Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0773

Accredited to ISO/IEC 17025:2017

TORUS Measurement Systems Ltd

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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 Nedge Hill Science Park Telford Shropshire TF3 3AJ	**Local contact** Evan Warlow	Dimensional	A
Address 43 Haviland Road Ferndown Industrial Estate Wimborne Dorset BH21 7RY	**Local contact** **Tom Rutter**	Dimensional	B

Site activities performed away from the locations listed above:

Location details		Activity	Location code
The location must be suitable for the nature of the particular calibrations undertaken and will be the subject of contract review arrangements between the laboratory and the customer	**Local contact** Denise Ball	Dimensional	A1
The location must be suitable for the nature of the particular calibrations undertaken and will be the subject of contract review arrangements between the laboratory and the customer	**Local contact** Tom Rutter	Dimensional	B1

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				
Plain plug gauges (parallel) cylindrical setting standards and rollers.	1 to 3 diameter 3 to 100 100 to 150 150 to 300	0.79 on diameter 1.0 1.5 2.3	By comparison with reference standards	A
Plain plug gauges, taper.	0 to 100	3.3	By comparison with reference standards	A
Receiver and position gauges, jigs and fixtures.	0 to 1500 x 900 x 800	2.2 + (2.3 x length in m) 3.5 + (2.2 x length in m)	Using a CMM Using first principles Documented in-house methods using first principles and/or a CMM. The stated uncertainties are based on the calibration of an ideal item under ideal conditions. The reported uncertainties will reflect the item calibrated and the conditions at the time of the calibration.	A
Beverage Masters	1 to 200 height / diameter / dome depth 1 to 4 flange width 2 to 4 curl opening 10 to 90 curl diameter 20 to 70 inner curl dia 0.1 to 1.5 thickness 10 to 70 reform diameter 1 to 5 reform depth 30 to 100 master punch ironing ring diameter 10 to 70 internal reform diameter	3.3 2.2 2.4 1.6 5.0 0.80 5.9 12 2.4 12	Documented in-house methods using the following equipment: Reference standards, electronic probe, surface table, vertical and horizontal length measuring machines, probe comparator, dedicated fixtures, sine table, master scanner and standard metrology holding equipment.	A

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Beverage Masters Length Blocks	300	1.4 + (6.6 x length in m)	Comparison to reference standards	A
Height gauges (complex) Tesa electronic height gauges, for E, B and R	0 to 1000 Length measurement error, E	1.6 + (7.0 x length in m)	BS EN ISO13225:2012 comparison to length standards	A & A1
	Bidirectional length measurement error, B	1.6 + (7.0 x length in m)		A & A1
Height gauge setting masters.	25	2.0	Comparison to reference standards	A
Performance verification of co-ordinate measuring machines (CMM's)	Length measurement – E_L 0 to 1500 (longest diagonal)	0.78 + (1.1 x length in m)	ISO 10360-2:2009 using end standards	A & A1
	Single stylus probing test: $P_{Form.Sph.1×25:SS:Tact}$ $P_{Size.Sph.1×25:SS:Tact}$	0.37 0.46	ISO 10360-5:2020 Using a 10 to 50 mm test sphere	
	Single stylus probing test P_{FTU}	0.17	ISO 10360-5:2010 (withdrawn) Using a 10 to 50 mm test sphere	
Performance verification of non-cartesian co-ordinate measuring machines (CMM's)	Length measurement - E_{Bi} E_{Uni} 0 to 1545 diameter	2.9 + (1.3 x length in m) 2.9 + (1.3 x length in m)	ISO 10360-12:2016 using end standards. Test value uncertainties based on ISO/TS 23165:2006	A & A1
	Probing measurement - $P_{Size.SPH.1x25}$ $P_{Form.SPH.1x25}$	2.2 2.2	ISO 10360-12:2016 using a 10 mm to 51 mm diameter test sphere. Test value uncertainties based on ISO/TS 17865:2016	
	Articulated location measurement - $L_{Dia.5x5:Art}$	2.2	ISO 10360-12:2016 using a 10 mm to 51 mm diameter test sphere. Test value uncertainties based on ISO/TS 17865:2016 Note 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.	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
LENGTH				
Plain plug gauges (parallel)	0.3 to 50 diameter 50 to 100 diameter 100 to 165 diameter	1.0 2.0 on diameter 2.5	Calibrated by comparison to length standards using a single axis length machine	B
Plain ring gauges	2 to 12 diameter 12 to 50 diameter 50 to 100 diameter 100 to 300 diameter	2.0 1.8 on diameter 2.4 5.0	Calibrated by comparison to length standards using a single axis length machine	B
Length gauges, flat and spherical ended (excluding length bars)	0 to 600	1.0 + (8.0 x length in m)	Calibrated by comparison to length standards	B
Plain gap gauges	3 to 100	3.0	Calibrated by comparison to length standards using a single axis length machine	B
Screw plug gauges (parallel) including check and setting plugs (See Note 2)	1 to 100 diameter	3.0 on pitch diameter	Note 2 Single start, symmetrical threads only Calibrated by comparison to cylindrical setting standards using thread measuring wires.	B
Screw pitch	0.2 to 8	1.5	Calibrated using a single axis length machine	B
Screw flank angle	0° to 52°	5.0 minutes of arc	Calibrated using a optical projection methods	B
Screw ring gauges (parallel)	1 to 20	See Note 3	Note 3 1 mm to 20mm diameter range relates to functional test of size using check plugs.	B
Screw caliper gauges	1 to 30	See Note 4	Note 4 Functional test of size using setting plugs calibrated with a CMC of 3.0 µm	B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ANGLE				
Squares	50 to 300	4.0 On squareness	BS 939:2007	B
Blade type	300 to 600	6.0		
		See note 1		
FORM	160 x 100 to 1600 x 1000	1.5 + (0.80 x diagonal in m)	BS817:2008	B & B1
Surface plate Granite and Cast iron		See note 1		
MEASURING INSTRUMENTS AND MACHINES				
Micrometers	0 to 600	Heads: 2.0 between any two points	BS 870:2008	
External	0 to 300	Setting and extension rods	BS 959:2008	
Internal	0 to 300	1.0 + (8.0 x length in m)	BS 6468:2008	
Depth	0 to 100	3.0	Calibrated using master setting ring gauges and a calibration fixture	
	100 to 200	4.0		
3 Point bore				
Vernier gauges	0 to 1500	Overall performance: 10 + (30 x length in m)	BS 887:2008	
Caliper	0 to 1500	Overall performance: 10 + (30 x length in m)	BS 1643:2008	
Height	0 to 1500	Overall performance: 10 + (30 x length in m)	BS EN ISO 13225:2012	
Height (simple)	0 to 600	Overall performance: 10 + (30 x length in m)	BS 6365:2008	
Depth	0 to 50	1.0	BS 907:2008 and BS 2795:1981	
	Discrimination	2.0		
Dial gauges and dial test indicators	0.025 to 1	3.0	BS 957:2008	
Feeler gauges	0 to 15	10 on profile	Calibrated using an optical projection methods	
Radius gauges				
ANCILLARY MEASUREMENTS	Flatness	2.0	Comparison against reference standards	
	Parallelism	2.0		
	Straightness	2.0		
	Squareness	3.5		

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