

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <p>Accredited to ISO/IEC 17025:2005</p>	Brunel Metrology Services Ltd	
	Issue No: 032	Issue date: 30 November 2010
	Units 28/32/33 Old Mills Industrial Estate Paulton Bristol BS39 7SU	Contact: Mr B Spanswick Tel: +44 (0)1761 411247 Fax: +44 (0)1761 410555 E-Mail: ruth.williams@brunelmetrology.co.uk Website: www.brunelmetrology.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 Units 28/32/33 Old Mills Industrial Estate Paulton Bristol BS39 7SU	Local contact Mr B Spanswick	Dimensional Electrical Torque Pressure
		A

Site activities performed away from the locations listed above:

Location details	Activity	Location code
At customers premises	Mr B Spanswick	Dimensional Electrical Pressure
		B



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DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
DIMENSIONAL				
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
LENGTH			NOTE	
Plain plug gauges (parallel), cylindrical setting standards and rollers	1 to 100 diameter 100 to 150 150 to 200 200 to 300	0.80 1.0 1.4 1.6] on diameter	1. All linear calibrations may be given in inch units. 1. Calibrations may also be given in lbf.in and lbf.ft	A
Plain ring gauges (parallel) and setting standards	2 to 10 diameter 10 to 25 25 to 50 50 to 100 100 to 150 150 to 250	1.0 0.8 1.0 1.5 2.0 3.0] on diameter	2. The uncertainty quoted is for the departure from flatness, straightness, parallelism, or squareness, ie the distance separating the two parallel planes which just enclose the surface under consideration.	A
Screw plug gauges (parallel) including check and setting plugs (See note 4)	3 to 100 100 to 150	3.0 5.0] On pitch diameter	4. Single start, Symmetrical thread forms only.	A
Screw ring gauges (parallel) (se note 4)	10 to 50 50 to 100	5.0 7.0] On pitch diameter		A
Screw thread pitch	0.2 to 8	1.5		
Screw thread flank angles	0° to 52°	5.0 minutes of arc		
Length gauges, flat and spherical ended	25 to 600	1.0 + (8.0 x length in m)		A
Plain gap gauges (parallel)	0.5 to 100 100 to 200 200 to 300	3.0 5.0 8.0		A
Parallels	As BS 906:1972 5 to 50 x 100 x 400	1.2 to 5.0		A
Vee blocks	As BS 3731:1987 20 to 150 diameter, vee capacity	2.5 to 5.0		A
Feeler Gauges	As BS 957:2008 0.02 to 1.00	2.0		A



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ANGLE				
Squares Blade type	As BS 939:2007 50 to 300 300 to 600 600 to 800	3.0 — 5.0 — On squareness 8.0 — See Note 3		A
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 3		A
Spirit levels	As BS 3509:1962 and BS 958:1968 2 seconds of arc to 60 minutes of arc nominal sensitivity	Mean sensitivity 10 % of nominal Minimum of 0.50 seconds of arc		A
Electronic indicating levels	0 to 10 minutes of arc	1.0 % of range Minimum 0.50 seconds of arc		A
FORM				
Surface plates Granite Cast iron	As BS 817:2008 160 x 100 to 4000 x 6000	1.5 + (0.80 x diagonal in m) See Note 3		A & B
MEASURING INSTRUMENTS AND MACHINES				
Micrometers External	As BS 870:2008 0 to 900	Heads 2.0 between any two points. Setting and extension rods 1.0 + (8.0 x length in m)		A
Internal	As BS 959:2008 0 to 900			
Depth	As BS 6468:2008 0 to 300			
Micrometer setting rods and extensions	25 to 900	1.0 + (8.0 x length in m)		A
Height setting micrometer	0 to 600	Heads 1.0 Stepped column 1.6 Overall performance 2.0		A
Riser blocks for above	150 300	1.0 2.0		A



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MEASURING INSTRUMENTS AND MACHINES (cont'd)				
Dial gauges and dial test indicators	As BS 907:2008 and BS 2795:1981 0 to 50	1.0		A
Displacement transducers (linear)	0 to 100	1.0		A
Vernier gauges Caliper / Dial	As BS 887:2008 0 to 1000	Overall performance 10 + (30 x length in m)		A
Height	As BS 1643:2008 0 to 1000			
Depth	As BS 6365:2008 0 to 600			
Electronic height gauges	0 to 1000	Linear: 1.0 + (5.0 x length in m) Squareness: 2.0 + (10 x length in m)		A & B
Setting masters for the above	0 to 125	1.6		A
Comparators (external)	As BS 1054:1975 250 to 10 000 magnifications	1.0 % of range Minimum 0.20		A
FIELD 1 (DC and LF ELECTRICAL MEASUREMENTS)				
DC RESISTANCE				
Measurement	0 Ω to 140 Ω 140 Ω to 1.4 k Ω 1.4 k Ω to 14 k Ω 14 k Ω to 140 k Ω 140 k Ω to 1.4 M Ω 1.4 M Ω to 14 M Ω	65 ppm + 200 $\mu\Omega$ 21 ppm + 1 m Ω 20 ppm + 10 m Ω 21 ppm + 100 m Ω 27 ppm + 1 Ω 65 ppm + 10 Ω		A & B
Generation	0 Ω to 40 Ω 40 Ω to 400 Ω 400 Ω to 4 k Ω 4 k Ω to 40 k Ω 40 k Ω to 400 k Ω 400 k Ω to 4 M Ω 4 M Ω to 40 M Ω 40 M Ω to 400 M Ω	40 m Ω 40 ppm 40 ppm 100 ppm 300 ppm 300 ppm 875 ppm 1000 ppm		A & B
AC Resistance	100 m Ω 50 Hz	1.1%	Calculated in terms of ACV and ACI. Current up to 20A	A



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DC VOLTAGE				
Measurement	0 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V 1000 V to 3000 V	2.5 μ V 15 ppm + 0.8 μ V 2.5 μ V 14 ppm + 1 μ V 13 ppm + 5 μ V 17 ppm + 70 μ V 17 ppm + 360 μ V 5%		A & B
Generation	0 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	2.5 μ V 25 ppm 20 ppm 25 ppm 20 ppm		A & B
DC CURRENT	0 μ A to 320 μ A 320 μ A to 320 mA 320 mA to 3.2 A 3.2 A to 10 A	0.26 μ A 150 ppm 375 ppm 500 ppm		A & B
AC VOLTAGE	1 mV to 100 mV 20 Hz to 40 Hz 40 Hz to 10 kHz 10 kHz to 100 kHz	720 ppm + 10 μ V 250 ppm + 10 μ V 0.19 % + 70 μ V		A & B
	100 mV to 1 V 20 Hz to 40 Hz 40 Hz to 10 kHz 10 kHz to 100 kHz	710 ppm + 86 μ V 220 ppm + 73 μ V 660 ppm + 580 μ V		
	1V to 10 V 20 Hz to 40 Hz 40 Hz to 10 kHz 10 kHz to 100 kHz	720 ppm + 860 μ V 420 ppm + 73 μ V 0.12 % + 6.7 mV		
	10 V to 100 V 20 Hz to 40 Hz 40 Hz to 10 kHz 10 kHz to 100 kHz	830 ppm + 10 mV 580 ppm + 9 mV 0.28% + 26 mV		
	100 V to 1000 V 20 Hz to 40 Hz 40 Hz to 100 kHz	0.11 % + 16 mV 0.12 % + 82 mV		
	1000 to 3000 V 40 Hz to 60 Hz	5.0 %		
AC CURRENT	1 μ A to 320 μ A 10 Hz to 3 kHz	0.35 μ A		A & B
	320 μ A to 320 mA 10 Hz to 3 kHz	200 ppm		



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AC CURRENT	320 mA to 3.2 A <i>10 Hz to 3 kHz</i>	0.35 %		
	3.2 A to 10 A <i>10 Hz to 3 kHz</i>	0.50 %		
	10 A to 20 A <i>10 Hz to 1 kHz</i>	1.0 %		
FREQUENCY			Frequency may also be expressed as Events / unit time e.g. rpm	A & B A
Spot Frequencies generation only	10 MHz, 1 MHz, 100 kHz, 10 kHz, 1 kHz, 100 Hz, 10 Hz, 1 Hz	$2.0 \text{ in } 10^9$	Multi-period measurement	A
Repetitive frequency/time	10 Hz to 2.7 GHz	$2.5 \text{ in } 10^9$	Frequency measurement	A
	0.5 Hz to 10 MHz	25 ppm		A & B
Single Shot	10 Hz to 2.7 GHz	$12 \text{ in } 10^9$	Frequency measurement	A
Elapsed time	200 ms to 12 hours	200 ms		A
TEMPERATURE SIMULATION			J, T and K type thermocouple simulation, °C equivalent, Including Cold Junction Compensation	A & B
	-100 °C to 100 °C	0.30 °C		
	100 °C to 600 °C	0.30 °C		
	600 °C to 1372 °C	0.40 °C		
ADDITIONAL MEASUREMENTS SPECIFIC TO 17 TH EDITION EQUIPMENT				A & B
Continuity	0 Ω to 20 Ω 100 Ω 1 kΩ	3.1 % + 850 μΩ 3.1 % + 14 mΩ 3.1 % + 71 mΩ		
Insulation	0 MΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1 GΩ	0.80 % + 500 Ω 1.8 % + 35 kΩ 1.9 % + 260 kΩ 2.5 % + 290 kΩ		



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Loop Impedance (50 Hz)	50 mΩ 100 mΩ 220 mΩ 330 mΩ 500 mΩ 1.0 Ω 5.0 Ω 10 Ω 100 Ω 1 kΩ	0.80 % + 1.7 mΩ 0.80 % + 1.7 mΩ 0.80 % + 3.0 mΩ 0.80 % + 1.7 mΩ 0.80 % + 2.0 mΩ 0.80 % + 2.0 mΩ 0.80 % + 5.0 mΩ 0.80 % + 6.2 mΩ 0.80 % + 26 mΩ 0.80 % + 1.0 Ω		
RCD's				A & B
Timing	20 ms to 5s	1.5 ms		
Current (50 Hz)	3 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 3 A 50 mΩ 100 Ω 220 mΩ 330 mΩ 500 mΩ 1 Ω 5 Ω 10 Ω 100 Ω 1 kΩ	7.0 % + 20 μA 7.0 % + 160 μA 7.0 % + 840 μA 7.0 % + 5.3 mA 0.74 % + 2.0 mΩ 0.74 % + 2.0 mΩ 0.74 % + 2.5 mΩ 0.74 % + 2.0 mΩ 0.74 % + 2.0 mΩ 0.74 % + 2.0 mΩ 0.74 % + 4.0 mΩ 0.74 % + 6.2 mΩ 0.74 % + 20 mΩ 0.74 % + 80 mΩ		A & B
Earth Bond Current	100 mA 8 A 10 A 30 A	2.0 % + 3.0 mA 2.0 % + 20 mA 2.0 % + 26 mA 2.0 % + 30 mA		
Load Test	0.13 kVA (nom 440 Ω)	2.0 % + 5.0 Ω		
Leakage Current	2 mA to 8 mA	1.8 % + 15 μA		
Insulation Test Voltage	50 V to 100 V 100 V to 250 V 250 V to 500 V 500 V to 1000 V	120 mV 220 mV 520mV 1.2 V		
TORQUE				
Hand torque tools	To BS EN ISO 6789:2003 0.2 Nm to 1000 Nm	1.0 % of applied torque See Note 2		A



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<p>PRESSURE</p> <p><u>Gas pressure (gauge)</u></p> <p>Calibration of pressure measuring instruments and gauges.</p> <p><u>Hydraulic pressure (gauge)</u></p> <p>Calibration of pressure measuring instruments and gauges.</p>	<p>- 95 kPa to 200 kPa 200 kPa to 2 MPa</p> <p>600 kPa to 6 MPa 6 MPa to 120 MPa</p>	<p>130 Pa 1.4 kPa</p> <p>0.038 % 0.038 %</p>	<p>Calibration of pressure devices with an electrical output can be undertaken</p>	<p>A & B</p> <p>A & B</p>
END				