Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0683

Accredited to ISO/IEC 17025:2017

Pullman Instruments (UK) 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 ESG House, Chatsworth Road, Harrogate, North Yorkshire, HG1 5HX.	**Local contact** Mr Tony Cox Tel: +44 (0)1423 720360 Fax: +44 (0)1423 720361 Email: info@pullman.co.uk Website: www.pullman.co.uk	Electrical Temperature Pressure	**A**
Address Hindley Business Centre Platt Lane Hindley Wigan WN2 3PA	**Local contact** Mr Tony Cox Tel: +44 (0)1942-526164 Fax: +44 (0)1942-525335 E-Mail: tonyc@pullman.co.uk Website: www.pullman.co.uk	Length	**B**

Site activities performed away from the locations listed above:

Location details	Activity	Location code
The customers' 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.	Temperature	**S**

Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL			Electrical calibrations are performed as a direct comparison against a reference standard	
DC Voltage				A
Generation	20 mV to 200 mV	5.0 μV	Values can be generated for the calibration of measuring instruments	
	200 mV to 2 V	25 μV		
	2 V to 20 V	220 μV		
	20 V to 200 V	4.5 mV		
	200 V to 1 kV	16 mV		
Measurement			For measurement of instrument outputs	
	0 mV to 100 mV	1.8 μV		
	100 mV to 1 V	6.5 μV		
	1 V to 10 V	100 μV		
	10 V to 100 V	1.3 mV		
	100 V to 1 kV	13 mV		
DC Current				A
Generation	0 μA to 200 μA	15 nA	Values can be generated for the calibration of measuring instruments	
	200 μA to 2 mA	120 nA		
	2 mA to 20 mA	1.2 μA		
	20 mA to 200 mA	17 μA		
	200 mA to 2 A	220 μA		
	2 A to 10 A	3.7 mA		
	10 A to 30 A	16 mA		
	30 A to 1500 A	1.0 %	For the calibration of clamp meters only	
Measurement				
	0 μA to 100 μA	3.0 nA	For measurement of instrument outputs	
	100 μA to 1 mA	33 nA		
	1 mA to 10 mA	250 nA		
	10 mA to 100 mA	6.0 μA		
	100 mA to 1 A	220 μA		
	1 A to 10 A	6.5 mA		
	10 A to 30 A	22 mA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL (cont'd)				
DC Resistance (cont'd)				A
Generation	1 Ω	7.0 mΩ	Values can be generated for the calibration of measuring instruments	
	10 Ω	6.0 mΩ		
	100 Ω	8.0 mΩ		
	1 kΩ	32 mΩ		
	10 kΩ	290 mΩ		
	100 kΩ	2.9 Ω		
	1 MΩ	80 Ω		
	10 MΩ	1.2 kΩ		
Measurement	0 Ω to 1 Ω	30 μΩ	For measurement of instrument outputs	
	1 Ω to 10 Ω	210 μΩ		
	10 Ω to 100 Ω	1.7 mΩ		
	100 Ω to 1 kΩ	15 mΩ		
	1 kΩ to 10 kΩ	600 mΩ		
	10 kΩ to 100 kΩ	2.0 Ω		
	100 kΩ to 1 MΩ	35 Ω		
	1 MΩ to 10 MΩ	470 Ω		
AC Voltage				A
Generation	*40 Hz to 1 kHz* 10 mV to 200 mV	63 μV	Values can be generated for the calibration of measuring instruments	
	40 Hz to 50 kHz 200 mV to 2 V	800 μV		
	40 Hz to 1 kHz 2 V to 20 V	5.0 mV		
	1 kHz to 20 kHz 2 V to 20 V	6.0 mV		
	40 Hz to 1 kHz 20 V to 200 V	48 mV		
	56 Hz to 1 kHz 200 V to 1000 V	240 mV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL (cont'd)				
AC Voltage (cont'd)				A
Measurement	*40 Hz to 20 kHz*		For measurement of instrument outputs	
	10 mV to 100 mV	50 μV		
	10 Hz to 50 kHz			
	100 mV to 1 V	1.2 mV		
	40 Hz to 50 kHz			
	1 V to 10 V	15 mV		
	40 Hz to 10 kHz			
	10 V to 100 V	56 mV		
	40 Hz to 1 kHz			
	100 V to 1 kV	500 mV		
AC Current				A
Generation	*40 Hz to 1 kHz*			
	10 μA to 200 μA	220 nA		
	200 μA to 2 mA	1.2 μA		
	2 mA to 20 mA	12 μA		
	20 mA to 200 mA	110 μA		
	200 mA to 2 A	1.2 mA		
	2 A to 30 A	33 mA		
	45 Hz to 100 Hz		For the calibration of clamp meters only	
	30 A to 1500 A	1.0 %		
Measurement	*40 Hz to 1 kHz*		For measurement of instrument outputs	
	1 μA to 100 μA	50 nA		
	100 μA to 1 mA	500 nA		
	1 mA to 10 mA	5.0 μA		
	10 mA to 100 mA	60 μA		
	100 mA to 1 A	630 μA		
	1 A to 10 A	14 mA		
	10 A to 30 A	37 mA		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
CAPACITANCE Generation fixed points			Values can be generated for the calibration of measuring instruments	A
	1 nF	25 pF		
	10 nF	42 pF		
	20 nF	76 pF		
	50 nF	180 pF		
	100 nF	360 pF		
	1 µF	5.0 nF		
	10 µF	84 nF		
FREQUENCY Measurement				A
	100 Hz to 10 kHz	350 mHz	Frequency may also be reported as 1/f for repetitive events.	
	10 kHz to 100 kHz	450 mHz		
	100 kHz to 1 MHz	5.2 Hz		
Generation	500 mHz to 1 kHz	240 mHz	Values can be generated for the calibration of measuring instruments	
	1 kHz to 10 kHz	420 mHz		
	10 kHz to 20 kHz	900 mHz		
	20 kHz to 50 kHz	2.2 Hz		
	50 kHz to 100 kHz	4.3 Hz		
	100 kHz to 1 MHz	4.5 Hz		
	1 MHz to 10 MHz	45 Hz		
RPM	600 RPM to 60000 RPM	0.50 RPM	Optical Tachometers	A

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE			Calibration by comparison with reference thermometers	
Temperature indicators and recorders, with temperature sensor(s)	-100 °C to +150 °C 150 °C to 660 °C 660 °C to 1100 °C	0.10 °C 0.20 °C 4.0 °C	Calibration performed within Metal Block Baths	A & S
Block calibrators	-90 °C to -30 °C -30 °C to +450 °C	0.40 °C 0.65 °C		A & S
	-100 °C to +20 °C 20 °C to 660 °C	0.035 °C 0.019 °C	Calibration performed with High spec Standard Platinum Resistance Thermometers (SPRT's)	A
Temperature controlled fridges, freezers, autoclaves, ovens and environmental chambers	-90 °C to -30 °C -30 °C to +450 °C	0.30 °C 0.30 °C	Single monitoring probe. Time dependent temperature profiling	A & S
	-50 °C to +150 °C	0.70 °C	Multipoint monitoring probes. Time dependent temperature profiling	
Data Loggers	-30 °C to +120 °C	0.70 °C	Calibration performed within Air Chamber	A
PRESSURE			Methods consistent with EURAMET CG17.	A
Gas pressure (gauge)				
Calibration of pressure indicating instruments and gauges	-99.5 kPa to +700 kPa 700 kPa to 7 MPa	0.14 kPa 0.75 kPa		A
Gas pressure (absolute)				
Calibration of pressure indicating instruments and gauges	1 kPa to 800 kPa 800 kPa to 7.1 MPa	0.14 kPa 0.75 kPa		A

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
LENGTH				
Plain plug gauges (parallel) cylindrical setting standards and rollers	1 to 50 diameter 50 to 100 diameter 100 to 150 diameter	1.0 1.5 on diameter 2.0	By comparison with reference standards	B
Plain ring gauges (parallel) and setting standards	1 to 10 diameter 10 to 50 diameter 50 to 100 diameter 100 to 150 diameter	1.5 1.0 on diameter 1.5 2.0	By comparison with reference standards	B
Plain gap gauges (parallel)	0.5 to 100 diameter 100 to 150 diameter	3.0 5.0	By comparison with reference standards	B
Screw plug gauges (parallel) including check and setting plugs See Note 2	1 to 100 diameter	3.0 on pitch diameter	By comparison with reference standards	B
Screw pitch Screw flank angle	0.2 to 8 0° to 52°	1.5 5.0 minutes of arc	Mechanical and optical comparison	B
Screw thread adjustable caliper gauges (parallel)	1 to 150 diameter	See note 4	By use of setting plug	B
Length gauges, flat and spherical ended	0 to 600	1.0 + (8.0 x length in m)	By comparison with reference standards	B
Squares Blade type	BS 939:2007 50 to 300 300 to 450	 3.0 See Note 1 5.0		B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
MEASURING INSTRUMENTS AND MACHINES			All by comparison with reference standards	
Micrometers External (including ball and thread micrometers)	BS 870:2008 0 to 600	Heads: 2.0 Setting and extension rods: 1.0 + (8.0 x length in m)		B
	Flatness of anvils Parallelsim of anvils	0.5		
	BS 959:2008 0 to 900	0.6		
Internal	BS 6468:2008 0 to 300	Heads: 2.0 Setting and extension rods: 1.0 + (8.0 x length in m)		B
Depth	BS 1734:1951 0 to 50			B
Micrometer heads	3 to 150 diameter	1.0		B
Bore micrometer (three point) and Bore Gauges	BS 1685:2008 0° to 360°	Overall performance 5.0		B
Bevel protractors	BS EN ISO 13225:2012 0 to 1000	6.0 min of arc		B
Height gauges - (Simple) including vernier, dial and digital types (See note 3 and note 4)	BS 887:2008 0 to 1000	Length measurement error (E): 10 + (30 x length in m)		B
Vernier caliper, height and depth gauges (including digital and dial instruments)	BS 1643:2008 (withdrawn) 0 to 1000 BS 6365:2008 0 to 600	Overall performance 10 + (30 x length in m)		
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 50	1.0		B
Feeler gauges	BS 957:2008 0.05 to 1	3.0		B
Thickness Gauges (dial and digital types)	0 to 50	Dependent on size and performance Minimum 3.0		B
Spirit levels	BS 958:1968 5 seconds of arc to 60 minutes of arc nominal sensitivity	6.0 seconds of arc		B
Vee blocks	BS3731:1987 20 to 150	2.5 to 5.0		B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ANCILLARY MEASUREMENTS	Flatness	3.0		B
	Parallelism	3.0		B
	Squarenesss	3.0		B

Notes:

1 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

2. Single start, symmetrical thread forms only.

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

4. Conformance statements cannot be made against specifications whose magnitudes are smaller than the specified CMC values

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