Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0720

Accredited to ISO/IEC 17025:2017

Rhopoint Metrology Limited

Issue No: 036 **Issue date:** 15 May 2020

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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 Eurolab House Unit 10 Valepits Road Garretts Green Industrial Estate Birmingham B33 0TD	Dean Hughes	Dimensional Electrical Mass Pressure Temperature	A

Location details		Activity	Location code
Address Unit 28 Old Mills Industrial Estate Paulton Bristol BS39 7SU	Dean Hughes	Dimensional	B

Site activities performed away from the locations listed above:

Location details		Activity	Location code
At customers premises (Managed from Birmigham)	Dean Hughes	Dimensional Electrical Mass Pressure	C

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Calibration performed by the Organisation at the locations specified

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		Class (see footnote)		A
Inch (Steel and tungsten carbide)	BS 4311:2007 0.01 in to 0.4 in 0.4 in up to 1 in Size 2 in 3 in 4 in	C D 3.0 4.0 4.0 5.0 5.0 7.0 µ in 6.0 8.0 7.0 10	By comparison with reference end standards	
Millimetre (Steel and tungsten carbide)	BS EN ISO 3650:1999 0.5 to 10 10 up to 25 Size 30, 40, 50 60, 70, 75 80, 90, 100	C D 0.080 0.10 0.10 0.13 0.12 0.17 0.15 0.21 0.18 0.25		

Footnote
Class C uncertainties apply to the measurement of length of steel 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 4311:2007.

Class D uncertainties represent the best capability for the measurement of length of gauges by comparison with grade K standards of length of a dissimilar material.

Notes

1 The uncertainty quoted is for the departure from either flatness, straightness, parallelism, 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. Single and multi-start symmetrical and asymmetrical thread forms

4. Functional test of size using setting plugs calibrated with a CMC of 3.0 µm

5. Includes use of check plugs for screw rings from 1 mm to 2.5 mm diameter.

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				
LENTGTH (cont.)				
Thread measuring cylinders	BS 5590 and specials 0.1 to 5	0.50	By comparison with reference standards	A
Plain plug gauges (parallel) cylindrical setting standards and rollers	1 to 25 diameter 25 to 100 diameter 100 to 150 diameter 150 to 200 diameter 200 to 300 diameter 300 to 600 diameter	0.50 0.80 1.2 1.5 2.0 4.0 on diameter	By comparison with reference standards	A
Plain plug gauges (taper)				A
Parallel to 1 in 8 on diameter	3 to 50 diameter 50 to 100 diameter 100 to 200 diameter 200 to 300 diameter	3.0 4.0 5.0 6.0 on diameter	By comparison with reference standards	
1 in 8 to 1 in 3 on diameter	3 to 50 diameter 50 to 100 diameter 100 to 200 diameter 200 to 300 diameter	5.0 6.0 7.0 8.0		
Plain ring gauges (parallel) and setting standards	2 to 25 diameter 25 to 100 diameter 100 to 150 diameter 150 to 200 diameter 200 to 400 diameter 400 to 600 diameter	0.8 1.0 2.0 3.0 4.0 6.0 on diameter	By comparison with reference standards	A

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 (cont'd) Plain ring gauges (taper)				A
Parallel to 1 in 8 on diameter	2 to 50 diameter 50 to 100 diameter 100 to 150 diameter 150 to 200 diameter	4.0 5.0 6.0 7.0	.	
1 in 8 to 1 in 3 on diameter	2 to 50 diameter 50 to 100 diameter 100 to 150 diameter 150 to 200 diameter	6.0 7.0 8.0 9.0 on diameter	By comparison with reference standards	
Length gauges, flat and spherical ended	0 to 600	1.0 + (5.0 x length in m)	By comparison with reference standards	A
Plain gap gauges (parallel)	0.5 to 100 100 to 200 200 to 300	3.0 5.0 8.0	By comparison with reference standards	A
Receiver, position and profile gauges, jigs, fixtures (see note 1)	0 to 400 x 200 x 200	Minimum per coordinate: 3.0 + (10 x length in m)	Using documented in-house methods	A
Parallels	As BS 906:1972 5 to 50 x 100 x 400	0.5 to 5.0		A
Vee blocks	As BS 3731:1987 20 to 150	2.5 to 5.0		A
Screw plug gauges (parallel) including check and setting plugs See Note 3	1 to 100 diameter 100 to 300 300 to 600	3.0 5.0 8.0 on pitch diameter		A
Screw plug gauges (taper) including check plugs See Note 2	2 to 100 100 to 300 300 to 500	5.0 8.0 10		
Screw ring gauges (parallel) See Note 3 and 5	1 to 100 diameter 100 to 150 150 to 200 200 to 300 300 to 600	5.0 6.0 7.0 8.0 12 on pitch diameter	Methods consistent with NPL Notes on Applied Science No. 1.	
Screw ring gauges (tapered) See Note 2	6 to 100 diameter 100 to 200 200 to 400 400 to 600	7.0 10 13 16		
Screw pitch Screw flank angle	0.2 to 8 0° to 52°	1.5 5.0 minutes of arc	Mechanical and optical comparison	
Screw thread adjustable caliper gauges (parallel) See Note 3	1 to 200 diameter	See note 5	By use of setting plugs	A

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 (cont'd)				
Vee grooved jaw blades	0.6 (40 tpi) to 6.0 (4.5 T.P.I)	3.0	Documented in-house methods.	A
Vee grooved end pieces	0.6 (40 T.P.I) to 6.0 (4.5 T.P.I)	3.0	Documented in-house methods.	A
Plain end pieces	0 to 0.001	0.50 on flatness	Documented in-house methods.	A
Thread Stylii	0.6 (40 T.P.I) to 6.0 (4.5 T.P.I)	0.10 on form	Documented in-house methods.	A
Thread measuring vee pieces (prisms)	NPL Schedule MOY/SCM1/60 0 to 4.5	0.50		A
Orifice plates	BS EN ISO 5167-1:1991 0 to 1000	8		A
Penetration needles and cones	Needles to BS 2000-49:2007 0 to 2 diameter Cones to BS 2000:Part 50:1993 0 to 10 diameter	3.0 on diameter Mass 5.0 mg		A
ANGLE				
Squares				A
Blade type	BS 939:2007 50 to 300 300 to 600 600 to 1000	 3.0 5.0 8.0		
Cylindrical	BS 939:2007 75 to 300 300 to 600 600 to 1000	 2.0 On squareness 4.0 See Note 1 7.0		
Block	BS 939:2007 50 to 300 300 to 600 600 to 1000	 3.0 5.0 8.0		

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				
ANGLE (cont.)				
Angle plates and box angle plates	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		A
Sine bars and tables	BS 3064:1978 0 up to 500	Linear dimensions: 1.0 + (10 x length in m) Overall performance: 3.0 seconds of arc		A
Sine centres	0 to 500 length or between centres	Linear dimensions: 1.0 + (10 x length in m) Overall performance: 3.0 seconds or arc	In house methods based on BS 3064:1978	A
Compound sine tables	0 to 500 length			
FORM				
Roundness External Internal	 0 to 350 diameter 5 to 350 diameter	0.050 on radius	Mechanical styus form measurement	A
Straightedges Cast iron, Steel and Granite	 BS 5204:Part 1:1975 BS 5204:Part 2:1977 0 to 2000	 1.0 + (2.0 x length in m) See Note 1		A
Precision balls: Steel and Tungsten Carbide	 1 to 30	 0.80 on diameter	By comparison with reference standards	A
Surface plates Granite & cast iron	BS 817:1988 160 x 100 to 10m x 6m	1.50 + (0.80 x diagonal in m) See Note 1		A, C
Surface texture (excluding measurement standards and roughness comparison specimens)	BS 1134:Part 1:1988 Ra 0.02 µm to 80 µm	7.0 % of measured value		A

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				
MEASURING INSTRUMENTS AND MACHINES				
Micrometers External Internal Depth	 BS 870:2008 0 to 600 BS 959:2008 0 to 900 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)		A
3 point bore	0 to 150 150 to 250	5.0 8.0		A
Micrometer heads	BS 1734:1951 0 to 100	1.0		A
Bench micrometer	NPL MOY/SCMI 22 0 to 100	Overall performance 2.0		A
Height gauges - (Simple) including vernier, dial and digital types	BS EN ISO 13225:2012 0 to1000	Overall performance: 2.0 + (5.0 x length in m)		
Vernier caliper, height and depth gauges	BS 887:2008 0 to 1000 BS 1643:2008 0 to 1000 BS 6365:2008 0 to 600	Overall performance 10 + (30 x length in m)		A
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 50	1.0		A
Displacement transducers	0 to 200	1.0	Documented in-house methods.	A
Height setting micrometer	0 to 300	Heads 1.0 Overall performance 3.0	Documented in-house methods.	A
Riser blocks for above	150 300	2.5 5.0	By comparison with reference standards	A
Bench centres	to 1000 between centres	Linear dimensions 1.0 + (10 x length in m)	Documented in-house methods.	A

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				
MEASURING INSTRUMENTS AND MACHINES (cont'd)				
Height gauges, electronic	0 to 1000	1.0 + (5.0 x length in m)	Documented in-house methods.	A
Profile projectors	10 to 100 magnifications Linear 0 to 300 Angular 0° to 360°	Magnification 125 at screen Linear 5.0 Angular 2.0 mins of arc	Mechanical and optical comparison	A, C
Bevel protractors	As BS 1685:2008 0° to 360°	6 0 minutes of arc		A
Comparators (external)	As BS 1054 250 to 10 000 magnifications	1.0 % or range Minimum 0.20		A
Co-ordinate tables	0 to 500 square with 150 movement	Overall performance 3.0	Documented in-house methods.	A
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		A
Electronic indicating levels	0 to 20 minutes of arc	1.0 % or range Minimum 0.50 seconds of arc	Documented in-house methods based on BS 3509:1962	A
Luer (taper) gauges	BS 3930:Part 1:1987 and BS 3930:Part 2:1991 0.3 to 8	As per plain taper and screw taper gauges above		A
NPL type Wedge Micrometer	MOY/SMI/89 2.5 micrometer travel	0.30		A
Steel Rules	BS 4372:1968 0 to 1000	15 + (20 x L in m)		A
Feeler gauges	BS 957:2008 0.025 to 1	3.0		A
Thread diameter measuring	MOY/SCM1/9 and MOY/SCM1/12 0 to 300	Overall performance 1.5		A

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (*k*=2)	Remarks	Location Code
PRESSURE			Methods consistent with EURAMET CG3 and CG17	
<u>Hydraulic pressure (gauge)</u>				
Calibration of pressure indicating instruments and gauges, Pressure equivalent calibration of deadweight testers.	550 kPa to 110 MPa	0.017 %	Calibration of devices with an electrical output may be undertaken.	A, C
<u>Gas pressure (gauge)</u>				
Calibration of pressure indicating instruments and gauges, Pressure equivalent calibration of deadweight testers.	-97 kPa to -3.5 kPa 3.5 kPa to 100 kPa 100 kPa to 700 kPa 700 kPa to 12 MPa	0.015 % 0.014 % 0.012 % 0.010 %		A, C
<u>Gas pressure (absolute)</u>				
Calibration of pressure indicating instruments and gauges	3.5 kPa to 130 kPa 103.5 kPa to 200 kPa 200 kPa to 800 kPa 800 kPa to 12 MPa	0.015 % + 9 Pa 0.014 % + 25 Pa 0.012 % + 25 Pa 0.010 % + 25 Pa		A, C
<u>Gas Pressure (Differential)</u>				
Calibration of pressure indicating instruments and gauges	2.5 kPa to 100 kPa (line pressure 1.2 MPa to 10 MPa)	0.60 ppm/MPa of line pressure, plus 0.0080 % of differential pressure, plus 88 Pa		A

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
ELECTRICAL The method for all electrical measurements listed below is by direct comparison to laboratory standards unless otherwise described in the remarks column.				
DC Voltage				
	0 mV to 320 mV 320 mV to 3.2 V 3.2 V to 32 V 32 V to 320 V 320 V to 1020 V	26 ppm + 1.8 µV 14 ppm + 2.6 µV 16 ppm + 30 µV 23ppm + 200 µV 23 ppm + 2.0 mV	Source values for the calibration of measuring instruments	A
	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1020 V	8.0 ppm + 1.2 µV 5.0 ppm + 1.3 µV 5.0 ppm + 4.8 µV 7.0ppm + 47 µV 7.0 ppm + 600 µV	Measurement suitable for the calibration of sources	A
DC Current				
	0 µA to 320 µA 320 µA to 3.2 mA 3.2 mA to 32 mA 32 mA to 320 mA 320 mA to 1.1 A 1.1 A to 3.2 A 3.2 A to 11 A 11 A to 20 A	180 ppm + 24 nA 120 ppm + 60 nA 120 ppm + 300 nA 120 ppm + 3.0 µA 240 ppm + 40 µA 450 ppm + 50 µA 590 ppm + 600 µA 0.12 % + 900 µA	Source values for the calibration of measuring instruments	A
	10 A to 100 A 100 A to 550 A 550 A to 1000 A	0.12 % 0.15 % 0.18 %	For the calibration of clamp meters only.	A
	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 20 A	39 ppm + 1.4 nA 17 ppm + 4.0 nA 18 ppm + 100 nA 57 ppm + 1.0 µA 220 ppm + 19 µA 470 ppm + 500 µA	Suitable for the calibration of sources	A
DC Resistance				
	0 Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 32 Ω 32 Ω to 100 Ω 100 Ω to 320 Ω 320 Ω to 1 kΩ	1.2 mΩ 77 ppm + 1.2 mΩ 47 ppm + 1.8 mΩ 36 ppm + 1.7 mΩ 35 ppm + 2.4 mΩ 34 ppm + 3.3 mΩ	Source values for the calibration of measuring instruments	A

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
DC Resistance Continued	1 kΩ to 3.2 kΩ 3.2 kΩ to 10 kΩ 10 kΩ to 32 kΩ 32 kΩ to 100 kΩ 100 kΩ to 320 kΩ 320 kΩ to 1 MΩ	34 ppm + 24 mΩ 34 ppm + 33 mΩ 34 ppm + 230 mΩ 34 ppm + 330 mΩ 40 ppm + 2.3 Ω 41 ppm + 3.3 Ω	Source values for the calibration of measuring instruments	A
	1 MΩ to 3.2 MΩ 3.2 MΩ to 10 MΩ 10 MΩ to 32 MΩ 32 MΩ to 100 MΩ 100 MΩ to 320 MΩ 320 MΩ to 1000 MΩ	75 ppm + 35 Ω 150 ppm + 74 Ω 290 ppm + 2.9 kΩ 600 ppm + 6.8 kΩ 0.35 % + 130 kΩ 1.7 % + 580 kΩ		
	0 Ω to 1 Ω 1 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 2 GΩ	32 µΩ 12 ppm + 29 µΩ 10 ppm + 63 µΩ 10 ppm + 580 µΩ 10 ppm + 6.0 mΩ 10 ppm + 58 mΩ 12 ppm + 2.0 Ω 27 ppm + 120 Ω 150 ppm +12 kΩ 0.18 % + 1.2 MΩ	Measurement suitable for the calibration of sources	A
AC Voltage				
	10 mV to 320 mV *45 Hz to 1 kHz* *1 kHz to 10 kHz*	 0.018 % + 10 µV 0.018 % + 10 µV	Source values for the calibration of measuring instruments	A
	320 mV to 3.2 V *45 Hz to 1 kHz* *1 kHz to 10 kHz*	 0.018 % + 70 µV 0.018 % + 70 µV		
	3.2 V to 32 V *45 Hz to 1 kHz* *1 kHz to 10 kHz*	 0.018 % + 700 µV 0.018 % + 700 µV		
	32 V to 320 V *45 Hz to 1 kHz* *1 kHz to 10 kHz*	 0.023 % + 3.0 mV 0.024 % + 7.0 mV		
	320 V to 1020 V *45 Hz to 1 kHz* *1 kHz to 10 kHz*	 0.036 % + 12 mV 0.036 % + 12 mV		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
AC Voltage	10 mV to 200 mV *20 Hz to 1 kHz* *1 kHz to 10 kHz* 200 mV to 2 V *20 Hz to 1 kHz* *1 kHz to 10 kHz* 2 V to 20 V *20 Hz to 1 kHz* *1 kHz to 10 kHz* 20 V to 200 V *20 Hz to 1 kHz* *1 kHz to 10 kHz* 200 V to 1 kV *55 Hz to 1 kHz* *1 kHz to 10 kHz*	 0.018 % + 4.7 µV 0.019 % + 4.7 µV 0.015 % + 24 µV 0.015 % + 24 µV 0.015 % + 240 µV 0.015 % + 240 µV 0.015 % + 2.3 mV 0.016 % + 2.3 mV 0.016 % + 23 mV 0.017 % + 23 mV	Measurement suitable for the calibration of sources	A
AC Current	10 µA to 320 µA *45 Hz to 1 kHz* *1 kHz to 5 kHz* 320 µA to 3.2 mA *45 Hz to 1 kHz* *1 kHz to 5 kHz* 3.2 mA to 32 mA *45 Hz to 1 kHz* *1 kHz to 5 Hz* 32 mA to 320 mA *45 Hz to 1 kHz* *1 kHz to 5 kHz* 320 mA to 3.2 A *45 Hz to 1 kHz* *1 kHz to 5 kHz* 3.2 A to 11 A *45 Hz to 1 kHz* *1 kHz to 5 kHz* 11 A to 20 A *45 Hz to 1 kHz* *1 kHz to 5 kHz*	 0.15 % + 120 nA 0.36 % + 180 nA 0.12 % + 180 nA 0.23 % + 240 nA 0.049 % + 2.4 µA 0.095 % + 2.4 µA 0.049 % + 24 µA 0.12 % + 58 µA 0.065 % + 120 µA 0.70 % + 1.2 mA 0.12 % + 2.4 mA 3.5 % + 2.4 mA 0.18 % + 5.8 mA 3.0 % + 5.8 mA	Source values for the calibration of measuring instruments	A

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (*k*=2)	Remarks	Location Code
AC Current				
	10 µA to 320 µA		Source values for the calibration of measuring instruments	A
	45 Hz to 1 kHz	0.15 % + 120 nA		
	1 kHz to 5 kHz	0.36 % + 180 nA		
	320 µA to 3.2 mA			
	45 Hz to 1 kHz	0.12 % + 180 nA		
	1 kHz to 5 kHz	0.23 % + 240 nA		
	3.2 mA to 32 mA			
	45 Hz to 1 kHz	0.049 % + 2.4 µA		
	1 kHz to 5 Hz	0.095 % + 2.4 µA		
	32 mA to 320 mA			
	45 Hz to 1 kHz	0.049 % + 24 µA		
	1 kHz to 5 kHz	0.12 % + 58 µA		
	320 mA to 3.2 A			
	45 Hz to 1 kHz	0.065 % + 120 µA		
	1 kHz to 5 kHz	0.70 % + 1.2 mA		
	3.2 A to 11 A			
	45 Hz to 1 kHz	0.12 % + 2.4 mA		
	1 kHz to 5 kHz	3.5 % + 2.4 mA		
	11 A to 20 A			
	45 Hz to 1 kHz	0.18 % + 5.8 mA		
	1 kHz to 5 kHz	3.0 % + 5.8 mA		
	10 A to 100 A			A
	45 Hz to 1 kHz	0.14 %	For the calibration of clamp meters only.	
	1 kHz to 5 kHz	0.74 %		
	100 A to 550 A			
	45 Hz to 1 kHz	0.17 %	For the calibration of clamp meters only.	
	1 kHz to 5 kHz	3.5 %		
	100 A to 1000 A			
	45 Hz to 1 kHz	0.22 %	For the calibration of clamp meters only.	
	1 kHz to 5 kHz	3.5 %		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
AC current - continued				
	10 µA to 200 µA		Measurement suitable for the calibration of sources	A
	55 Hz to 1 kHz	0.060 % + 24 nA		
	1 kHz to 5 kHz	0.061 % + 24 nA		
	200 µA to 2 mA			
	55 Hz to 1 kHz	0.037 % + 240 nA		
	1 kHz to 5 kHz	0.037 % + 240 nA		
	2 mA to 20 mA			
	55 Hz to 1 kHz	0.036 % + 2.4 µA		
	1 kHz to 5 kHz	0.036 % + 2.4 µA		
	20 mA to 200 mA			
	55 Hz to 1 kHz	0.035 % + 24 µA		
	1 kHz to 5 kHz	0.035 % + 24 µA		
	200 mA to 2 A			
	55 Hz to 1 kHz	0.073 % + 240 µA		
	1 kHz to 5 kHz	0.087 % + 240 µA		
	2 A to 20 A			
	55 Hz to 1 kHz	0.10 % + 2.4 mA		
	1 kHz to 5 kHz	0.30 % + 2.4 mA		
AC Resistance	*40 Hz to 400 Hz*		Excitation current -	A
	1 mΩ to 10 mΩ	0.080 %	10 A: 1 mΩ to 20 mΩ	
	10 mΩ to 100 mΩ	0.071 %	1 A: 20 mΩ to 2 Ω	
	100 mΩ to 1 Ω	0.071 %		
	1 Ω to 10 Ω	0.086 %	100 mA: 2 Ω to 20 Ω	
	10 Ω to 100 Ω	0.051 %	10 mA: 20 Ω to 200 Ω	
Oscilloscopes			1 mA: 200 Ω to 2 kΩ	A
Vertical deflection coefficients:	*1 kHz*			
	5 mV to 100 mV	0.17 % + 470 nV		
	100 mV to 100 V	0.12 % + 470 nV		
Horizontal deflection coefficients:	5 s/div to 5 ns/div	0.40 %		
Power Meters			At unity power factor only. Voltages will be in th range 10 V to 1000 V and currents will be in the range 100 mA to 20 A	A
DC Power	1 W to 20 kW	0.16 %		
AC Power 45Hz to 1 kHz	1 W to 20 kW	0.28 %		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
Power Meters continued				
DC Power With Clamp	20 kW to 100 kW	0.31 %	For use with Power meters with clamp head	A
AC Power With Clamp (45Hz to 1 kHz)	20 kW to 100 kW	0.46 %		
DC Voltage				
	0 mV to 320 mV 320 mV to 3.2 V 3.2 V to 32 V 32 V to 320 V 320 V to 1020 V	71 ppm + 3.7 µV 59 ppm + 5.9 µV 59 ppm + 60 µV 65 ppm + 600 µV 65 ppm + 2.0 mV	Source values for the calibration of measuring instruments	C
	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	14.0 ppm + 1.2 µV 10.0 ppm + 1.7 µV 9.0 ppm + 6.0 µV 10.0 ppm + 116 µV 13.0 ppm + 2.4 mV	Measurement suitable for the calibration of sources	C
DC Current				
	0 µA to 3.2 mA 3.2 mA to 32 mA 32 mA to 320 mA 320 mA to 1.1 A 1.1 A to 11 A	154 ppm + 60 nA 120 ppm + 300 nA 120 ppm + 4.0 µA 354 ppm + 44 µA 705 ppm + 400 µA	Source values for the calibration of measuring instruments	C
	10 A to 100 A 100 A to 550 A	0.26 % + 0.24 A 0.28 % + 0.24 A		C
	0 µA to 100 µA 100 µA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 5 A 5 A to 10 A	77 ppm + 0.5 nA 62 ppm + 5.0 nA 62 ppm + 50 nA 120 ppm + 1.2 µA 182 ppm + 24 µA 0.36 % + 1.4 mA 0.36 % + 2.4 mA	Measurement suitable for the calibration of sources	C

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
DC Resistance				
	0 Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 32 Ω 32 Ω to 100 Ω 100 Ω to 320 Ω 320 Ω to 1 kΩ	7.0 mΩ 153 ppm + 7.0 mΩ 144 ppm + 11.6 mΩ 107 ppm + 11.6 mΩ 106 ppm + 11.6 mΩ 106 ppm + 70 mΩ	Source values for the calibration of measuring instruments	C
	1 kΩ to 3.2 kΩ 3.2 kΩ to 10 kΩ 10 kΩ to 32 kΩ 32 kΩ to 100 kΩ 100 kΩ to 320 kΩ 320 kΩ to 1 MΩ	106 ppm + 70 mΩ 106 ppm + 700 mΩ 106 ppm + 700 mΩ 129 ppm + 7.0 Ω 141 ppm + 7.0 Ω 176 ppm + 64 Ω		
	1 MΩ to 3.2 MΩ 3.2 MΩ to 10 MΩ 10 MΩ to 32 MΩ 32 MΩ to 100 MΩ 100 MΩ to 320 MΩ	177 ppm + 64 Ω 694 ppm + 640 Ω 0.12 % + 0.86 kΩ 0.58 % + 8.6 kΩ 0.58 % + 61 kΩ		
	0 Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 10 kΩ 10 kΩ to 100 kΩ 100 kΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1 GΩ	56 µΩ 26 ppm + 52 µΩ 14 ppm + 118 µΩ 13 ppm + 1.16 mΩ 13 ppm + 12.0 mΩ 16 ppm + 116 mΩ 27 ppm + 3.0 Ω 46 ppm + 60.0 Ω 488 ppm +6.0 kΩ 0.36 % + 0.58 MΩ	Measurement suitable for the calibration of sources	C
Temperature indicators, calibration by electrical simulation				A,C
Base metal thermocouple Noble metal thermocouple	- 200 °C to + 1600 °C - 200 °C to + 1760 °C	0.20 °C 0.70 °C	Including cold junction compensation.	
Base metal thermocouple Noble metal thermocouple	- 200 °C to + 1600 °C - 200 °C to + 1760 °C	0.20 °C 0.70 °C	Excluding cold junction compensation.	
Cold junction compensation	0 ºC to 50 ºC	0.10 ºC	This is a supplementary measurement for monitoring temperature in air.	A,C
Resistance sensors	- 200 °C to 0 °C 0 ° to 850 °C	0.150 °C 0.050 °C		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
Frequency	10 MHz 1 Hz to 1.35 GHz	1.2 in 10^{11} 21 in 10^{8}		A,C
Time Interval	0 s to 60 min	0.060 s		A
	0 s to 60 min	0.080 s		C
Tachometers (Optical)	60 rpm to 90000 rpm	0.2 rpm	This is for devices with a resolution of 0.1 RPM	A,C
ADDITIONAL MEASUREMENTS SPECIFIC TO 17TH EDITION EQUIPMENT				
Continuity	0 Ω to 20 Ω 100 Ω 1 kΩ	3.0 % + 1.2 mΩ 0.40 % + 6.3 mΩ 0.40 % + 18.2 mΩ		A,C
Continuity Current	0 to 320 mA	5.1 mA		
Insulation	1 MΩ 2 MΩ 3 MΩ 4 MΩ 5 MΩ 6 MΩ 7 MΩ 8 MΩ 9 MΩ 10 MΩ 20 MΩ 30 MΩ 40 MΩ 50 MΩ 60 MΩ 70 MΩ 80 MΩ 90 MΩ 100 MΩ 200 MΩ 400 MΩ 600 MΩ 800 MΩ 1 GΩ 2 GΩ 4 GΩ 6 GΩ 8 GΩ 10 GΩ	1.8 kΩ 2.7 kΩ 3.8 kΩ 4.9 kΩ 6.0 kΩ 71 kΩ 82 kΩ 94 kΩ 110 kΩ 120 kΩ 240 kΩ 360 kΩ 470 kΩ 587 kΩ 710 kΩ 830 kΩ 940 kΩ 1.1 MΩ 1.3 MΩ 2.9 MΩ 5.7 MΩ 8.6 MΩ 11 MΩ 14 MΩ 25 MΩ 240 MΩ 360 MΩ 470 MΩ 590 MΩ		A,C

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
ADDITIONAL MEASUREMENTS SPECIFIC TO 17TH EDITION EQUIPMENT continued				A,C
Insulation Test Voltage	50 VDC 100 VDC 250 VDC 500 VDC 1000 VDC	1.4 V 1.7 V 3.2 V 6.0 V 12 V		
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	5.1 mΩ 5.1 mΩ 5.2 mΩ 5.5 mΩ 5.9 mΩ 8.0 mΩ 30 mΩ 60 mΩ 620 mΩ 6.0 Ω	.	A,C
PAT Load Test	0.13 kVA (nom 440 Ω)	28 Ω		A,C
PAT Leakage Current	2 mA 4.7 mA 7.7 mA	42 µA 85 µA 140 µA		
PAT Earth Bond Current	100 mA 10 A 25 A	8.5 mA 190 mA 450 mA		
PAT Earth Bond Resistance	0.05 Ω 0.1 Ω 0.22 Ω 0.33 Ω 0.5 Ω 1 Ω 5 Ω 10 Ω 100 Ω 1 kΩ	5.1 mΩ 5.0 mΩ 5.2 mΩ 5.4 mΩ 5.9 mΩ 8.0 mΩ 30 mΩ 60 mΩ 620 mΩ 6.3 Ω		
PAT Flash Voltage Class 1 Class 2	 1.5 kV 3.0 kV	 73 V 143 V		
PAT Flash Current	1 to 3 mA	180 µA		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
ADDITIONAL MEASUREMENTS SPECIFIC TO 17TH EDITION EQUIPMENT continued				
RCD Trip Current	3 to 10 mA 10.1 to 100 mA 101 mA to 1 A 1.01 A to 2 A	630 µA 5.9 mA 6.6 mA 120 mA		A,C
RCD Trip Time	20 m Sec 40 m Sec 100 m Sec 200 m Sec 390 m Sec 900 m Sec	0.70 m Sec 1.0 m Sec 1.5 m Sec 1.5 m Sec 1.5 m Sec 8.3 m Sec		A,C
TEMPERATURE			By comparison in a regulated heat source (Ambient air, liquid bath, block calibrator, etc.)	
Resistance thermometers	-25 °C to 0 °C 0 °C 0 °C to 140 °C 140 °C to 185 °C 185 °C to 320 °C 320 °C to 420 °C	0.11 °C 0.035 °C 0.11 °C 0.21 °C 0.41 °C 0.61 °C		A
Thermocouples	-25 °C to 0 °C 0 °C to 140 °C 140 °C to 185 °C 185 °C to 320 °C 320 °C to 420 °C	0.40 °C 0.45 °C 0.50 °C 0.70 °C 0.90 °C		A
Temperature indicators with the following probe types				A
Resistance (eg Pt100)	-25 °C to 0 °C 0 °C 0 °C to 50 °C 50 °C to 140 °C 140 °C to 185 °C 185 °C to 320 °C 320 °C to 420 °C	0.10 °C 0.022 °C 0.10 °C 0.10 °C 0.20 °C 0.40 °C 0.60 °C		A
Thermocouple	-25 °C to 0 °C 0 °C to 140 °C 140 °C to 185 °C 185 °C to 320 °C 320 °C to 420 °C	0.40 °C 0.45 °C 0.50 °C 0.70 °C 0.90 °C		A

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
MASS				
Weights and artefacts	25 000 g 20 000 g 10 000 g 5 000 g 2 000 g 1 000 g 500 g 200 g 100 g 50 g 20 g 10 g 5 g 2 g 1 g 0.5 g 0.2 g 0.1 g 0.05 g 0.02 g 0.01 g 0.005 g 0.002 g 0.001 g	250 mg 200 mg 100 mg 50 mg 20 mg 10 mg 5 mg 2 mg 1 mg 0.6 mg 0.5 mg 0.4 mg 0.3 mg 0.24 mg 0.20 mg 0.16 mg 0.12 mg 0.10 mg 0.08 mg 0.06 mg 0.05 mg 0.04 mg 0.04 mg 0.04 mg	Notes 1. Calibrated using Borda substitution method. 2. Calibrations can be given in other units as required. 3. Intermediate values can be calibrated to an uncertainty interpolated from the next higher and lower values in the table.	A
NON AUTOMATIC WEIGHING MACHINES Lab & Site Electronic, single pan	200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg 50 kg 100 kg 107 kg	0.03 mg 0.03 mg 0.04 mg 0.05 mg 0.06 mg 0.07 mg 0.10 mg 0.12 mg 0.18 mg 0.36 mg 0.90 mg 1.8 mg 7.2 mg 18 mg 36.1 mg 72.4 mg 1.8 g 2.5 g 2.6 g	Notes 1. Calibrated by comparison with reference standards 2. Weights are available in OIML Class: E2 from 200 mg to 500 g, max. grouped load 1 kg F1 from 1 g to 20 kg, max. grouped load 55 kg. M1 from 5 kg to 20 kg, max. grouped load 107 kg 2. Other loads within the overall listed range may also be used	A, C

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				
Plain plug gauges (parallel)	1 to 25 diameter 25 to 100 diameter	0.80 1.0	By comparison with refeence end standards	B
Plain ring gauges (parallel)	2 to 25 diameter 25 to 100 diameter	1.1 1.3		B
Length gauges, flat and spherical ended	0 to 175	1.5 + (5.0 x length in m)		B
MEASURING INSTRUMENTS AND MACHINES				
Micrometers External	BS 870:2008 0 to 200	Heads: 2.0 between any two points Setting and extension rods 1.3 + (5.0 x length in m)		B
Vernier caliper gauges	BS 887:2008 0 to 300	10 + (30 x length in m)		B
Vernier height gauges	BS 1643:2008 0 to 600	10 + (30 x length in m)		B
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 25	1.5		B
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 uncertainty of measurement 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 CIPM-ILAC definition of the CMC is as follows:

A CMC is a calibration and measurement capability available to customers under normal conditions:
(a) as published in the BIPM key comparison database (KCDB) of the CIPM MRA; or
(b) as described in the laboratory's scope of accreditation granted by a signatory to the ILAC Arrangement.

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 CMC is calculated according to the procedures given in M3003 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 CMC in certificates issued under its accreditation.

The CMC may be described using various methods in the Schedule of Accreditation:

As a single value that is valid throughout the range.
As an explicit function of the measurand or of a parameter (see below).
As a range of values. The range is stated such that the customer can make a reasonable estimate of the likely uncertainty at any point within the range.
As a matrix or table where the CMCs depend on the values of the measurand and a further quantity.
In graphical form, providing there is sufficient resolution on each axis to obtain at least two significant figures for the CMC.

Expression of CMCs - symbols and units

In general, only units of the SI and those units recognised for use with the SI are used to express the values of quantities and of the associated CMCs. Nevertheless, other commonly used units may be used where considered appropriate for the intended audience. For example, the term "ppm" (part per million) is frequently used by manufacturers of test and measurement equipment to specify the performance of their products. Terms like this may be used in Schedules of Accreditation where they are in common use and understood by the users of such equipment, providing their use does not introduce any ambiguity in the capability that is being described.

When the CMC is expressed as an explicit function of the measurand or of a parameter, this often comprises a relative term (e.g., percentage) and an absolute term, i.e. one expressed in the same units as those of the measurand. This form of expression is used to describe the capability that can be achieved over a range of values. Some examples are shown below. It should be noted that these expressions are *not* mathematical formulae but are instead written in a commonly used shorthand for expressing uncertainties - therefore, for purposes of clarity, an indication of how they are to be interpreted is also provided below.

DC voltage, 100 mV to 1 V: 0.0025 % + 5.0 µV

Over the range 100 mV to 1 V, the CMC is 0.0025 %·V + 5.0 µV, where V is the measured voltage.

Hydraulic pressure, 0.5 MPa to 140 MPa: 0.0036 % + 0.12 ppm/MPa + 4.0 Pa

Over the range 0.5 MPa to 140 MPa, the CMC is $0.0036\ \%\cdot p + (0.12\cdot 10^{-6}\cdot p\cdot 10^{-6}) + 4.0$ Pa, where p is the measured pressure in Pa.

It should be noted that the percentage symbol (%) simply represents the number 0.01. In cases where the CMC is stated only as a percentage, this is to be interpreted as meaning percentage of the measured value or indication.

Thus, for example, a CMC of 1.5 % means $1.5 \cdot 0.01 \cdot i$, where i is the instrument indication.