

# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

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

 <b>UKAS</b> CALIBRATION  0332  Accredited to ISO/IEC 17025:2017	<b>Mitutoyo (UK) Limited</b>  Issue No: 040 Issue date: 02 July 2024	
	6 Banner Park Wickmans Drive Coventry CV4 9XA	Contact: Gary Adams Tel: +44 (0)2476 426 336 Fax: +44 (0)2476 426 339 E-Mail: calibration@mitutoyo.co.uk Website: www.mitutoyo.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
<b>Address</b> 6 Banner Park Wickmans Drive Coventry CV4 9XA	<b>Local contact</b> Gary Adams	Dimensional  A

#### Site activities performed away from the locations listed above:

Location details	Activity	Location code
At customers premises	Gary Adams	Dimensional  B



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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				
Gauge Blocks Inch (Steel, Ceramic and Tungsten Carbide protectors)	BS 4311-1:2007 0.010 to 0.4 in. 0.4 to 1 in. Size 2 in 3 in 4 in	Class (See notes) <b>C</b> 3.0 4.0 5.0 $\mu$ in 6.0 7.0	<b>Class C</b> uncertainties apply to the measurement of length of 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 4311-1:2007.	A
Millimetre (Steel Ceramic and Tungsten Carbide protectors)	BS EN ISO 3650:1999 0.2 to 10 10 to 25 Sizes 30, 40, 50 60, 70, 75 80, 90, 100	0.080 0.10 0.12 0.15 0.18	1 All linear calibrations may be given in inch units.	
Gauge Block Accessories	0.1 to 12.5	0.30	BS 4311-2:2009	A
Step Gauges (Check Masters Gauges)	0 to 1000	1.0 + (1.0 x length in m)	In house procedure CP051	A
Length Gauges, Flat and Spherical-ended (excluding length bars)	0 to 1000	1.0 + (5.0 x length in m)	In house procedure CP029	A
Thread Measuring Cylinders	0.1 to 5	0.50	BS 3777:1964 and BS 5590:1978	A
Plain Plug Gauges (parallel) cylindrical setting standards and rollers	1 to 50 diameter 50 to 100 diameter 100 to 150 diameter 150 to 200 diameter 200 to 300 diameter	0.80 1.0 1.5 2.0 3.0	In house procedures CP063, CP067, CP104	A
Plain Ring Gauges (parallel) and setting standards	2 to 10 diameter 10 to 25 diameter 25 to 50 diameter 50 to 100 diameter 100 to 150 diameter 150 to 200 diameter 200 to 300 diameter	1.0     on diameter 0.80 1.0 1.5 2.0 2.5 3.0	In house procedures CP042	A
Precision Spheres (Metal and Ceramic)	0 to 50 diameter	0.50	In house procedures CP074	A



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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 (cont'd)				
Feeler Gauges	0.025 to 1	1.0	BS 957: 2008.	A
Gap Gauges	0.5 to 100 100 to 200	3.0 5.0	In house procedures CP069	A
Optical Parallels	0 to 50 diameter	0.30 (See Note 2)	In house procedure CP007	A
Parallels (Engineers)	5 to 50 x 10 x 400	1.5 to 5.0	BS 906:1972	A
Vee Blocks	20 to 150	Flatness: 1.5 Parallelism: 2.5 Squareness: 3.6 Centrality of vee: 3.0 Matching: 4.4 Equality of semi-angle: 15 Seconds of arc	BS 3731:1987	A
ANGLE			Note 2 The uncertainty quoted is for the departure from flatness, straightness, or squareness, it the distance separating the two parallel planes which just enclose the surface under consideration.	
Squares				
Blade type	Squareness of blade to stock: 50 to 300 300 to 600	3.0 5.0	BS 939:2007	A
	Straightness of blade: Flatness: Parallelism: Lateral squareness:	1.5 1.5 3.0 10		
Cylindrical	75 to 900	2.0 (See Note 2)	BS 939:2007	A
Right Angle and Box Angle Plates	50 to 600	Squareness: 3.0 + (1.0 per 100 mm) Parallelism: 1.0 + (1.0 per 100 mm) (See Note 2)	BS 5535:1978	A



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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
LENGTH (cont'd)				
Sine Bars	0 to 500 length  Overall performance: Flatness of working faces Centre distance of rollers Common plane/parallelism  Equality of roller diameter	3.0 seconds of arc 1.0 1.0 2.0  0.8	BS 3064:1978	A
Spirit Levels	4 seconds of arc to 60 minutes of arc nominal sensitivity	Mean sensitivity 10% of nominal Minimum 0.84 seconds of arc	BS 3509:1962 and BS 958:1968	A
<b>MEASURING INSTRUMENTS AND MACHINES</b>				
Micrometers External	0 to 600	Heads / Traverse: 2.0 Setting: $1.3 + (6.0 \times \text{length in m})$ Flatness of anvils: 0.20 Parallelism of anvils: 0.70	BS 870:2008	A
Internal	0 to 900	Heads: 2.0 Setting and extension rods $1.5 + (5.0 \times \text{length in m})$	BS 959:2008	A
Depth micrometer	Based on BS 6468:2008 0 to 300  Heads: Setting and extension rods: Base flatness: Measuring face flatness: Parallelism of Type S:	2.0 $1.5 + (5.0 \times \text{length in m})$ 1.5 0.20 1.5	BS 6468:2008	A
External Micrometers (indicating, digital and electronic)	0 to 600 0 to 25 and 25 to 50 50 to 600	Heads / Traverse: 1.5 Setting: 0.90 Setting: $1.0 + (6.0 \times \text{length in m})$ Flatness of anvils: 0.20 Parallelism of anvils: 0.70	In house procedures CP004	A
Height Setting Micrometers	0 to 1000	Heads: 1.2 between any two points Stepped column: $1.0 + (6.2 \times \text{length in metres})$	In house procedures CP010	A



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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS AND MACHINES (cont'd)				
Riser Blocks for Above Item	150 300 600	1.7 2.5 4.0	In house procedures CP010	A
Micrometer Heads	0 to 50  <i> Traverse:</i> <i> Flatness:</i> <i> Squareness:</i>	1.0 0.20 0.80	BS 1734:1951	A
Three Point Bore Micrometer	6 to 100 100 to 200	3.0 4.0	In house procedures CP076	A
Cartesian co-ordinate measuring machines (CMM)	0 to 1530 (longest diagonal using end standards) $E_L$  Single stylus probing test: $P_{Form.Sph.1x25:SS:Tact}$ $P_{Size.Sph.1x25:SS:Tact}$	0.40 + 0.80 x length in m  0.11 0.60	ISO 10360-2:2009  ISO 10360-5:2020. Using a 10 mm to 51 mm diameter test sphere. Test value uncertainties calculated in line with ISO/TS 17865:2016	A, B
Co-ordinate measuring machines (CMM)	Single stylus probing test $P_{FTU}$ $P_{STU}$  CMMs with the axis of a rotary table as the fourth axis. Radius 150 mm to 400 mm FR, FT, FA  CMMs used in scanning measuring mode. $P_{Form.Sph.Scan:k:Tact}$ $P_{Size.Sph.Scan:k:Tact}$ $T_{Sph.Scan:k:Tact}$  CMMs used in scanning measuring mode $T_{ij}$ $T$	0.11 0.52  0.38  0.11 0.60 0.21 seconds  0.28 0.21 seconds	ISO 10360-5:2010 (Withdrawn). Using a 10 mm to 50 mm diameter test sphere.  BS EN ISO 10360- 3:2001  ISO 10360-5:2020. Using a 24.9 mm to 25.5 mm diameter test sphere. Test value uncertainties calculated for $P_{form}$ and $P_{size}$ in line with ISO/TS 17865:2016  BS EN ISO 10360- 4:2001 (withdrawn). Using a 25 mm diameter test sphere.	A, B
Toolmakers Microscopes	0 to 200	3.2 + (10 x length in m) 13 minutes of arc	In house procedures CP066	A, B



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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS AND MACHINES (cont'd)				
Profile Projectors	10x to 100x magnifications 0 to 200 mm 0 to 360 degrees	125 at the screen 3.5 + (11 x length in m) 5.0 minutes of arc	In house procedures CP064	A, B
Vernier Caliper Gauges,	0 to 1000	Overall performance 10 + (30 x length in m) Flatness: 1.5 Parallelism: 2.5 Squareness: 4.0 Co-Planer: 10 Width of internal jaws: 4.0	BS 887:2008	A  A  A
Vernier Height Gauges	0 to 1000	Overall performance 10 + (30 x length in m)	BS 1643:2008	
Vernier Depth Gauges	0 to 600 Overall performance: Flatness / Straightness: Parallelism:	10 + (30 x length in m) 1.5 2.5	BS 6365:2008	
Depth Gauges (digital and dial)	0 to 600 Overall performance: Flatness / Straightness: Parallelism:	10 + (30 x length in m) 1.5 2.5	In house procedure CP044	
Calipers (digital and dial)	0 to 1500	10 + (15 x length in m) Flatness: 1.5 Parallelism: 2.5 Squareness: 4.0 Co-Planer: 10 Width of internal jaws: 4.0	In house procedures CP024	A
Height gauges - (Simple) including vernier, dial and digital types	0 to 1000	Length measurement error (E): 10 + (30 x length in metres)	BS EN ISO 13225:2012	A
Height gauges (digital and electronic)	0 to 1000	10 + (15 x length in m)	In house procedures CP035	A
Dial Gauges and Dial Test Indicators	0 to 50  Scale interval measurements: Discrimination:	1.0 0.70	BS 907:2008 and BS 2795:1981	A
External and Internal Dial Callipers	0 to 100 100 to 180	3.6 7.0	In house procedure CP108	A



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MEASURING INSTRUMENTS AND MACHINES (cont'd)				
Bevel Protractors	0° to 360°  Accuracy of scale Parallelism of blade Straightness of blade	5.0 minutes of arc 3.0 1.5	BS 1685:2008	A
Comparators (external)	up to 250 to 10 000 magnifications	1.0 % of range Minimum 0.20	BS 1054:1975 In house procedure CP 053	A
Bench Centres	0 to 500	1.0 + (10 x length in m)	In house procedures CP011	A
Rules - Steel	0 to 1000 1000 to 2000	15 + (10 x length in m) 30 + (10 x length in m)	BS 4372:1968	A
Scales - linear	0 to 600	2.0 + (10 x length in m)	In house procedures CP078	A
FORM			2 The uncertainty quoted is for the departure from flatness, straightness, or squareness, it the distance separating the two parallel planes which just enclose the surface under consideration.	
Surface Plates Granite and Cast Iron	160 x 100 to 2500 x 1600	1.5 + (0.80 x diagonal in m) See Note 2	BS 817:2008	A, B
Straightedges Cast Iron, Steel and Granite	0 to 1500	1.0 + (2.0 x length in m) See Note 2	BS 5204:Part 1:1975 and BS 5204:Part 2:1977	A
Roundness External Internal	0 to 350 diameter 3 to 350 diameter	0.050 on radius	BS 3730:Part 2:1982	A
Surface texture (excluding measurement standards and roughness comparison specimens)	Ra 0.02 µm to 80 µm	7.0 % of measured value (0.16 µm Ra minimum)	BS 1134:2010	A
END				



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