gauge block accessories	As BS 4311-2:2009 0.1 to 12.5	0.30		A
Length gauges, flat and spherical ended (excluding Length Bars)	0 to 1000	1.0 + (5.0 x length m)	By comparison with reference standards	A
Plain plug gauges parallel, cylindrical setting standards and rollers.	1 to 50 diameter 50 to 100 100 to 300	0.80 1.0 1.5	By comparison with reference standards	A
Plain ring gauges (parallel)	0.7 to 10 diameter 10 to 50 50 to 100 100 to 300	1.0 0.80 1.0 2.5	By comparison with reference standards	A
Plain plug gauges (taper)				A
Parallel to 1 in 3 on diameter	3 to 200 diameter	3.0	By comparison with reference standards	
Plain ring gauges (taper)				A
Parallel to 1 in 3 on diameter	3 to 100 diameter 100 to 200 diameter	3.0 5.0	By comparison with reference standards	
Precision balls (steel, carbide, ceramic)	1 to 100 diameter	0.80	By comparison with reference standards	
Feeler Gauges	BS 957:2008.0.0025 to 1	1.0	By comparison with reference standards	A

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
LENGTH (cont'd)				
Gap gauges (Plain parallel)	2 to 100 100 to 200 200 to 300	3.0 5.0 8.0	By comparison with reference standards	A
Paint thickness setting foils	0 to 8	1.0	By comparison with reference standards	A
Rule – steel	BS 4372:1968 0 to 1000 1000 to 2000	 5.0 + (10 x length in m) 8.0 + (10 x length in m)		A
Linear Precision scales	0 to 400	5.0	By optical measurement	A
SCREW THREAD GAUGES			2 wire method	
Screw plug gauges (parallel) including check and setting plugs. See Note 2	1 to 100 diameter 100 to 150 diameter	3.0 on pitch 5.0 diameter		A
Screw plug gauges (taper) See Note 4	5 to 100 diameter 100 to 150 diameter	5.0 on pitch 8.0 diameter		
Screw ring gauges (parallel) See Note 2	1 to 75 diameter 75 to 150 diameter	5.0 on pitch 7.0 diameter	By comparison with reference standards	
Screw ring gauges (taper) See Note 2	5 to 100 diameter 100 to 150 diameter	7.0 on pitch 10.0 diameter		
Screw pitch Screw flank angle	0.2 to 8 0° to 52°	1.5 5.0 minutes of arc		
Screw thread adjustable caliper gauges (parallel) See Note 2	1 to 150	See note 3		A
Thread measuring cylinders	BS 5590:1978 and specials 0.1 to 5	 0.50		A
Parallels	BS 906:1972 5 to 50 x 100 x 400	 1.5 to 5.0		A
Vee blocks	BS 3731:1987 20 to 200	 2.5 to 5.0		A
Receiver and position gauges, jigs, fixtures	0 to 600 x 600 x 600 0 to 600 x 600 x 500 (Using a coordinate measuring machine)	See note 4 8 µm + 6 µm/m	Documented in-house method	A

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
SCREW THREAD GAUGES				
Thread vee groove jaw blades	0.6 (40 T.P.I.) to 6.0 (4.5 T.P.I)	3.0	Documented in-house method	A
ANGLE				
Squares				A
Blade type	BS 939:2007 50 to 300 300 to 600	 3.0 5.0		A
Cylindrical	75 to 300 300 up to 600	2.0 2.0 On squareness see Note 1		A
Block	50 to 300 300 to 600	3.0 5.0		A
Right angle and box angle plates	BS 5535:1878 50 to 600	Squareness: 3.0 + 1.0 per 100 mm Parallelism: 1.0 + 1.0 per 100 mm See Note 1		A
Sine bars and tables	BS 3064:1978 0 to 500 length	Linear dimensions 2.0 + (3 x length in m) Overall performance 3.0 seconds of arc		A
Clinometers	0° to 360°	10 seconds of arc	By comparison to reference standards	A
Electronic indicating levels	0 minutes of arc to 8 minutes of arc	1.0 % of range Minimum 0.40 seconds of arc		A
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		A
Rotary tables and dividing heads, including inclinable versions	0 ° to 360 ° angular scales 0 to 600 Capacity	3.0 seconds of arc Linear measurements: 1.0 + (10 x length in m)	By comparison with angle standards. By comparison with end standards and datum planes.	A, B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS				
Micrometers				
Micrometers External	BS 870:2008 0 to 1000	Heads: 2.0		A
Internal	BS 959:2008 0 to 900	Setting and extension rods		
Depth	BS 6468:2008 0 to 300	1.0 + (5.0 x length in m)		
Micrometer, 3 point bore	6 to 100 100 to 250	3.0 5.0	By comparison to reference standards	A
Micrometer Heads	BS 1734:1951 0 to 50	1.0		A
Height setting micrometer	0 to 300	Heads 1.5 between any two points Stepped column 2.5 Overall performance 3.0	By comparison to reference standards	A
Riser blocks for above	150 300	2.5 5.0	By comparison to reference standards	A

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS (cont'd)				A
Vernier, digital electronic, dial caliper, height and depth gauges	BS 887:2008 0 to 1200 BS 1643:2008 0 to 1200 BS 6365:2008 0 to 600	Overall performance 10 + (30 x length in m)		
	ISO 13385-1 2019 Partial surface contact error (E)		Calibration by comparison to length standards	A
	0 to 50 mm 50 to 100 mm 100 to 200 mm 200 to 300 mm 300 to 2000 mm	2.0 3.0 6.0 8.0 6 + (10 x length in m)	The stated uncertainty has been calculated in accordance With ISO 14253-5 and relates to the test value uncertainty.	
	Shift error (S) internal jaws 3 to 50 mm	6.0		
	Shift error (S) depth and step 3 to 50 mm	6.0		
	ISO 13385-2 2020 Partial surface contact error (E)		Calibration by comparison to length standards	A
	0 to 100 mm 100 to 200 mm 200 to 300 mm 300 mm to 1000mm	4.0 6.0 9.0 6 + (10 x length in m)	The stated uncertainty has been calculated in accordance With ISO 14253-5 and relates to the test value uncertainty.	
	Shift error (S) 0 to 100 mm	4.0		
Height gauges - (Simple) including vernier, dial and digital types (See notes 7 and 8)	As BS EN ISO 13225:2012 0 to 1200	Length measurement error (E): 1 + (5 x length in metres)		A

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS (cont'd)				
Bevel protractors	As BS 1685:2008 0° to 360°	6.0 minutes of arc		A
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 50	1.0		A
Displacement transducers (linear)	0 to 100	0.2	By comparison to reference standards	A
Height gauges (digital and electronic)	0 to 1000	1.0 + (5 x length in m)	By comparison to reference standards	A
Straightedges Cast iron, Steel and Granite	BS 5204:Part 1:1975 BS 5204:Part 2:1977 0 to 2000	4.0 See note 1		A
Tool makers flats	63 to 150	0.15 See note 1	By comparison to reference standards	A
Cube moulds for cement and concrete	BS EN 12390-1 2012 100 to 150 × 150 × 150 BS EN 196-1 2005 160 × 40 × 40	17 µm + 8 µm/m		A
Profile projectors	5 to 100 magnifications	125 at the screen	By comparison with end standards.	A, B
	0 to 300 linear scales	4.0	Using optical methods.	
	0 ° to 360 ° angular scales	3.0 minutes of arc	Using two point contact method.	
Horizontal measuring machines	0 to 100	0.30 + (3.0 × L in m) Flatness of Anvils: 0.20 Parallelism of Anvils: 0.15	By comparison with end standards. Using optical methods. Using two point contact method.	A, B
FORM				
Surface plates				
Granite and Cast Iron	BS 817:2008 160 x 100 to 2500 x 1600	1.5 + (1.0 x diagonal in m)		A, B
	Local variation	2.0		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
ANCILLERY MEASUREMENTS				
Flatness		0.25	See note 10	A
Parallelism		0.15		
Squareness		3.0		
Straightness		1.5 + (1.0 x length in m)		
Angular		5 second of arc		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
ELECTRICAL MEASUREMENTS: All values and uncertainties listed below are applicable for the calibration of both measurement instruments and for instruments with an output. the method used is by direct comparison unless otherwise stated in the remarks column. Uncertainties listed apply for the laboratory environment of 18°C to 22°C. Measurements can take place outside these limits but at increased uncertainties.				
ELECTRICAL				
		μΩ/Ω		
RESISTANCE	0 Ω to 2 Ω	20 μΩ/Ω + 15 μΩ		A, B
	2 Ω to 20 Ω	11 μΩ/Ω + 20 μΩ		
	20 Ω to 200 Ω	9.5 μΩ/Ω + 110 μΩ		
	200 Ω to 2 kΩ	9.5 μΩ/Ω + 600 μΩ		
	2 kΩ to 20 kΩ	9.5 μΩ/Ω + 6.4 mΩ		
	20 kΩ to 200 kΩ	9.7 μΩ/Ω + 66 mΩ		
	200 kΩ to 2 MΩ	12 μΩ/Ω + 1.5 Ω		
	2 MΩ to 20 MΩ	24 μΩ/Ω + 16 Ω		
	20 MΩ to 200 MΩ	87 μΩ/Ω + 2.2 kΩ		
	200 MΩ to 2 GΩ	240 μΩ/Ω + 100 kΩ		
	2 GΩ to 20 GΩ	0.16 % + 10 MΩ		
Current carrying resistors DC	100 μΩ to 100 mΩ	0.035 %	50 A to 100 A	A
	1 mΩ to 100 mΩ	0.050 %	2 A to 5 A	
	1 mΩ to 100 mΩ	0.13 %	10 A to 20 A	
AC RESISTANCE	0.5 Ω to 2 kΩ			A, B
	50 Hz	0.65 %		
DC VOLTAGE	0 mV to 200 mV	7.1 μV/V + 600 nV		A, B
	200 mV to 2 V	4.1 μV/V + 800 nV		
	2 V to 20 V	4.1 μV/V + 4.8 μV		
	20 V to 200 V	6.3 μV/V + 47 μV		
	200 V to 1050 V	6.5 μV/V + 720 μV		
	1 kV to 10 kV	0.050 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
ELECTRICAL (cont'd)				
DC CURRENT	0 µA to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 10 A 10 A to 20 A 20 A to 100 A	15 µA/A + 500 pA 16 µA/A + 4.8 nA 17 µA/A + 48 nA 54 µA/A + 900 nA 200 µA/A + 17 µA 170 µA/A + 61 µA 440 µA/A + 410 µA 0.050 % + 0.58 mA		A, B
DC CURRENT Generation only	3.2 A to 105 A 105 A to 200 A 16 A to 160 A 160 A to 525 A 525 A to 1 kA	0.24 % + 10 mA 0.24 % + 46 mA 0.24 % + 6.4 mA 0.24 % + 52 mA 0.24 % + 230 mA	Suitable for Clamp Meters Using 10 turn coil Using 10 turn coil Using 50 turn coil Using 50 turn coil Using 50 turn coil	A, B
AC VOLTAGE	1 µV to 200 mV *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz*	 170 µV/V + 4.2 µV 170 µV/V + 4.4 µV 360 µV/V + 5.0 µV 720 µV/V + 20 µV		A, B
	200 mV to 2 V *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz*	 130 µV/V + 23 µV 130 µV/V + 24 µV 240 µV/V + 30 µV 500 µV/V + 100 µV		A, B
	2 V to 20 V *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz*	 130 µV/V + 230 µV 130 µV/V + 230 µV 240 µV/V + 300 µV 500 µV/V + 1.0 mV		A, B
	20 V to 200 V *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 100 kHz*	 140 µV/V + 2.3 mV 130 µV/V + 2.4 mV 240 µV/V + 4.0 mV 530 µV/V + 11 mV		
	200 V to 300 V *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz*	 210 µV/V + 71 mV 140 µV/V + 25 mV 270 µV/V + 44 mV		
	300 V to 1050 V *20 Hz to 40 Hz* *40 Hz to 10 kHz* *10 kHz to 30 kHz*	 210 µV/V + 71 mV 170 µV/V + 51 mV 340 µV/V + 150 mV		
	1 kV to 10 kV @ *50 Hz*	1.5 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
ELECTRICAL (cont'd)				A, B
AC CURRENT	1 nA to 200 μA *10 Hz to 1 kHz* *1 kHz to 5 kHz*	 380 μA/A + 21 nA 600 μA/A + 21 nA		
	200 μA to 2 mA *10 Hz to 1 kHz* *1 kHz to 10 kHz*	 380 μA/A + 210 nA 360 μA/A + 200 nA		
	2 mA to 20 mA *10 Hz to 1 kHz* *1 kHz to 10 kHz*	 360 μA/A + 2.1 μA 350 μA/A + 2.0 μA		
	20 mA to 200 mA *10 Hz to 1 kHz* *1 kHz to 10 kHz*	 380 μA/A + 21 μA 330 μA/A + 20 μA		
	200 mA to 500 mA *40 Hz to 3 kHz* *3 kHz to 5 kHz*	 0.12 % 0.15 %		
	200 mA to 2 A *10 Hz to 1 kHz* *1 kHz to 10 kHz*	 670 μA/A + 230 μA 870 μA/A + 210 μA		
	2 A to 4 A *40 Hz to 3 kHz* *3 kHz to 5 kHz*	 0.16 % 0.27 %		
	2 A to 20 A *10 Hz to 1 kHz* *1 kHz to 10 kHz*	 920 μA/A + 2.4 mA 0.26 % + 2.1 mA		
	20A to 50A *50 Hz*	 0.37%		
AC CURRENT Generation only	 3.2 A to 32 A *(10 to 100 Hz)* 32 A to 200 A *(10 to 100 Hz)* 3.2 A to 32 A *(100 to 440 Hz)* 32 A to 200 A *(100 to 440 Hz)* 16 A to 160 A *(10 to 100 Hz)* 160 A to 1 kA *(10 to 100 Hz)*	 0.33 % + 6.0 mA 0.33 % + 100 mA 0.93 % + 31 mA 0.81 % + 290 mA 0.33 % + 320 mA 0.33 % + 520 mA	Suitable for Clamp Meters Using 10 turn coil Using 10 turn coil Using 10 turn coil Using 10 turn coil Using 50 turn coil Using 50 turn coil	A, B
	10 A to 50 A @ *50 Hz*	0.38 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
ELECTRICAL (cont'd)				A, B
DISTORTION				
Distortion Factor				
	0.01 % to 0.1 % *0.2 V to 300 V* *20 Hz to 20 kHz* *20 kHz to 100 kHz*	 0.015 % distortion factor 0.029 % distortion factor	The capabilities for distortion factor relate to fundamental components in the frequency range 20 Hz to 100 kHz.	
	0.1 % to 1 % *0.2 V to 300 V* *20 Hz to 20 kHz* *20 kHz to 100 kHz*	 0.15 % distortion factor 0.29 % distortion factor		
	1 % to 30 % *0.2 V to 300 V* *20 Hz to 20 kHz* *20 kHz to 100 kHz*	 15 % of reading 30 % of reading		
Spot frequency	*1 kHz and 100 mV to 300 V* *0.01 % to 0.1 %* *0.1 % to 3 %* *3 % to 30 %*	 0.0028 % distortion factor 3.1 % of reading 0.41 % of reading	Calibration of distortion Analyzers	A
Phase angle	O ° to 360 ° 10 Hz to 10 kHz	 0.22 °		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
ELECTRICAL SIMULTION OF THERMOCOUPLES				
UUT with RJC Type:				A, B
B	+600 °C to 800 °C	0.41 ºC		
B	+800°C to 1820°C	0.33 ºC		
C	0 °C to 2320 °C	0.48 ºC		
E	-250 °C to -150 °C	0.37 ºC		
E	-150 ºC to 650 ºC	0.15 ºC		
E	650 ºC to 1000 ºC	0.19 ºC		
J	-200 °C to -100 °C	0.23 ºC		
J	-100 °C to 760 °C	0.14 ºC		
J	760 °C to 1200 °C	0.19 ºC		
K	-250 °C to –200 °C	0.67 ºC		
K	-200 °C to -100 °C	0.27 ºC		
K	-100 °C to 120 °C	0.13 ºC		
K	120 °C to 1000 °C	0.19 ºC		
K	1000 ºC to 1372 ºC	0.32 ºC		
L	-200 °C to 900 °C	0.33 ºC		
N	-200 °C to -100 °C	0.31 ºC		
N	-100 °C to -25 °C	0.15 ºC		
N	-25 °C to 410 °C	0.12 ºC		
N	410 ºC to 1300 ºC	0.19 ºC		
R	0 °C to 250 °C	0.47 ºC		
R	250 °C to 1000 °C	0.27 ºC		
R	1000 °C to 1760 °C	0.31 ºC		
S	0 °C to 250 °C	0.39 ºC		
S	250 °C to 1400 °C	0.30 ºC		
S	1400 °C to 1760 °C	0.38 ºC		
T	-250 °C to –150 °C	0.55 ºC		
T	-150 °C to 0 °C	0.49 ºC		
T	0 °C to 400 °C	0.13 ºC		
UUT without RJC Type:				A, B
B	250 ºC to +500 ºC	0.520 ºC		
B	+500 ºC to +1820 ºC	0.260 ºC		
E	-200 ºC to +1000 ºC	0.021 ºC		
J	-200 ºC to –80 ºC	0.059 ºC		
J	-80 ºC to +1200 ºC	0.030 ºC		
K	-200 ºC to –80 ºC	0.082 ºC		
K	-80 ºC to +1372 ºC	0.039 ºC		
N	-200 ºC to –80 ºC	0.130 ºC		
N	-80 ºC to +1300 ºC	0.056 ºC		
R	0 ºC to +20 ºC	0.260 ºC		
R	+20 ºC to +1767 ºC	0.220 ºC		
S	0 ºC to +20 ºC	0.260 ºC		
S	+20 ºC to +1767 ºC	0.220 ºC		
T	-200 ºC to –80 ºC	0.082 ºC		
T	-80 ºC to +400 ºC	0.043 ºC		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
PRT Simulation At 1 mA				A, B
Spot Values - nominal	5 Ω 25.4 Ω 100 Ω 188 Ω 254 Ω 333 Ω 400 Ω	120 µΩ 210 µΩ 520 µΩ 890 µΩ 1.2 mΩ 1.5 mΩ 1.8 mΩ		
Pt100 (temperature equivalents) BS EN 60751:2008	-184 ºC 0 ºC 232 ºC 420 ºC 660 ºC	0.00050 ºC 0.0013 ºC 0.0025 ºC 0.0034 ºC 0.0047 ºC		
Intermediate Values	0 Ω to 400 Ω	12 µΩ/Ω + 0.75 mΩ	Simulate between nominal – 200 ºC and 900 ºC	A, B
ELECTRICAL MEASUREMENT				
Thermistor Simulation	-50 ºC -20 ºC 0 ºC +20 ºC +40 ºC +60 ºC +80 ºC +100 ºC +120 ºC +125 ºC	0.00047 ºC 0.00039 ºC 0.00043 ºC 0.00043 ºC 0.00049 ºC 0.00054 ºC 0.00059 ºC 0.00065 ºC 0.00072 ºC 0.00073 ºC	The uncertainties are appropriate for a typical 10,000 Ohm NTC thermistor simulation, and will vary for other types. Calibrations can also be carried out at other simulated temperatures in the range –50 ºC to +125 ºC. The uncertainties will lie between the adjacent points.	
Thermometer Readout (Ref Junction Compensation)	Ambient (nominally 20 °C)	0.060 °C		
Optical Tachometers	0 RPM to 1000 RPM 1000 RPM to 10000 RPM 10000 RPM to 100000 RPM	0.020 RPM 0.20 RPM 2.0 RPM		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
CAPACITANCE				
Generation only	*0 to 350 Hz*			
	0.5 nF to 4 nF	0.35 % + 18 pF	Suitable for the testing of capacitance measuring devices	A, B
	4 nF to 40 nF	0.35 % + 35 pF		
	40 nF to 400 nF	0.35 % + 190 pF		
	400 nF to 4 μF	0.47 % + 2.0 nF		
	4 μF to 40 μF	0.57 % + 19 nF		
	40 μF to 400 μF	0.58 % + 190 nF		
	400 μF to 4 mF	0.58 % + 2.0 μF		
	4 mF to 40 mF	1.2 % + 69 μF		
	350 Hz to 1.5 kHz			
	0.5 nF to 4 nF	0.70 % +35 pF		
	4 nF to 40 nF	0.70 % + 69 pF		
	40 nF to 400 nF	0.70 % + 370 pF		
	400 nF to 4 μF	0.93 % + 3.0 nF		
	4 μF to 40 μF	1.2 % + 37 nF		
	40 μF to 400 μF	1.2 % + 370 nF		
	400 μF to 4 mF	1.2 % + 4.0 μF		
	4 mF to 40 mF	2.3 % +140 μF		
OSCILLOSCOPE CHARACTERISTICS				
Vertical deflection square wave peak to peak	0 V to 130 V	0.3 %	Into 1 MΩ	
BANDWIDTH				
	3 dB point with respect to set point		Appropriate for calibration of oscilloscopes	A, B
	10 Hz to 50 kHz	0.60 %		
	50 kHz to 100 MHz	2.4 %		
	100 MHz to 250 MHz	5.2 %		
TIMING MARKER	5 ns to 5 s per division	0.30 %	Appropriate for calibration of oscilloscopes	
FREQUENCY				
	10 MHz reference	1.0 in 10^9	Stable oscillators	
	100 mHz to 1 MHz	1.5 in 10^9 + 1.0 μHz	May be expressed as time (1/f) for repetitive measurements	A
	1 MHz to 20.1 GHz	1.5 in 10^9		
Generation only	0.5 Hz to 250 MHz	0.29 μΩ/Ω	May be expressed as time (1/f) for repetitive measurements	A, B
Rise time	Nominal 1 ns 100 mV to 500 mV pulse rise and fall	90 ps	In to 50 Ω	
	Nominal 100 ns 5 V to 50 V pulse rise and fall	9 ns	In to 1 M Ω	
TIME Electronically Triggered				
Interval/Period Average	25 ns to 10 s	2.0 in 10^9 + (100 ns/No of periods)	Actual uncertainties quoted on certificate will include an allowance for the characteristics of the measured signal	A, B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
FREQUENCY (cont'd)				
Time Interval (A-A Event)	100 ns to 10^9 s	2.0 in 10^9 + 100 ns		A, B
Time Interval (A-B Event)	100 ns to 10^9 s	2.0 in 10^9 + 100 ns		
Time Interval	0.1 ms to 10 s	1.8 %	Appropriate for the calibration of RCD testers	A, B
TIME Mechanically Triggered	over 1 second	50 ms		A, B
POWER				
At unity power factor ± 1	10 µW to 10.5 kW @ *40 Hz to 1 kHz*	0.20 %		
	4 kW to 21 kW @ *50 Hz*	0.47 %		
AC Power Factor	0 to unity capacitive or Inductive	0.034		A, B
DC power	10 µW to 10.5 kW	0.060 %		
TORQUE				
Hand torque tools (including drivers)	To BS EN ISO 6789:2003 (withdrawn) 0.2 N·m to 1500 N·m	1.5 %		A
	BS EN ISO 6789:2017 0.2 N·m to 0.5 N·m 0.5 N·m to 1.0 N·m 1.0 N·m to 10 N·m 10 N·m to 1500 N·m	 3.1 % 1.6 % 0.60 % 0.50 %	By comparison with reference transducers See Notes 5 & 6	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
PRESSURE				
Hydraulic pressure (gauge)				
Calibration of pressure indicating instruments and gauges, pressure relief valves and switches	400 kPa to 600 kPa 600 kPa to 260 MPa 260 MPa to 372 MPa	0.015 % 0.0090 % Q [0.020%, 0.60 x10^{-6}/MPa]	Calibration of devices with an electrical output may be undertaken	A, B
Pressure equivalent calibration of Dead Weight Testers (pressure balance supplied with an associated mass set). Permanent lab only)	372 MPa to 400 MPa	590 kPa		
Calibration of Piezoelectric pressure transducers at quasi-static pressures	400 kPa to 260 MPa 260 MPa to 372 MPa	0.36 % 0.37 %	Calibration of devices with a charge output may be undertaken	A, B
Gas pressure (gauge)				
Calibration of pressure indicating instruments and gauges, pressure relief valves and switches Pressure equivalent calibration of Dead Weight Testers (pressure balance supplied with an associated mass set) Permanent lab only	-95 kPa to -5 kPa -5 kPa to -1.5 kPa -1.5 kPa to 1.5 kPa 1.5 kPa to 5 kPa 5 kPa to 50 kPa 50 kPa to 2.5 MPa 2.5 MPa to 7 MPa 7 MPa to 21 MPa 21 MPa to 40 MPa	0.0090 % 0.010 % 0.58 Pa 0.0080 % 0.0070 % 0.0063 % Q [0.0042 %, 60 Pa] Q [0.0046 %,260 Pa] 16 kPa	Absolute pressure calibrations can be undertaken using associated barometric pressure measurement correction. The uncertainties quoted will be increased by 6 Pa..	A, B
Gas pressure (absolute)				
Calibration of pressure indicating instruments and gauges	0.1 Pa to 1 Pa 1 Pa to 10 Pa 10 Pa to 60 Pa 60 Pa to 100 Pa 100 Pa to 133 Pa 133 Pa to 131 kPa 131 kPa to 350 kPa 350 kPa to 2.1 MPa 2.1 MPa to 7.1 MPa 7.1 MPa to 21.1 MPa	0.088 Pa 0.11 Pa 0.28 Pa 0.44 Pa 0.59 Pa Q [0.0043 %, 4.0 Pa] Q [0.0060 %, 11 Pa] Q [0.0055 %, 30 Pa] Q [0.0042 %, 60 Pa] Q [0.0046 %, 260 Pa]	Pressure indicating instruments and gauges without a pressure port can be calibrated.	A A, B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
TEMPERATURE				
Radiation thermometers (pyrometers)	-30 °C to -10 °C -10 °C to +15 °C 15 °C to 20 °C (ambient) 20 °C (ambient) to 100 °C 100 °C to 200 °C 200 °C to 300 °C 300 °C to 400 °C 400 °C to 500 °C	1.65 °C 1.25 °C 0.8 °C 0.6 °C 0.8 °C 1.0 °C 1.3 °C 1.6 °C	By comparison with a reference blackbody source or radiation thermometer.	A
Blackbody sources	-30 °C to -10 °C -10 °C to +15 °C 15 °C to 20 °C (ambient) 20 °C (ambient) to 100 °C 100 °C to 200 °C 200 °C to 300 °C 300 °C to 400 °C 400 °C to 500 °C	1.65 °C 1.25 °C 0.8 °C 0.6 °C 0.8 °C 1.0 °C 1.3 °C 1.6 °C	By comparison with a reference blackbody source or radiation thermometer.	A
Resistance Thermometers (4 Wire)	- 80 °C to - 50 °C -50 °C to 5 °C 0 °C (Ice Point) 0.01 °C (Triple Point of Water) 20 °C (Ambient) 5 °C to 80 °C 80 °C to 160 °C 160 °C to 260 °C 260 °C to 425 °C 425 °C to 660 °C	0.013 °C 0.011 °C 0.007 °C 0.003 °C 0.010 °C 0.013 °C 0.015 °C 0.016 °C 0.032 °C 0.055 °C	3 and 2 wire PRT can also be calibrated but will have an increased uncertainty. By comparison in a range of metal and liquid media baths	A
Temperature Indicators and/or recorders with temperature sensors	- 80 °C to- 50 °C - 50 °C to 5 °C 0 °C (Ice Point) 0.01 °C (Triple Point of Water) 20 °C (Ambient) 5 °C to 80 °C 80 °C to 160 °C 160 °C to 260 °C 260 °C to 425 °C 425 °C to 660 °C	0.012 °C 0.010 °C 0.006 °C 0.003 °C 0.010 °C 0.012 °C 0.014 °C 0.015 °C 0.031 °C 0.054 °C	By comparison in a range of metal and liquid media baths	A

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k=2)	Remarks	Location Code
TEMPERATURE (cont'd)				
Block Calibrators and small liquid baths	- 80 °C to 0 °C 0 °C to 150 °C 150 °C to 250 °C 250 °C to 425 °C 425 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1200 °C	0.0344 °C 0.041 °C 0.053 °C 0.076 °C 0.11 °C 1.0 °C 1.9 °C	By comparison to a reference PRT or thermocouple.	A
Noble Metal Thermocouples (Thermocouples with cold junctions)	0 °C (Ice Point) 20 °C (Ambient) 20 °C to 260 °C 260 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1200 °C	0.12 °C 0.11 °C 0.11 °C 0.35 °C 1.5 °C 2.3 °C	Thermocouples without a cold junction will have an increased uncertainty. By comparison in a range of metal and liquid media baths	A
Base metal Thermocouples	0 °C (Ice Point) 20 °C (Ambient) -80 °C to 260 °C 260 °C to 425 °C 425 °C to 660 °C 660 °C to 1100 °C 1100 °C to 1200 °C	0.062 °C 0.069 °C 0.070 °C 0.15 °C 0.15 °C 1.5 °C 2.3 °C	By comparison in a range of metal and liquid media baths	A
Extension or compensating cable Base Metal	0 °C (Ice Point) 20 °C (Ambient) -25 °C to 200 °C	0.026 °C 0.040 °C 0.040 °C	By comparison in a range of metal and liquid media baths	A
Noble Metal	0 °C (Ice Point) 20 °C (Ambient) 20 °C to 200 °C	0.11 °C 0.10 °C 0.10 °C		
Thermistors	0 °C (Ice Point) 0.01 ºC (Triple Point of Water) Ambient (nominally 20 °C) -50 °C to 5 °C 5 °C to 125 °C	0.007 °C 0.003 °C 0.010 °C 0.010 °C 0.013 °C		A
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 measurement uncertainty 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 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 measurement uncertainty is calculated according to the procedures given in the GUM 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 measurement uncertainty in certificates issued under its accreditation.

Expression of CMCs - symbols and units

It should be noted that the percentage symbol (%) represents the number 0.01. In cases where the measurement uncertainty is stated as a percentage, this is to be interpreted as meaning percentage of the measurand.
Thus, for example, a measurement uncertainty of 1.5 % means $1.5 \times 0.01 \times q$, where q is the quantity value.

The notation Q[a, b] stands for the root-sum-square of the terms between brackets: $Q[a, b] = [a^2 + b^2]^{1/2}$