Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0394

Accredited to ISO/IEC 17025:2017

Trescal Limited

Issue No: 067 **Issue date:** 14 December 2023

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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 (Pride Park) Trescal Ltd Unit 2, Riverside Road Pride Park Derby DE24 8HY **Local contact** Trevor Smith Tel: +44 (0) 1332 238102 Email: calibration.derby@trescal.com	Dimensional Electrical Humidity Temperature Torque	Pride Park
Address (Ansty) Trescal EMS – Rolls-Royce Standards Room Building 6 Ansty Coventry CV7 9JR **Local contact** David Williams Tel: +44 (0) 2476 623625 Email: david.williams2@rolls-royce.com	Torque Pressure	Ansty
Address (Inchinnan) Trescal EMS – Rolls-Royce Inchinnan Drive Inchinnan Renfrewshire PA4 9AF **Local contact** Robert Simpson Tel: +44 (0) 141 626 8540 Email: robert.simpson@trescal.com	Dimensional Torque	Inchinnan
Address (Washington) Trescal EMS – Rolls-Royce Calibration Laboratory Radial Park Road Washington Tyne and Wear NE38 9DA **Local contact** Robert Simpson Tel: +44 (0) 191 297 3023 Email: robert.simpson@trescal.com	Dimensional Torque	Washington

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Calibration performed by the Organisation at the locations specified

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address (Bristol) Trescal EMS – Rolls-Royce Metrology Laboratory (EW6/7) PO Box 3 Filton Bristol BS34 7QE	**Local contact** Mr M Viney Tel: +44 (0) 117 979 6099 Email: michael.viney@rolls-royce.com	Fuel Flow Torque	Bristol
Address (Solihull) Trescal EMS - Rolls-Royce Derwent Building 5000 Solihull Parkway Birmingham Business Park Birmingham B37 7YP	**Local contact** Jim Attwooll Tel +44 (0) 121 2732781 Email: jim.attwooll@rolls-royce.com	Electrical DC&LF Dimensional	Solihull

Site activities performed away from the locations listed above:

All Rolls-Royce sites: The 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** Trevor Smith Tel: +44 (0) 1332 238102 Email: Trevor.smith@trescal.com	Form Electrical Temperature	Site

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				
LENGTH				Pride Park
Thread measuring cylinders	BS3777:1964 and BS 5590:1978 and specials 0.1 to 5.0 diameter	0.50 on diameter	NOTES 1 In addition to all items in the first column, other similar items, including parts of measuring instruments and machines, may be calibrated in accordance with the stated CMCs. Where the item or part calibrated is of lower quality due to wear, errors in geometry or form, or poor surface texture, or where any other factor adversely affects the measurement capability, greater uncertainties will be quoted.	
Plain plug gauges (parallel), cylindrical setting standards, gear measuring cylinders and rollers. See Note 6	1 to 50 diameter 50 to 100 100 to 150 150 to 200 200 to 300	0.50 0.80 1.0 1.2 1.6 (on diameter)		
Plain ring gauges (parallel) and setting standards	CCP 2.3.2, issue 12 1 to 50 diameter 50 to 100 diameter 100 to 150 diameter 150 to 200 diameter	0.90 1.2 1.8 2.5 (on diameter)		
Length gauges, flat and spherical ended See Note 6	0 m to 3 m	1.0 + (5.0 x length in m)	2 The uncertainty quoted is for the departure from flatness, straightness, or squareness, i.e. the distance separating the two parallel planes which just enclose the surface under consideration.	
Length bars Inspection and workshop grades 1 and 2	BS 1790:1961 BS 5317:1976	1.0 + (1.6 x length in m)	3 All linear calibrations may be given in inch units.	
Plain gap gauges (parallel)	BS 969:2008 0.5 to 100 100 to 200 200 to 300	3.0 5.0 8.0	4 Single start symmetrical thread forms only. 5 Single start symmetrical thread forms only.	
Screw plug gauges (parallel) including check and setting plugs See Notes 5 and 6	1 to 100 diameter 100 to 300 diameter	2.5 5.0 (On pitch diameter)	6 By comparison with end standards using a length measuring machine.	
Screw ring gauges (parallel) See Notes 4 and 6	5 to 75 diameter 100 to 150 diameter 150 to 300 diameter	4.0 5.0 8.0 (On pitch diameter)		
Screw pitch	0.2 to 8	1.5	Using a length measuring machine.	
Screw flank angle	0º to 50º	5.0 minutes of arc	Using a projector.	
Parallels	BS 906:Parts 1 and 2:1992 5 to (50 x 100 x 400)	1.5 to 5.0		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
LENGTH (continued)				Pride Park
Gauge blocks		Class (see note)	Note	
Inch (Steel)	BS 4311-1:2007 0 in to 0.4 in 0.4 in to 1 in Size 2 in 3 in 4 in	C D 3.0 µ in 4.0 µ in 4.0 µ in 5.0 µ in 5.0 µ in 6.0 µ in 7.0 µ in	Class C uncertainties apply to the measurement of length by comparison with grade K standards of a similar material. Class D uncertainties apply to the measurement of length by comparison with grade K standards of a dissimilar material. The uncertainties apply to new and used grade 0, 1 and 2 gauges to BS EN ISO 3650:1999 and BS 4311-1:2007.	
Millimetre (Steel)	BS EN ISO 3650:1999 0 to 10 10 to 25 Size 30, 40, 50 60, 70, 75 80, 90, 100	C D 0.080 0.10 0.10 0.13 0.12 0.15 0.18		
Vee blocks	BS 3731:1987 20 to 150 diameter, Vee capacity	2.5 to 5.0		
Receiver, position and profile gauges, jigs, fixtures	1500 x 750 x 750	From first principles: Dependant on size and features Minimum per co-ordinate: 3.0 + (10 x length in m)		
	1500 x 3200 x 1100	Using CMM: Dependant on size and features Minimum per co-ordinate: 5.0 + (10 x length in m)		
ANGLE				
Squares				
Blade type	BS 939;2007, CCP 2.4.17 issue 10 50 to 300 300 to 600	 3.0 5.0		
Cylindrical	BS 939:2007, CCP 2.4.17 issue 10 75 to 300 300 to 600	 2.0 On squareness 4.0 *See* Note 2		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ANGLE (continued)				Pride Park
Block	BS 939:2007			
	50 to 300	7.0		
	300 to 600	7.0		
Angle gauges	NPL type	2.0 seconds of arc	In-house methods based	
	Other types	3.0 seconds of arc	on MOY/SCMI/18	
Sine bars and tables	BS 3064:1978	Linear dimensions:		
	100 to 500 length	1.5 + (10 x length in m)		
		Flatness: 2.4		
		Parallelism: 3.0		
		Squareness: 4.5		
		Overall performance:		
		4.0 seconds of arc		
Sine centres	100 to 500 length or between centres	Linear dimensions: 1.5 + (10 x length in m) Flatness: 2.4	In-house methods based on BS 3064:1978	
Compound sine tables	100 to 500 length	Parallelism: 3.0		
		Overall performance 4.0 seconds of arc		
FORM				
Straightedges				
Cast iron	BS 5204:Part 1:1975 and	1.0		
Steel	BS 5204:Part 2:1977	+ (2.0 x length in m)		
Granite	0 m to 2m	See Note 2		
Roundness	BS 3730:Part 2:1982			
External	0 to 350 diameter	0.050 on radius		
Internal	3 to 350 diameter	0.050 on radius		
Steel balls	1 to 25 diameter	0.70 on diameter	By comparison with end standards	
	25 to 50 diameter	0.80 on diameter	using a length measuring machine.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
MEASURING INSTRUMENTS AND MACHINES			Instrument entries in this section of the schedule also cover digital and dial type gauges which are calibrated based on the quoted standards.	Pride Park
Micrometers				
External micrometer	Based on BS 870:2008, CCP 2.4.1 issue 13 0 to 600			
	Heads:	2.0 between any two points		
	(Zero) Setting, 0 to 25:	1.0		
	(Zero) Setting, 25 to 600:	1.0 + (8.0 x length in m)		
	Flatness of anvils:	0.50		
	Parallelism of anvils:	0.80		
	Spindle alignment:	3.7		
Internal micrometer	Based on BS 959:2008 0 to 300	Heads: 2.0 Setting and Extension rods: 1.0 + (5.0 x length in m)		
Depth micrometer	Based on BS 6468:2008 0 to 300	Heads: 2.0 Setting and Extension rods: 1.0 + (5.0 x length in m)		
Micrometer heads	BS 1734:1951; 0 to 100	1.0		
Height setting micrometer	0 to 300	Heads 1.0 Stepped column 1.6 Overall performance 2.0	By comparison with end standards.	
Riser Blocks	150 300	1.6 1.7	By comparison with end standards.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
MEASURING INSTRUMENTS AND MACHINES (continued)				Pride Park
Height gauges - (Simple) including vernier, dial and digital types	BS EN ISO 13225:2012 0 to 300	4.0		
Vernier gauges Caliper	Based on BS 887:2008 0 to 1200 Overall performance: Flatness: Parallelism: Squareness: Co-Planer: Width of internal jaws:	 10 + (30 x length in m) 3.0 4.0 8.0 25 6.0		
Height	Based on BS 1643:2008 0 to 1200 Overall performance: Flatness: Parallelism: Depth of Jaw / Scriber:	 10 + (30 x length in m) 3.0 4.0 7.0		
Depth	Based on BS 6365:2008 0 to 600 Overall performance: Flatness / Straightness: Parallelism:	 10 + (30 x length in m) 3.0 4.0		
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 50 Scale interval measurements: Discrimination:	 1.0 1.3		
Spirit levels	BS 958:1968 and BS 3509:1962 Nominal sensitivity 5 seconds of arc to 60 minutes of arc	Mean sensitivity: 10 % of nominal; minimum 0.50 seconds of arc		
Clinometers	0° to 360°	10 seconds of arc	In-house method based on MOY/SCMI/36	
Levels, electronic	0 seconds of arc to 10 minutes of arc	1.0 % of range minimum 0.50 seconds of arc	The quoted uncertainty will be particularly dependent on the sensitivity of the device. Using small angle generator.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TORQUE				
Hand torque tools (excluding torque screwdrivers)	BS EN ISO 6789:2017 And BS EN ISO 6789:2003 (withdrawn and superseded) and CCP 3.6.6 Issue 11 1.0 N·m to 1000 N·m	1.0 %	The quoted uncertainty will be particularly dependent on the repeatability of the unit under test.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL MEASUREMENTS				**Pride Park**
DC VOLTAGE				
Measurement	Up to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1 000 V	5.5 µV/V + 1.3 µV 5.1 µV/V 6.1 µV/V 9.4 µV/V 9.6 µV/V		
Generation				
	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1100 V	5.5 µV/V + 0.68 µV 4.0 µV/V + 1.0 µV 2.4 µV/V + 5.5 µV 4.0 µV/V + 80 µV 5.5 µV/V + 0.8039 mV		
DC RESISTANCE				
Measurement	0 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 200 kΩ 200 kΩ to 2 MΩ 2 MΩ to 20 MΩ 20 MΩ to 200 MΩ 200 MΩ to 2 GΩ	30 µΩ/Ω + 20 µΩ 13 µΩ/Ω 14 µΩ/Ω 24 µΩ/Ω 55 µΩ/Ω 450 µΩ/Ω 0.50%	The stated CMCs are for a four-terminal configuration and may be increased if a two-terminal configuration is necessary.	
Generation				
Four terminal configuration	10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ	21 µΩ/Ω 7.4 µΩ/Ω 7.4 µΩ/Ω 7.4 µΩ/Ω 8.2 µΩ/Ω 28 µΩ/Ω 41 µΩ/Ω 60 µΩ/Ω		
Two terminal configuration	0 Ω, 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ	8.0 mΩ 9.0 mΩ 16 mΩ 160 µΩ/Ω 17 µΩ/Ω 8.2 µΩ/Ω 21 µΩ/Ω 41 µΩ/Ω 60 µΩ/Ω		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DC CURRENT				Pride Park
Measurement	10 µA to 200 µA 200 µA to 200 mA 200 mA to 2 A	100 µA/A 100 µA/A 170 µA/A		
Generation	10 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	80 µA/A +1.6 nA 32 µA/A + 9.3 nA 32 µA/A + 93 nA 32 µA/A + 930 nA 79 µA/A + 18 µA 120 µA/A + 440 µA 590 µA/A + 4.5 mA		
	2 A to 20 A 20 A to 32 A 32 A to 105 A 105 A to 200 A 200 A to 525 A 525 A to 1000 A	590 µA/A + 4.5 mA 0.26 % + 1.2 mA 0.26 % + 9.5 mA 0.26 % + 45 mA 0.26 % + 48 mA 0.26 % + 230 mA	For the calibration of current clamps and similar devices, using multi-turn coil.	
AC VOLTAGE				
Measurement	10 mV to 200 mV *10 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 50 kHz*	 390 µV/V 640 µV/V 0.17%		
	200 mV to 2 V *10 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 50 kHz*	 190 µV/V 270 µV/V 870 µV/V		
	2 V to 20 V *10 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 50 kHz*	 180 µV/V 270 µV/V 870 µV/V		
	20 V to 200 V *10 Hz to 10 kHz* *10 kHz to 30 kHz* *30 kHz to 50 kHz*	 190 µV/V 270 µV/V 870 µV/V		
	200 V to 300 V *40 Hz to 10 kHz* *10 kHz to 30 kHz*	 250 µV/V 390 µV/V		
	300 V to 1 kV *40 Hz to 10 kHz* *10 kHz to 30 kHz*	 0.11 % 0.12 %		
	200 V to 1 kV *30 kHz to 50 kHz*	 0.20 %		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AC VOLTAGE (continued)				Pride Park
Generation	1 mV to 2 mV			
	10 Hz to 300 kHz	0.80 % + 23 µV		
	300 kHz to 1 MHz	1.6 % + 45 µV		
	2 mV to 20 mV			
	10 Hz to 100 kHz	300 µV/V + 4.4 µV		
	100 kHz to 300 kHz	0.80 % + 5.0 µV		
	300 kHz to 1 MHz	1.6 % + 12 µV		
	20 mV to 200 mV			
	10 Hz to 30 kHz	94 µV/V + 8.0 µV		
	30 kHz to 100 kHz	230 µV/V + 8.0 µV		
	100 kHz to 300 kHz	1.4 % + 13 µV		
	300 kHz to 1 MHz	4.9 % + 83 µV		
	200 mV to 2 V			
	10 kHz to 100 kHz	70 µV/V + 38 µV		
	100 kHz to 300 kHz	1.2 % + 42 µV		
	300 kHz to 1 MHz	4.8 % + 310 µV		
	2 V to 20 V			
	10 kHz to 100 kHz	70 µV/V + 380 µV		
	100 kHz to 300 kHz	1.2 % + 380 µV		
	300 kHz to 1 MHz	4.8 % + 3.2 mV		
	20 V to 200 V			
	10 kHz to 100 kHz	93 µV/V + 380 µV		
	200 V to 1 kV			
	40 Hz to 30 kHz	110 µV/V + 42 mV		
	30 kHz to 100 kHz	780 µV/V + 63 mV		
AC CURRENT				
Measurement	*40 Hz to 1 kHz:*			
	10 µA to 200 µA	370 µA/A + 16 nA		
	200 µA to 200 mA	840 µA/A		
	200 mA to 2 A	660 µA/A + 310 µA		
Generation	*10 Hz to 1 kHz:*			
	10 µA to 200 µA	120 µA/A + 9.3 nA		
	200 µA to 2 mA	81 µA/A + 100 nA		
	2 mA to 20 mA	81 µA/A + 930 nA		
	20 mA to 200 mA	81 µA/A + 9.3 µA		
	200 mA to 2 A	240 µA/A + 96 µA		
	2 A to 10 A	310 µA/A + 1.3 mA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AC CURRENT (continued) Generation	*1 kHz to 5 kHz* 10 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 Hz to 3 kHz* 10 A to 20 A *3 kHz to 10 kHz* 10 A to 20 A *10 Hz to 100 Hz* 20 A to 32 A 32 A to 200 A 200 A to 1000 A *100 Hz to 440 Hz* 20 A to 32 A 32 A to 200 A	240 µA/A + 12 nA 160 µA/A + 110 nA 160 µA/A + 930 nA 160 µA/A + 9.3 µA 350 µA/A + 120 µA 660 µA/A + 1.5 mA 0.021 % + 6.9 mA 0.50 % + 23 mA 0.40 % + 5.5 mA 0.41 % + 90 mA 0.41 % + 450 mA 0.98 % + 27 mA 0.87 % + 250 mA	For the calibration of current clamps and similar devices, using multi-turn coil.	Pride Park

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
OSCILLOSCOPES				Pride Park
Frequency	10 Hz to 300 MHz	19 µHz/Hz + 12 mHz		
Time Markers	0.2 Hz to 20 Hz 50 Hz to 500 MHz	58 µs/s 19 µs/s		
DC Voltage	*1 MΩ* 0 V to 33 V	0.19 % + 78 µV		
	50 Ω 0 V to 2.2 V	0.20 % + 78 µV		
Square Wave Peak to Peak *1 MΩ*	*10 Hz to 10 kHz* 1.8 mV to 105 V	0.21 % + 79 µV		
50 Ω	*10 Hz to 10 kHz* 1.8 mV to 2.2 V	0.21 % + 78 µV		
Amplitude Edge Function	*1 kHz to 1 MHz* 1.8 mV to 105 V	1.6 % + 170 µV		
Risetime	*1 kHz to 1 MHz*	36 ps		
Sine Wave Peak to Peak	5 mV to 5.5 V *50 kHz*	1.6 % + 230 µV		
	5 mV to 100 mV *50 kHz to 100 MHz* *100 MHz to 300 MHz*	1.7 % + 78 µV 1.9 % + 78 µV		
	100 mV to 5.6 V *50 kHz to 100 MHz* *100 MHz to 300 MHz*	1.5 % + 78 µV 1.8 % + 78 µV		
Amplitude Wave Generator	*10 Hz to 100 kHz* 1.8 mV to 55 V	2.3 % + 78 µV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
FREQUENCY				Pride Park
Specific Values	1 MHz and 10 MHz	1.2 parts in 10^9	For calibrating oscillators	
Other Values	0.1 Hz to 1 Hz	1.5 parts in 10^3	Measurement capability only above 60 MHz	
	1 Hz to 10 Hz	1.5 parts in 10^4		
	10 Hz to 100 Hz	1.5 parts in 10^5		
	100 Hz to 1 kHz	1.5 parts in 10^6		
	1 kHz to 10 kHz	1.5 parts in 10^7		
	10 kHz to 100 kHz	1.7 parts in 10^8		
	100 kHz to 1 MHz	3.9 parts in 10^9		
	1 MHz to 60 MHz	2.5 parts in 10^9		
	60 MHz to 100 MHz	1.2 parts in 10^9		
	100 MHz to 150 MHz	2.4 parts in 10^9		
	150 MHz to 500 MHz	1.4 parts in 10^9		
ELAPSED TIME				
Stop watches (mechanical and electronic)	± 0.5 s error / 24 hours	0.062 s	Time reference measurement per 24 hour period	
	± 2.0 s error / 24 hours	0.090 s	per 24 hour period	
	10 s to 24 hours	0.41 s	Real time measurement	
TEMPERATURE SIMULATION				
Temperature indicators and simulators (thermocouple type), calibration by electrical simulation				
Base metal thermocouples	Type J, -210 °C to 0 °C	0.064 °C	excluding cold junction compensation	
	Type J, 0 °C to 1200 °C	0.018 °C		
	Type K, -270 °C to -200 °C	0.23 °C	excluding cold junction compensation	
	Type K, -200 °C to 0 °C	0.070 °C		
	Type K, 0 °C to 1370 °C	0.022 °C		
	Type N, -270 °C to -200 °C	0.62 °C	excluding cold junction compensation	
	Type N, -200 °C to 0 °C	0.084 °C		
	Type N, 0 °C to 1300 °C	0.027 °C		
	Type T, -270 °C to -200 °C	0.19 °C		
	Type T, -200 °C to 0 °C	0.070 °C	excluding cold junction compensation	
	Type T, 0 °C to 400 °C	0.020 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Temperature indicators and simulators (thermocouple type), calibration by electrical simulation (continued)				Pride Park
Cold junction compensation	At ambient temperature of 20 °C ± 2.0 °C	0.13 °C		
Base metal thermocouples	Type J, -210 °C to 0 °C	0.14 °C		
	Type J, 0 °C to 1200 °C	0.13 °C	including cold junction compensation	
	Type K, -270 °C to -200 °C	0.24 °C		
	Type K, -200 °C to 0 °C	0.15 °C	including cold junction compensation	
	Type K, 0 °C to 1370 °C	0.13 °C		
	Type N, -270 °C to -200 °C	0.53 °C		
	Type N, -200 °C to 0 °C	0.15 °C	including cold junction compensation	
	Type N, 0 °C to 1300 °C	0.13 °C		
	Type T, -270 °C to - 200 °C	0.21 °C		
	Type T, -200 °C to 0 °C	0.15 °C	including cold junction compensation	
	Type T, 0 °C to 400 °C	0.13 °C		
Noble metal thermocouples	-50 °C to 0 °C	0.19 °C		
	0 °C to 250 °C	0.17 °C	excluding cold junction compensation	
	250 °C to 1760 °C	0.089 °C		
Cold junction compensation	At ambient temperature of 20 °C ± 2 °C	0.17 °C		
Temperature indicators and simulators (thermocouple type), calibration by electrical simulation				
Noble metal thermocouples	-50 °C to 0 °C	0.24 °C		
	0 °C to 250 °C	0.22 °C	including cold junction compensation	
	250 °C to 1760 °C	0.18 °C		
PRT simulation (Pt 100)	-200 °C to 0 °C	0.017 °C		
	0 ºC to 100 ºC	0.018 ºC		
	100 ºC to 400 ºC	0.020 ºC		
	400 ºC to 630 ºC	0.023 ºC		
	630 °C to 850 °C	0.026 °C		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE				Pride Park
Thermocouples				
Base metal	-40 °C to +200 °C	0.45 °C	Calibration within both liquid and metal medium	
Noble metal	-40 °C to +200 °C	0.92 °C	Calibration within both liquid and metal medium	
Resistance thermometers	-40 ºC to +200 ºC	0.070 °C	Calibration within both liquid and metal medium	
Electronic thermometers with sensors; analogue or digital	Ranges as per sensor	As per sensor type	Calibration within both liquid and metal medium	
HUMIDITY			By comparison with dew-point hygrometer and Platinum Resistance Thermometers	
Dew point	-10 °C to 0 °C 0 °C to 20 °C	0.12 °C dp 0.10 °C dp		
Relative Humidity	5 %rh to 95 %rh	2.2 %rh	At air temperature 5 °C to 60 °C	
Air Temperature	5 °C to 60 °C	0.4 °C		
PRESSURE			Methods consistent with EURAMET CG17	Ansty
Hydraulic pressure (Gauge)				
Pressure indicating instruments and gauges	600 kPa to 120 MPa	0.010 %	Calibration of pressure measuring devices with an electrical output may be undertaken.	
Pneumatic pressure (Gauge)				
Pressure indicating instruments and gauges	3.70 kPa to 3.5 MPa	0.010 %		
Pneumatic pressure (Absolute)				
Pressure indicating instruments and gauges	3.70 kPa to 3.5 MPa	0.010 % + 5.0 Pa		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TORQUE				**Ansty**
Hand torque tools	CCP 3.6.6 issue 11 0.113 N·m to 1356 N·m	1.0 %	The quoted uncertainty will be particularly dependent on the repeatability of the unit under test.	
LENGTH				**Inchinnan**
Thread measuring cylinders	BS3777:1964 and BS 5590:1978 and specials 0.1 to 5.0 diameter	0.50 on diameter		
Plain plug gauges (parallel), cylindrical setting standards, gear measuring cylinders and rollers	1 to 50 diameter 50 to 100 diameter 100 to 150 diameter	0.50 0.80 1.0 on diameter	By comparison with end standards using a length measuring machine.	
Plain ring gauges (parallel) and setting standards	CCP 2.3.2, issue 12 1 to 50 diameter 50 to 100 diameter 100 to 150 diameter	0.90 1.2 1.8 on diameter		
Length gauges, flat and spherical ended	0 m to 1 m	1.0 + (5.0 x length in m)	By comparison with end standards using a length measuring machine	
Plain gap gauges (parallel)	BS 969:2008 0.5 to 100 100 to 200	3.0 5.0		
Screw plug gauges (parallel) excluding check and setting plugs	1 to 100 diameter	2.5 on pitch diameter	Single start symmetrical thread forms only. By comparison with end standards using a length measuring machine.	

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 AND MACHINES **LENGTH**			Instrument entries in this section of the schedule also cover digital and dial.	
External micrometer	Based on BS 870:2008, CCP 2.4.1 issue 13 0 to 300		type gauges which are calibrated based on the quoted standards	
	Heads:	2.0 between any two points		
	(Zero) Setting, 0 to 25:	1.0		
	(Zero) Setting, 25 to 600:	1.0 + (8.0 x length in m)		
	Flatness of anvils:	0.50		
	Parallelism of anvils:	0.80		
	Spindle alignment:	3.7		
Internal micrometer	Based on BS 959:2008 0 to 300	Heads: 2.0 Setting and Extension rods: 1.0 + (5.0 x length in m)		
Depth micrometer	Based on BS 6468:2008 0 to 300	Heads: 2.0 Setting and Extension rods: 1.0 + (5.0 x length in m)		
Vernier gauges				
Caliper	Based on BS 887:2008 0 to 300			
	Overall performance:	10 + (30 x length in m)		
	Flatness:	3.0		
	Parallelism:	4.0		
	Squareness:	8.0		
	Co-Planer:	25		
	Width of internal jaws:	6.0		
Height	Based on BS 1643:2008 0 to 300			
	Overall performance:	10 + (30 x length in m)		
	Flatness:	3.0		
	Parallelism:	4.0		
	Depth of Jaw / Scriber:	7.0		
Depth	Based on BS 6365:2008 0 to 300			
	Overall performance:	10 + (30 x length in m)		
	Flatness / Straightness:	3.0		
	Parallelism:	4.0		
				Inchinnan

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks
MEASURING INSTRUMENTS AND MACHINES LENGTH			
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 50 Scale interval measurements: Discrimination:	 1.0 1.3	
TORQUE			
Hand torque tools	CCP 3.6.6 issue 11 0.136 N·m to 677.91 N·m	1.0 %	The quoted uncertainty will be particularly dependent on the repeatability of the unit under test

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
LENGTH				
External micrometer	BS 870:2008, CCP 2.4.1 issue 13 0 to 600		Instrument entries in this section of the schedule also cover digital and dial type gauges which are calibrated based on the quoted standards.	
	Heads:	2.0 between any two points		
	(Zero) Setting, 0 to 25:	1.0		
	(Zero) Setting, 25 to 600:	1.0 + (8.0 x length in m)		
	Flatness of anvils:	0.50		
	Parallelism of anvils:	0.80		
	Spindle alignment:	3.9		
Internal micrometer	BS 959:2008 0 to 150	Heads: 2.0 Setting and Extension rods: 1.0 + (5.0 x length in m)		Washington
Depth micrometer	BS 6468:2008 0 to 150	Heads: 2.0 Setting and Extension rods: 1.0 + (5.0 x length in m)		
Vernier gauges				
Caliper	Based on BS 887:2008 0 to 600			
	Overall performance:	10 + (30 x length in m)		
	Flatness:	3.0		
	Parallelism:	4.0		
	Squareness:	8.0		
	Co-Planer:	25		
	Width of internal jaws:	6.0		
Depth	Based on BS 6365:2008 0 to 150			
	Overall performance:	10 + (30 x length in m)		
	Flatness / Straightness:	3.0		
	Parallelism:	4.0		
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 50			
	Scale interval measurements:	1.5		
	Discrimination:	1.3		
TORQUE				
Hand torque tools	CCP 3.6.6 issue 11 0.1 N·m to 1000 N·m	1.0 %	The quoted uncertainty will be particularly dependent on the repeatability of the unit under test	

FUEL FLOW			Piston prover method	**Bristol**
Flow rate - volume Flow rate - mass	5 l/hr to 27000 l/hr 4 kg/hr to 21330 kg/hr	0.10 % 0.20 %	Calibration fluid AVTUR (Aviation fuel)	
TORQUE				
Hand torque tools	CCP 3.6.6 issue 11 0.1 N·m to 1000 N·m	1.0 %	The quoted uncertainty will be particularly dependent on the repeatability of the unit under test	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL MEASUREMENTS				Solihull
DC RESISTANCE				
Measurement	0 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	28 µΩ/Ω + 25 µΩ 16 µΩ/Ω + 100 µΩ 13 µΩ/Ω + 1.0 mΩ 13 µΩ/Ω + 10 mΩ 16 µΩ/Ω + 100 mΩ 27 µΩ/Ω + 2.0 Ω 75 µΩ/Ω + 100 Ω 500 µΩ/Ω + 12 kΩ 1.0 % + 1.1 MΩ		
DC VOLTAGE				
Measurement	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1 kV	11 µV/V + 1.2 µV 8.5 µV/V + 0.9 µV 8.5 µV/V + 4.0 µV 13 µV/V + 60 µV 13 µV/V + 600 µV		
DC CURRENT				
Measurement	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	140 µA/A + 0.60 nA 130 µA/A + 6.0 nA 130 µA/A + 60 nA 130 µA/A + 1.3 µA 240 µA/A + 25 µA		
AC VOLTAGE				
Measurement	10 mV to 200 mV *40 Hz to 10 kHz* 200 mV to 2 V *40 Hz to 10 kHz* 2 V to 20 V *40 Hz to 10 kHz* 20 V to 200 V *40 Hz to 10 kHz* 200 V to 1 kV *55 Hz to 1 kHz* *1 kHz to 10 kHz*	 320 µV/V + 5.0 µV 210 µV/V + 25 µV 210 µV/V + 250 µV 210 µV/V + 2.5 mV 360 µV/V + 50 mV 450 µV/V + 50 mV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AC CURRENT				Solihull
Measurement	10 µA to 200 µA *55 Hz to 1 kHz*	600 µA/A + 25 nA		
	200 µA to 2 mA *55 Hz to 1 kHz*	400 µA/A + 250 nA		
	2 mA to 20 mA *55 Hz to 1 kHz*	400 µA/A + 2.5 µA		
	20 mA to 200 mA *55 Hz to 1 kHz*	400 µA/A + 25 µA		
	200 mA to 2 A *55 Hz to 1 kHz*	900 µA/A + 500 µA		
DC RESISTANCE				
Generation				
Specific Values	10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 M Ω 10 MΩ 100 MΩ	35 µΩ/Ω 15 µΩ/Ω 15 µΩ/Ω 15 µΩ/Ω 15 µΩ/Ω 18 µΩ/Ω 80 µΩ/Ω 180 µΩ/Ω		
Other Values	0 Ω to 11 Ω 11 Ω to 33 Ω 33 Ω to 110 Ω 110 Ω to 330 Ω 330 Ω to 1.1 kΩ 1.1 kΩ to 3.3 kΩ 3.3 kΩ to 11 kΩ 11 kΩ to 33 kΩ 33 kΩ to 110 kΩ 110 kΩ to 330 kΩ 330 kΩ to 1.1 MΩ 1.1 MΩ to 3.3 MΩ 3.3 MΩ to 11 MΩ 11 MΩ to 33 MΩ 33 MΩ to 110 MΩ 110 MΩ to 330 MΩ	180 µΩ/Ω + 11 mΩ 150 µΩ/Ω + 19 mΩ 110 µΩ/Ω + 19 mΩ 110 µΩ/Ω + 19 mΩ 110 µΩ/Ω + 90 mΩ 110 µΩ/Ω + 90 mΩ 110 µΩ/Ω + 900 mΩ 110 µΩ/Ω + 900 mΩ 140 µΩ/Ω + 9.0 Ω 150 µΩ/Ω + 9.0 Ω 180 µΩ/Ω + 80 Ω 200 µΩ/Ω + 80 Ω 710 µΩ/Ω + 800 Ω 0.14 % + 800 Ω 0.60 % + 8.0 kΩ 0.60 % + 21 kΩ		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DC VOLTAGE				Solihull
Generation	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1 kV	12 µV/V + 1.0 µV 7.5 µV/V + 1.5 µV 6.0 µV/V + 5.0 µV 8.0 µV/V + 70 µV 10 µV/V + 700 µV		
DC CURRENT				
Generation	0 µA to 220 µA 220 µA to 2.2 mA 2.2 mA to 22 mA 22 mA to 220 mA 220 mA to 2.2 A 2.2 A to 11 A	70 µA/A + 10 nA 60 µA/A + 12 nA 60 µA/A + 120 nA 70 µA/A + 1.2 µA 100 µA/A + 35 µA 710 µA/A + 510 µA		
AC VOLTAGE				
Generation	*40 Hz to 10 kHz* 0.22 mV to 2.2 mV 2.2 mV to 22 mV 22 mV to 220 mV 220 mV to 2.2 V 2.2 V to 22 V 22 V to 220 V *55 Hz to 1 kHz* 220 V to 1 kV	 700 µV/V + 6.0 µV 230 µV/V + 7.0 µV 140 µV/V + 10 µV 100 µV/V + 14 µV 100 µV/V + 130 µV 110 µV/V + 1.5 mV 120 µV/V + 8.0 mV		Solihull
AC CURRENT				
Generation	*55 Hz to 1 kHz* 10 µA to 220 µA *220* µA to 2.2 mA *2.2 mA to 22 mA* *22 mA to 220 mA* *220 mA to to 2.2 A*	 260 µA/A + 20 nA 250 µA/A + 55 nA 200 µA/A + 550 nA 200 µA/A + 5.5 µA 800 µA/A + 55 µA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
MEASURING INSTRUMENTS AND MACHINES			Instrument entries in this section of the schedule also cover digital and dial type gauges which are calibrated based on the quoted standards.	
Micrometers				
External micrometer	BS 870:2008 0 to 300			
	Heads:	2.0 between any two points		
	(Zero) Setting, 0 to 25:	1.0		
	(Zero) Setting, 25 to 600:	1.0 + (8.0 x length in m)		
	Flatness of anvils:	0.50		
	Parallelism of anvils:	0.80		
	Spindle alignment:	3.7		
Depth micrometer	As BS 6468:2008 0 to 300	Heads: 2.0 between any two points Setting and extension rods: 1.0 + 5.0 x length in m		
Vernier gauges				
Caliper	Based on BS 887:2008 0 to 600			
	Overall performance:	10 + (30 x length in m)		
	Flatness:	3.0		
	Parallelism:	4.0		
	Squareness:	8.0		
	Co-Planer:	25		
	Width of internal jaws:	6.0		
Height	Based on BS 1643:2008 0 to 600			
	Overall performance:	10 + (30 x length in m)		
	Flatness:	3.0		
	Parallelism:	4.0		
	Depth of Jaw / Scriber:	7.0		
Depth	Based on BS 6365:2008 0 to 300			
	Overall performance:	10 + (30 x length in m)		
	Flatness / Straightness:	3.0		
	Parallelism:	4.0		
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 50			
	Scale interval measurements:	1.0		
	Discrimination:	1.3		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
FORM				Site
Surface plates Granite Cast iron	As BS 817:2008 160 x 100 to 4 m x 4 m	1.5 + (0.80 x diagonal in m) See Note 2		
ELECTRICAL				
Temperature indicators and simulators (thermocouple type), calibration by electrical simulation:			Internal Reference junction enabled. Ambient temperature range 18 °C to 22°C (controlled customer environment).	
Base metal thermocouple types	Type J, -210 °C to 0 °C Type J, 0 °C to 1200 °C	0.36 °C 0.28 °C		
	Type K, -270 °C to -200 °C Type K, -200 °C to 0 °C Type K, 0 °C to 1000 °C Type K, 1000 °C to 1370 °C	4.6 °C 0.37 °C 0.29 °C 0.27 °C		
	Type N, -270 °C to -200 °C Type N, -200 °C to -100 °C Type N, -100 °C to 0 °C Type N, 0 °C to 800 °C Type N, 800 °C to 1300 °C	1.9 °C 0.49 °C 0.34 °C 0.26 °C 0.24 °C		
	Type T, -270 °C to -200 °C Type T, -200 °C to 0 °C Type T, 0 °C to 400 °C	0.81 °C 0.36 °C 0.26 °C		
Noble metal thermocouple types	Type R, -50 °C to 0 °C Type R, 0 °C to 150 °C Type R, 150 °C to 400 °C Type R, 400 °C to 1768 ºC	0.91 °C 0.55 °C 0.55 °C 0.51 °C		
	Type S, -50 °C to 0 °C Type S, 0 °C to 100 °C Type S, 100 °C to 300 °C Type S, 300 °C to 1768 °C	0.80 °C 0.66 °C 0.55 °C 0.48 °C		
RTD Pt100	 -200 °C to 0 °C -200 °C to 0 °C	 0.072 °C 0.042 % + 0.072 °C	Ambient temperature range 18 °C to 28 °C -10 °C to +50 °C	
	0°C to 850 °C 0°C to 850 °C	0.029 % + 0.075 °C 0.051 % + 0.075 °C	18 °C to 28 °C -10 °C to +50 °C	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DC Voltage			Ambient temperature range	Site
	0 V to 150 mV	0.023 % + 5.0 µV	18 °C to 28 °C	
	0 V to 150 mV	0.048 % + 5.0 µV	-10 °C to +50 °C	
	0.15 V to 0.25 V	0.023 % + 8.4 µV	18 °C to 28 °C	
	0.15 V to 0.25 V	0.048 % + 8.4 µV	-10 °C to +50 °C	
	0.25 V to 1 V	0.023 % + 12 µV	18 °C to 28 °C	
	0.25 V to 1 V	0.048 % + 12 µV	-10 °C to +50 °C	
	1 V to 25 V	0.023 % + 0.65 mV	18 °C to 28 °C	
	1 V to 25 V	0.048 % + 0.65 mV	-10 °C to +50 °C	
	25 V to 60 V	0.023 % + 1.2 mV	18 °C to 28 °C	
	25 V to 60 V	0.048 % + 1.2 mV	-10 °C to +50 °C	
DC Current	0 to 25 mA	0.025 % + 1.7 µA	18 °C to 28 °C	
	0 to 25 mA	0.049 % + 1.7 µA	-10 °C to +50 °C	
	25 mA to 100 mA	0.025 % + 2.0 µA	18 °C to 28 °C	
	25 mA to 100 mA	0.049 % + 2.0 µA	-10 °C to +50 °C	
DC Resistance	0 Ω to 250 Ω	0.023 % + 4.3 mΩ	18 °C to 28 °C	
	0 Ω to 250 Ω	0.048 % + 4.3 mΩ	-10 °C to +50 °C	
	250 Ω to 2650 Ω	0.023 % + 11 mΩ	18 °C to 28 °C	
	250 Ω to 2650 Ω	0.048 % + 11 mΩ	-10 °C to +50 °C	
	2650 Ω to 4000 Ω	0.023 % + 100 mΩ	18 °C to 28 °C	
	2650 Ω to 4000 Ω	0.048 % + 100 mΩ	-10 °C to +50 °C	
TIME INTERVAL	10 s to 24 hours	1.7 s	Real time measurement	
TEMPERATURE				
Temperature controlled, ovens, environmental chambers, fridges and freezers.	-80 °C to 400 °C	1.8 °C	Single and multipoint time dependent temperature profiling, also referred to as spatial temperature surveying or mapping using procedures: QCR LCP 0020 and 0023	
	400 °C to 1000 °C	2.0 °C		
	1000 °C to 1300 °C	2.3 °C		

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: $Q[a, b] = [a^2 + b^2]^{1/2}$