Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0332 **Accredited to ISO/IEC 17025:2017**	**Mitutoyo (UK) Limited** **Issue No:** 034 **Issue date:** 02 September 2020	
	6 Banner Park **Wickmans Drive** **Coventry** **CV4 9XA**	**Contact: Vlad Enache** **Tel: +44 (0)2476 426 316/317** **Fax: +44 (0)2476 426 339** **E-Mail: enquiries@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
Address 6 Banner Park Wickmans Drive Coventry CV4 9XA	**Local contact** Vlad Enache	Dimensional	A

Site activities performed away from the locations listed above:

Location details		Activity	Location code
At customers premises	Vlad Enache	Dimensional	B

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 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) C 3.0 4.0 5.0 μ in 6.0 7.0	**Class C** 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

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)				
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	2.5 to 5.0	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	50 to 300 300 up to 600	3.0 5.0	BS 939:2007	A
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
Sine Bars	0 to 500 length	Linear dimensions: 1.0 + (10 x length in m) Overall performance: 3.0 seconds of arc	BS 3064:1978	A
Spirit Levels	5 seconds of arc to 60 minutes of arc nominal sensitivity	Mean sensitivity 10% of nominal Minimum 0.50 seconds of arc	BS 3509:1962 and BS 958:1968	A

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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS AND MACHINES				
Micrometers				A
External	0 to 600	Heads: 2.0 Setting and extension rods 1.5 + (5.0 x length in m)	BS 870:2008	
Internal	0 to 900		BS 959:2008	
Depth	0 to 300		BS 6468:2008	
Micrometers (indicating digital and electronic)	0 to 1000	1.0 + (5.0 x length in m) Minimum 1.5	In house procedures CP004	A
Height Setting Micrometers	0 to 1000	Heads: 1.2 between any two points Stepped column: 1.0 + (6.2 x length in metres)	In house procedures CP010	A
Riser Blocks for Above Item	150 300 600	1.7 2.5 4.0	In house procedures CP010	A
Micrometer Heads	0 to 50	1.0	BS 1734:1951	A
Three Point Bore Micrometer	6 to 100 100 to 200	3.0 4.0	In house procedures CP076	A
Performance verification of coordinate measuring machines	0 mm to 1530 mm (longest diagonal using end standards) E_L	0.40 + 0.80 x length in m	ISO 10360-2:2009 and ISO 10360-5:2010	A, B
	Single stylus probing test 10 to 50 (test sphere diameter) P_{FTU} P_{STU}	 0.11 0.52	ISO 10360-5:2010	

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)				
Performance verification of coordinate measuring machines	(CMMs with the axis of a rotary table as the fourth axis) Radius 150 mm to 400 mm FR, FT, FA	0.38	BS EN ISO 10360-3:2001	A, B
Performance verification of co-ordinate measuring machines	(CMMs used in scanning measuring mode) 25 mm reference sphere Tij Ʈ	0.28 0.21 seconds	BS EN ISO 10360-4:2001	A, B
Toolmakers Microscopes	0 to 200	3.2 + (10 x length in m) 13 minutes of arc	In house procedures CP066	A, B
Profile Projectors	10x to 100x magnifications 0 to 200 mm 0 to 360 degrees	125 at the screen 3.5 + (10 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)	BS 887:2008	A
Vernier Height Gauges	0 to 1000	Overall performance 10 + (30 x length in m)	BS 1643:2008	A
Depth Gauges	0 to 600	Overall performance 10 + (30 x length in m)	BS 6365:2008	A
Calipers (digital and electronic)	0 to 1500	10 + (15 x length in m)	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	1.0	BS 907:2008 and BS 2795:1981	A
Bevel Protractors	0° to 360°	6.0 minutes of arc	BS 1685:2008	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)				
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	5.0 + (10 x length in m) 10 + (10 x length in m)	BS 4372:1968	A
Scales - linear	0 to 600	1.0 + (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 (0.010 µm Ra minimum)	BS 1134:Part 1:1988	A
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, and an indication of how they are to be interpreted, are shown below.

<u>DC voltage, 100 mV to 1 V:</u> 0.0025 % + 5.0 µV:

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

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

Over the range 0.5 MPa to 140 MPa, the CMC is 0.0036 %$\cdot p$ + $(0.12\cdot10^{-6}\cdot p\cdot10^{-6})$ + 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.