Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

UKAS CALIBRATION

0239

Accredited to ISO/IEC 17025:2017

Hexagon Metrology Ltd

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Calibration performed by the Organisation at the locations specified below

Locations covered by the organisation and their relevant activities

Location details		**Activity**	**Location code**
Michigan Drive Tongwell, Milton Keynes MK15 8HT, UK	Mr A Brown	Dimensional	A
Customers premises	Mr A Brown	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				
MEASURING INSTRUMENTS AND MACHINES				
Performance verification of co-ordinate measuring machines	ISO 10360-2:2009 - CMM's used for measuring linear dimensions 0 to 1500 (longest diagonal using end standards)	0.20 + (0.40 x length in m)		B
	ISO 10360-5:2010 - single stylus probing test 10 to 50 (test sphere diameter)	0.12		B
Performance verification of Articulated arm coordinate measuring machines	ISO10360-12:2016 EUNI (0 up to 4500)	6.0 + 3.5 x L in m	Model Arm series RA8 (6 & 7 axis)	
	PFORM (upto 51 mm diameter) PSIZE (up to 51 mm diameter) LDIA (up to 51 mm diameter)	2.7 4.1 5.0		
Performance verification of Articulated arm coordinate measuring machines with Optical Distance Sensor	LDIA (using a test sphere).	4.3	ISO10360-8:2013 Annex D RS5 or RS6	A
Laser Tracker	Spatial length to retro reflector 0 to 2500	0.018 mm	Procedure SP1-POR-PR-003 Leica Laser Tracker AT403, AT930 and AT960 with SR, MR,LR & XR ranges Using a 2500 mm Invar Scale Bar, Frequency counter and Rubidium frequency standard	A
	Scale of absolute distance meter (frequency) - 25 MHz	0.75 Hz (0.03 ppm)		
	ADM Zero Point Offset	0.007 mm		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (*k*=2)	Remarks	Location Code
MEASURING INSTRUMENTS AND MACHINES (cont.)				
Laser Tracker + T-Probe	Spatial length with tactile probe 0 to2500	0.018 mm	AT960 Leica Laser Tracker Using a 2500 mm Invar Scale Bar	A
Laser Tracker + T-Scan 5 or LAS or LAX scanner	Spatial length with optical probe (Scanning) 0 to 2500	0.018 mm	AT960 Leica Laser Tracker Using a 2500 mm Invar Scale Bar White Scan Sphere for LAS or . 100mm Sphere for T-Scan 5 and LAS XL.	A
Environmental monitoring station in support of laser tracker calibraitons	Ambient laboratory conditions. (One discrete measurement at current conditions) • temperature • pressure • humidity	 0.06 °C 0.7 hPa 2.3 % r.H.	Meteo station for AT403, AT930 & AT960 Leica Laser Trackers Procedure SP1-POR-PR-003	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 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.

<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 %·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 %·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 · 0.01 · i, where i is the instrument indication.