


# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

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

 <b>0773</b>  Accredited to <b>ISO/IEC 17025:2017</b>	<b>TORUS Measurement Systems Ltd</b>  <b>Issue No: 022    Issue date: 28 January 2020</b>	
	<b>Nedge Hill Science Park</b> Telford Shropshire TF3 3AJ	<b>Contact: Ms Denise Ball</b> Tel: +44 (0)1952 210020 E-Mail: <a href="mailto:denise.ball@torus-group.com">denise.ball@torus-group.com</a> Website: <a href="http://www.torus-group.com">www.torus-group.com</a>

**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> Nedge Hill Science Park Telford Shropshire TF3 3AJ	<b>Local contact</b> Delwyn Jones	Dimensional  A

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

Location details	Activity	Location code
At customers premises	Delwyn Jones	Dimensional  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
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
<b>LENGTH</b>				
Plain plug gauges (parallel) cylindrical setting standards and rollers.	1 to 3 diameter 3 to 100 100 to 150 150 to 300	0.50 1.0 on diameter 1.5 2.0	By comparison with reference standards.	A
Plain plug gauges, taper.	0 to 100	2.5	By comparison with reference standards.	A
Length gauges, flat and spherical ended.	0 to 300	1.0 + (8.0 x length in m)	By comparison with reference standards.	A
Receiver and position gauges, jigs and fixtures.	0 to 1500 x 900 x 800	10.0	Documented in-house methods.	A
Beverage can masters.	0 to 200	5.0	Documented in-house methods.	A
Micrometers External	BS 870:2008 0 to 600	Heads: 2.0 Setting and extension rods: 1.0 + (8.0 x length in m)		A
Vernier calliper, height and depth gauges (including digital and dial instruments)	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
Height gauges (complex)	BS EN ISO13225:2012 0 to 1000 Length measurement error, E  Bidirectional length measurement error, B	1.6 + 7.0 x length in metres 1.6 + 7.0 x length in metres	Calibration of Tesa electronic height gauges, for E, B and R in accordance with the requirements of BS EN ISO13225:2012	A & B A & B A & B



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RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
Height gauge setting masters.	25	2	By comparison with reference standards.	A
Dial gauges and dial test indicators	BS 907:2008 and BS 2795:1981 0 to 50	2.0		A
Performance verification of co- ordinate measuring machines (CMM's)	ISO 10360-2:2009 and ISO 10360-5:2010 0 to 1500 (longest diagonal using end standards)	0.78 + (1.13 x length in m)		A & B
Performance verification of non-cartesian co-ordinate measuring machines (CMM's)	ISO 10360-12:2016  Length measurement - $E_{Bi}$ $E_{Uni}$ 0 to 1545 (diameter using end standards)	4.9 + (2.4 x length in m) 4.7 + (2.4 x length in m)		A & B
	Probing measurement - $P_{Size,SPH,1x25}$ $P_{Form,SPH,1x25}$ Using a 10 mm to 51 mm diameter test sphere	4.3 2.7		
	Articulated location measurement - $L_{Dia,5x5,Art}$ Using a 10 mm to 51 mm diameter test sphere	5.3		
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 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  $\mu$ V

Over the range 100 mV to 1 V, the CMC is 0.0025 %·V + 5.0  $\mu$ V, 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 %· $p$  + (0.12·10<sup>-6</sup>· $p$ ·10<sup>6</sup>) + 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 · 0.01 ·  $i$ , where  $i$  is the instrument indication.