Schedule of Accreditation

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Accredited to ISO/IEC 17025:2005

Metrology and Quality Services Ltd

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Unit 3
24-26 Boulton Road
Stevenage
Hertfordshire
SG1 4QX

Contact: Mr J Morris
Tel: +44 (0) 1438 900080
Fax: +44 (0) 1438 318386
E-Mail: enquiries@mqs.co.uk
Website: www.mqs.co.uk

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 3 24-26 Boulton Road Stevenage Hertfordshire SG1 4QX	**Local contact** Mr J Morris Tel: 01438 900080	Dimensional	A
Address 37 Western Parkway Business Centre Lower Ballymount Road Dublin 12 Ireland	**Local contact** Mr P Roche Tel: +353 [0] 1 4502 666	Dimensional	B
Address 23 Brindley Road Bayton Road Ind Estate Exhall Coventry West Midlands CV7 9EP	**Local contact** Mr J Morris Tel: 01438 900080	Dimensional & Torque Electrical	C

Site activities performed away from the locations listed above:

Location details		Activity	Location code
At customers premises	**Local contact** Mr G Wilson Tel: 01438 900080	Dimensional	D

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
LENGTH			NOTES	
Gauge blocks Inch (Steel, Ceramic and tungsten carbide)	As BS 4311:Part 1 2007 0.05 Inch to 0.4 inch 0.4 Inch to 1 inch 2 inch 3 inch 4 inch	Class (see Notes) C 3.0 4.0 5.0 6.0 7.0 μ inch	**Class C** uncertainties apply to the measurement of steel, ceramic and tungsten carbide gauges by comparison with grade K standards of length of a similar material. Class C uncertainties apply to grade 0, 1 and 2 gauges to BS EN ISO 3650:1999 and BS 4311:Part 1:2007 1. The uncertainty quoted is for the departure from flatness, straightness, parallelism or squareness, i.e. the distance separating the parallel planes which just enclose the surface under consideration. 2. Single & multi-start, symmetrical thread forms only. 3. Functional test of size using check plugs. 4. Calibration may also be given in lbf.ft and lbf.in 5. Brown & Sharpe PMI Ltd products only. 6. All linear calibrations may be given in inch units. 7. Features and associated parts of these gauges / fixtures can be measured to the uncertainties given for equivalent items listed in this schedule.	A
Millimetre (Steel, Ceramic and tungsten carbide)	As BS EN ISO 3650: 1999 0.5 to 10 10 to 25 30, 40, 50 60, 70, 75 80, 90, 100	C 0.080 0.10 0.12 0.15 0.18		A
Thread measuring cylinders	As BS 5590:1978 and specials 0.1 to 5.0 diameter	0.50		B & C
Precision pin gauges (parallel)	0.1 to 10 diameter	0.25		B & C
Plain plug gauges (parallel)	1 to 50 diameter 50 to 100	0.50 0.80		
Plain plug gauges (parallel)	1 to 50 diameter 50 to 100 100 to 150 150 to 200 200 to 300	0.50 0.80 1.0 1.2 2.0		B & C
Plain plug gauges (taper) including check plugs Taper up to 1 in 8 on diameter	5 to 50 diameter 50 to 100 100 to 200	3.0 on diameter 4.0 10		B & C C C
Tapers above 1 in 8	5 to 50 diameter 50 to 100 100 to 200	5.0 on diameter 6.0 12		B &C C C

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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
LENGTH (cont'd)				
Plain ring gauges (parallel) and setting standards	1 to 10 diameter 10 to 25 25 to 50 50 to 100 100 to 150 150 to 250	0.80 0.50 0.80 1.0 1.5 2.5	NOTES continued 8. Simple height gauges - vernier, dial and digital instruments designed only for measuring distances parallel to the beam.	C
Plain ring gauges (parallel) and setting standards	2 to 10 diameter 10 to 25 25 to 50 50 to 100 100 to 150	1.2 1.0 1.2 1.5 2.0	10. Single start, symmetrical thread forms only.	B
Plain ring gauges (taper)				
Taper up to 1 in 8 on diameter	2 to 5 diameter 5 to 50 50 to 100 100 to 200	4.0 on diameter 4.0 5.0 6.0	11. Functional test of size using setting plugs calibrated with a CMC of 2.5 µm	C B & C C C
Tapers above 1 in 8 on diameter	5 to 50 diameter 50 to 100 100 to 200	6.0 on diameter 7.0 8.0		B & C C C
Length gauges, flat and spherical ended	25 to 300	1.0 + (8.0 x length in m)		A
Length gauges, flat and spherical ended	25 to 1000	1.0 + (8.0 x length in m)		B & C
Plain gap gauges (parallel)	0.5 to 100 100 to 200 200 to 300	3.0 5.0 8.0		B & C
Parallels	As BS 906:1972 0 to 50 x 100 x 400	1.5 to 5.0		B & C
Vee blocks	As BS 3731:1987 20 to 150 diameter, vee capacity	1.5 to 5.0		B & C
Screw plug gauges (parallel) including check and setting plugs See Note 2	1 to 100 100 to 150 150 to 300	2.5 on pitch diameter 5.0 on pitch diameter 8.0 on pitch diameter 1.5 on pitch 5.0 minutes of arc on flank angle		B & C C C

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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
LENGTH (cont'd)				
Screw plug gauges (taper) including check plugs but excluding API gauges See Note 10	5 to 100 diameter	5.0 on pitch diameter		C
Screw ring gauges (parallel) See Note 2	1 to 12 10 to 100 100 to 150 150 to 250	See note 3 5.0 on pitch diameter 6.0 on pitch diameter 10.0 on pitch diameter 1.5 on pitch 5.0 minutes of arc on flank angle		C
	1 to 12 5 to 100	See note 3 5.0 on pitch diameter		B
Screw ring gauges (taper) - Ground Threads only and excluding API gauges See Note 10	6 to 75 diameter 75 to 150 diameter	5.0 on 7.0 pitch diameter		C
Screw thread adjustable caliper gauges (parallel) See Note 6	1 to 100 diameter	See note 11		
Receiver, position and profile gauges, jigs and fixtures	0 to 1000 x 750 x 500	3.0 + (10 x length in m) See note 7		C
Orifice Plates	BS EN ISO 5167-1:2003	4.0 + (6.0 x length in m)		C
ANGLE				
Squares Blade type	As BS 939:2007 50 to 300 300 to 600 600 to 900	 3.0 On 5.0 squareness 8.0 See Note 1		 B & C C C
Cylindrical	As BS 939:2007 0 to 300 300 to 600	 2.0 On 4.0 squareness See Note 1		C

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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
ANGLE (cont'd)				
Angle plates and box angle plates	As BS 5535:1978 50 to 600	Squareness 3.0 + (1.0 per 100 mm) Parallelism 1.0 + (1.0 per 100 mm) See Note 1		B & C
Bevel protractors	As BS 1685:2008 0° to 360°	6.0 minutes of arc		B & C
Sine bars	As BS 3064:1978 100 to 300	1.0 + (10 x length in m) 3.0 Seconds of arc		C
Sine tables	As BS 3064:1978 100 to 500	1.0 + (10 x length in m) 3.0 Seconds of arc		C
FORM				
Surface plates Granite Cast iron	As BS 817:2008 and above 160 x 100 to 4000 x 4000	1.5 + (0.80 x diagonal in m) See Note 1		B & C & D
Straightedges Cast iron Steel Granite	As BS 5204:Part 1:1975 300 to 4000 As BS 5204:Part 2:1977 300 to 2000	1.0 + (2.0 x length in m) See Note 1		C
Straightedges Cast iron Steel Granite	As BS 5204:Part 1:1975 200 to 1000 As BS 5204:Part 2:1977 200 to 1000	2.0 + (2.0 x length in m) See Note 1		B
Steel balls	1 to 50 diameter	0.80 on diameter		C
Roundness External Internal	As BS 3730 1 to 350 diameter 3 to 350	0.050 on radius		C
Surface texture (excluding measurement standards and roughness comparison specimens)	As BS 1134:Part 1:1988 Ra 0.02 µm to 80 µm	10 % of measured value		C

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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS AND MACHINES				
Micrometers				
External	As BS 870:2008 0 to 15000 to 150 As BS 959:2008 0 to 900	Heads 2.0 between any two points. Setting and extension rods 1.0 + (8.0 x length in m)		C B
Internal	As BS 6468:2008 0 to 300			B & C
Depth				B & C
Indicating micrometers	0 to 100	Indicators 0.50 Overall performance 1.5		B & C
Bore micrometers (three-point)	1 to 5 5 to 100 100 to 250	3.0 3.0 8.0		C B & C C
Bench micrometer	NPL MOY/SCMI 22 0 to 100	Overall performance 2.0		C
Combination sets	0° to 360° (Protractor) 0 to 500 (Rule)	30 minutes of arc 5.0 + (10 x length in m)		C
Calliper gauges including vernier, dial and digital types	As BS EN ISO 13385-1:2011 0 to 2000 Length measurement error, E	Overall performance 10 + (20 x length in m)		C
Height gauges - (Simple) including vernier, dial and digital types (See note 8 and note 9)	As BS EN ISO 13225:2012 (0 to 1000)	Length measurement error (E): 5.0 + (10 x length in m)		B & C

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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS AND MACHINES (cont'd)				
Vernier gauges				
Caliper Height Depth — including dial and digital type	As BS 887:2008 0 to 1000 1000 to 2000	Overall performance 10 + (30 x length in m)		B & C C
	As BS 1643:2008 withdrawn 0 to 1000			B & C
	As BS 6365:2008 0 to 600			B & C
Dial gauges and dial test indicators	As BS 907:2008 and BS 2795:1981 0 to 50	1.0		B & C
Comparators (external)	As BS 1054:1975 250 to 20 000 magnifications	1.0 % of range Minimum 0.10		C
Displacement transducers	0 to 100	0.30 + (4.0 x length in m)		B & C
Thread diameter measuring	NPL Schedules MOY/SCMI/9 0 to 300 capacity	Overall performance 1.5		C
Plain taper diameter measuring	NPL MOY/SCMI/48 0 to 100	Overall performance on diameter 1.5		C
Toolmakers Microscopes	As MOY/SCMI/2 Linear 0 to 150 x 150 Angular 0 to 360˚	3.0 3 minutes of arc		C & D
Universal microscopes	Linear 0 to 300 x 300 Angular 0 to 360˚	3.0 3 minutes of arc		
Air gauging units (See Note 5)	0 to 5000 magnifications	0.50 % of range		C
Radius Gauges	0 to 300 mm	10		
Feeler Gauges	As BS 957:2008 0.03 to 1.00	3.0		B & C
Internal and External Caliper Gauges	0 to 150	1.0		B & C
Clinometers	0 to 360 degrees	10 seconds of arc		C
Electronic indicating levels	0 to 20 minutes of arc	1.0 % of range Minimum 0.50 seconds of arc		B & C

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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS AND MACHINES (cont'd)				
Spirit levels	As 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		B & C
Micrometer heads	As BS 1734:1951 0 to 100	 1.0		B & C
Height setting micrometer	300	Heads 1.20 Stepped column 2.0 Overall performance 2.5		C
Riser blocks for above	150 300	2.0 4.0		C
Precision scales (linear)	0 to 300	1.5 + (3.0 x length in m)		C
Steel rules	As BS 4372:1968 0 to 500 500 to 1000	 5.0 + (10 x length in m) 10 + (10 x length in m)		C
Dividing heads Rotary tables Inclinable rotary tables	100 to 450 capacity 100 to 450 100 to 450	Overall angular performance 3.0 seconds of arc		C & D C & D C & D
Profile projectors	10 to 100 magnifications	125 at the screen 2.5 linear scales 1.5 minutes of arc		B & C & D
Height gauges – (Complex) (See note 9)	As BS EN ISO 13225:2012 0 to 1 m	Length measurement error (E): 1.0 + (5.0 x length in m) Length measurement error (B): 1.0 + (5.0 x length in m)		C & D
Electronic microprocessor controlled height gauges	0 to 1 m	1.0 + (5.0 x length in m)		B & C & D
Horizontal & vertical measuring machines	0 to 1 m	0.20 + (1.0 x length in m)		C & D
Evaluation of electrical contact unit for internal measurement		Overall performance 1.0 on diameter.		C & D

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
TORQUE				
Hand Torque Tools	As BS EN ISO 6789:2003 1 to 1000 Nm	1.6 % of maximum reading (see note 4)		C
ELECTRICAL				
DC Voltage				
Generation	0 V to 300 mV 300 mV to 3 V 3 V to 30 V 30 V to 300 V 300 V to 1000 V	17 ppm + 2.0 μV 11 ppm + 3.0 μV 10 ppm + 0.030 mV 13 ppm + 0.30 mV 16 ppm + 3.0 mV		C
Measurement	0 V to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	15 ppm + 1.5 μV 8.0 ppm + 2.6 μV 4.0 ppm + 12 μV 5.0 ppm + 230 μV 7.0 ppm + 2.4 μV		C
DC Current				
Generation	0 μA to 300 μA 300 μA to 3 mA 3 mA to 30 mA 30 mA to 300 mA 300 mA to 1 A 1 A to 3 A 3 A to 11 A 11 A to 20 A	60 ppm + 24 nA 30 ppm + 0.060 μA 36 ppm + 0.40 μA 43 ppm + 4.0 μA 110 ppm + 0.050 mA 110 ppm + 0.050 mA 110 ppm + 0.60 mA 400 ppm + 2.0 mA		C
	20 A to 100 A 100 A to 550 A	0.15 % 0.18 %	For the calibration of clampmeters only	C
Measurement	10 μA to 100 μA 100 μA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 2 A	120 ppm + 2.4 nA 30 ppm + 0.024 μA 37 ppm + 0.24 μA 30 ppm + 2.4 μA 78 ppm + 47 μA		C

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AC Voltage				
Generation	*10 mV to 300 mV*			C
	45 Hz to 1 kHz	0.010 % + 10 μV		
	1 kHz to 10 kHz	0.010 % + 10 μV		
	300 mV to 3 V			
	45 Hz to 1 kHz	0.010 % + 70 μV		
	1 kHz to 10 kHz	0.010 % + 70 μV		
	3 V to 30 V			
	45 Hz to 1 kHz	0.015 % + 0.70 mV		
	1 kHz to 10 kHz	0.013 % + 0.70 mV		
	30 V to 300 V			
	45 Hz to 1 kHz	0.012 % + 3.0 mV		
	1 kHz to 10 kHz	0.011 % + 8.0 mV		
	300 V to 1000 V			
	45 Hz to 1 kHz	0.020 % + 17 mV		
	1 kHz to 10 kHz	0.020 % + 17 mV		
Measurement	*10 mV to 100 mV*			C
	20 Hz to 1 kHz	0.020 % + 2.4 μV		
	1 kHz to 10 kHz	0.020 % + 2.4 μV		
	100 mV to 1 V			
	20 Hz to 1 kHz	0.020 % + 12 μV		
	1 kHz to 10 kHz	0.020 % + 12 μV		
	1 V to 10 V			
	20 Hz to 1 kHz	0.020 % + 0.12 μV		
	1 kHz to 10 kHz	0.020 % + 0.12 μV		
	10 V to 100 V			
	20 Hz to 1 kHz	0.020 % + 1.2 mV		
	1 kHz to 10 kHz	0.020 % + 1.2 mV		
	100 V to 1000 V			
	55 Hz to 1 kHz	0.020 % + 24 mV		
	1 kHz to 10 kHz	0.040 % + 24 mV		
AC Current				
Generation	*10 μA to 300 μA*			C
	45 Hz to 1 kHz	0.10 % + 0.12 μA		
	1 kHz to 5 kHz	0.11 % + 0.180 μA		
	300 μA to 3 mA			
	45 Hz to 1 kHz	0.040 % + 0.18 μA		
	1 kHz to 5 kHz	0.040 % + 0.24 μA		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
AC Current (Continued)				
Generation	*3 mA to 30 mA*			
	45 Hz to 1 kHz	0.030 % + 2.4 μA		
	1 kHz to 5 kHz	0.030 % + 2.4 μA		
	30 mA to 300 mA			
	45 Hz to 1 kHz	0.050 % + 24 μA		
	1 kHz to 5 kHz	0.050 % + 58 μA		
	300 mA to 1 A			
	45 Hz to 1 kHz	0.040 % + 0.12 mA		
	1 kHz to 5 kHz	0.15 % + 1.2 mA		
	1 A to 3 A			
	45 Hz to 1 kHz	0.040 % + 0.12 mA		
	1 kHz to 5 kHz	0.15 % + 1.2 mA		
	3 A to 11 A			
	45 Hz to 1 kHz	0.070 % + 2.4 mA		
	1 kHz to 5 kHz	0.85 % + 2.4 mA		
	11 A to 20 A			
	45 Hz to 1 kHz	0.085 % + 5.8 mA		
	1 kHz to 5 kHz	0.80 % + 5.8 mA		
	20 A to 100 A		For the calibration of clampmeters only	
	45 Hz to 1 kHz	0.25 %		
	100 A to 550 A			
	45 Hz to 65 Hz	0.30 %	For the calibration of clampmeters only	
	65 Hz to 500 Hz	0.50 %		
AC Current				
Measurement	*10 μA to 100 μA*			C
	55 Hz to 1 kHz	0.040 % + 0.012 μA		
	1 kHz to 5 kHz	0.11 % + 0.012 μA		
	100 μA to 1 mA			
	55 Hz to 1 kHz	0.030 % + 0.12 μA		
	1 kHz to 5 kHz	0.070 % + 0.12 μA		
	1 mA to 10 mA			
	55 Hz to 1 kHz	0.030 % + 1.2 μA		
	1 kHz to 5 kHz	0.070 % + 1.2 μA		
	10 mA to 100 mA			
	55 Hz to 1 kHz	0.030 % + 12 μA		
	1 kHz to 5 kHz	0.070 % + 12 μA		
	100 mA to 2 A			
	55 Hz to 1 kHz	0.060 % + 0.47 mA		
	1 kHz to 5 kHz	0.20 % + 1.2 mA		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
DC Resistance				
Generation	1Ω	560 ppm + 12 mΩ		
	10 Ω	80 ppm + 1.2 mΩ		C
	30 Ω	120 ppm + 1.8 mΩ		
	100 Ω	48 ppm + 1.7 mΩ		
	300 Ω	25 ppm + 2.4 mΩ		
	1 kΩ	14 ppm + 1.2 mΩ		
	3 kΩ	22 ppm + 24 mΩ		
	10 kΩ	17 ppm + 26 mΩ		
	30 kΩ	15 ppm + 0.23 Ω		
	100 kΩ	12 ppm + 0.26Ω		
	300 kΩ	19 ppm + 2.4 Ω		
	1 MΩ	70 ppm + 2.6 Ω		
	3 MΩ	80 ppm + 35 Ω		
	10 MΩ	210 ppm + 59 Ω		
	30 MΩ	230 ppm + 2.9 kΩ		
	100 MΩ	350 ppm + 3.5 kΩ		
	300 MΩ	0.22 % + 120 kΩ		
	1000 MΩ	0.31 % + 580 kΩ		
DC Resistance				
Measurement	0 Ω to 1 Ω	16 ppm + 26 μΩ		C
	1 Ω to 10 Ω	17 ppm + 26 μΩ		
	10 Ω to 100 Ω	11 ppm + 42 μΩ		
	100 Ω to 1 kΩ	11 ppm + 350 μΩ		
	1 kΩ to 10 kΩ	7.0 ppm + 3.5 mΩ		
	10 kΩ to 100 kΩ	11 ppm + 35 mΩ		
	100 kΩ to 1 MΩ	26 ppm + 810 mΩ		
	1 MΩ to 10 MΩ	42 ppm + 120 mΩ		
	10 MΩ to 100 MΩ	150 ppm + 5.2 Ω		
	100 MΩ to 1 GΩ	400 ppm + 520 kΩ		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
Temperature indicators, calibration by electrical simulation				C
Base metal thermocouple	- 200 °C to + 1600 °C	0.25 °C	excluding cold junction compensation	
Noble metal thermocouple	- 200 °C to + 1760 °C	0.25 °C	excluding cold junction compensation	
Cold junction compensation	At ambient temperature of 20 °C	0.20 °C		
Resistance sensors	- 200 °C to 0 °C 0 °C to 850 °C	0.15 °C 0.050 °C		
Frequency	1 Hz to 1.35 GHz	4.0 in 10^8		C
Time Interval	0.05 s to 60 min	0.050 s		
Tachometers (Optical)	100 rpm to 50000 rpm	2.0 rpm		
END				