Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0625

Accredited to ISO/IEC 17025:2017

Labcal Limited

Issue No: 045 **Issue date:** 09 December 2020

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Calibration performed by the Organisation at the locations specified

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address Labcal Limited Unit 265 Ricardo Way Ampress Park Lymington Hampshire SO41 8JU	**Local contact** Mr C Clifford-Smith	Air velocity calibration Electrical calibration Flow calibration Humidity calibration Pressure calibration Temperature calibration	A
Address Saltmarsh Park 67 Gosport Street Lymington SO41 9EG	**Local contact** Mr C Clifford-Smith	Air velocity calibration	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
FLOW			Prover and reference meter methods:	
Gas -				A
Flow-rate and Quantity passed	0.024 ml/min to 0.5 ml/min 0.5 ml /min to 8 l/min 8 l/min to 1200 l/min 1200 l/min to 12983 l/min	1.14 % + 0.0016 ml/min 0.15 % 0.18 % 0.30 %	Calibrations of pressure and flow devices with an electrical output may be undertaken. Calibration medium Air Other gases may be used up to 300 l/min	
Water				
Mass, Volume, Flow rate and Quantity passed	0.5 ml/min to 500 ml/min 500 ml/min to 2 l/min 2 l/min to 500 l/min	0.20 % 0.32 % 0.12 %	Gravimetric method:	
AIR VELOCITY			Laser doppler and reference meter methods:	
Calibration of Anemometers:				A
Pitot Tubes	2 m/s to 5 m/s 5 m/s to 27 m/s	0.18% + 0.030 m/s 0.18% + 0.10 m/s	Anemometer up to 125 mm diameter can be calibrated.	
Thermal anemometers	0.1 m/s to 5 m/s 5 m/s to 27 m/s	0.18 % + 0.030 m/s 0.18 % + 0.10 m/s	Uncertainty is dependent on instrument under test	
Vane anemometers	0.3 m/s to 5 m/s 5 m/s to 27 m/s	0.23 % + 0.030 m/s 0.23 % + 0.10 m/s	Calibration using laser Doppler anemometer or by comparison	
Calibration of anemometers and Pitot tubes (including ultrasonic anemometers)	5 m/s to 32 m/s 32 m/s to 50 m/s 50 m/s to 80 m/s	1.2 % + 0.20 m/s 1.2 % + 0.40 m/s 1.3 % + 0.40 m/s	Large anemometers can be calibrated	B
PRESSURE			Methods consistent with EURAMET CG3:	
<u>Hydraulic pressure (gauge)</u>				A
Calibration of pressure indicating instruments and gauges	500 kPa to 55 MPa 55 MPa to 140 MPa	0.010 % 0.014 %		
<u>Hydraulic pressure (absolute)</u>				A
Calibration of pressure indicating instruments and gauges	600 kPa to 7 MPa 7 MPa to 140 MPa	0.010 % + 10 Pa 0.012 %		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
<u>Gas pressure (gauge)</u>				
Calibration of pressure indicating instruments and gauges	- 100 kPa to 0 Pa 0 Pa to 3 kPa 3 kPa to 4.7 kPa 4.7 kPa to 40 kPa 40 kPa to 500 kPa 500 kPa to 8.2 MPa	0.010 % + 43 Pa 0.026% + 0.070 Pa 0.026 % + 0.31 Pa 0.010 % + 2.9 Pa 0.010 % + 43 Pa 0.010 % + 390 Pa		A
"Pressure equivalent" Calibration of dead weight testers (Pressure balance supplied with associated mass set)	0 kPa to 500 kPa 500 kPa to 8.2 MPa	0.015 % + 43 Pa 0.015 % + 390 Pa		A
<u>Gas pressure (absolute)</u>				A
Calibration of pressure indicating instruments and gauges	80 kPa to 115 kPa	0.010 %	Absolute pressure calibrations can be undertaken using associated barometric pressure measurement correction. The uncertainties quoted will be increased by 10 Pa	
ELECTRICAL			Reference meter methods:	
DC Voltage	0 V to 120 mV 120 mV to 1.2 V 1.2 V to 12 V 12. V to 120 V	21 ppm + 5.0 μV 21 ppm + 31 μV 21 ppm + 65 μV 21 ppm + 300 μV		A
DC Current	0 A to 12 mA 12 mA to 120 mA	110 ppm + 3.0 μA 110 ppm + 6.0 μA		
DC Resistance	10 Ω to 1.2 kΩ 1.2 kΩ to 12 kΩ	12 ppm + 13 mΩ 13 ppm + 130 mΩ		
FREQUENCY	1 Hz to 50 kHz	0.0020 % + 10 μHz		
TIME INTERVAL				
Elapsed time, single event Stop watches and timers	5 s to 24 Hours	20 ms		

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Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL CALIBRATION OF TEMPERATURE INDICATORS AND SIMULATORS			Reference meter methods:	
Base Metal thermocouples	- 200 °C to 1372 °C	0.50 °C	Including Reference Junction Compensation	A
Noble Metal	0 °C to 100 °C 100 °C to 1768 °C	0.90 °C 0.70 °C		
Reference Junction Temperature	Nominal Zero Ambient 16 °C to 25 °C	0.10 °C 0.30 °C		
PRT simulation (Pt 50 to 1000)	- 200 °C to 200 °C 200 °C to 600 °C 600 °C to 850 °C	0.16 °C 0.26 °C 0.36 °C		
TEMPERATURE			Reference meter methods in block or fluid baths:	
Resistance thermometers	-30 °C to +140 °C	0.10 °C		A
Base Metal Thermocouples	-30 °C to +140 °C	0.25 °C		
Temperature indicators with probes				
Resistance thermometers	- 30 °C to + 70 °C 70 °C to +140 °C	0.10 °C 0.15 °C		
Base Metal Thermocouples	-30 °C to +140 °C	0.25 °C		
Temperature probes in air	10 °C to 50 °C	0.15 °C	Reference meter method in environmental chamber:	
HUMIDITY			Reference meter methods: in environmental chamber	
Relative humidity measuring instruments	15 %rh to 90 %rh *10 °C to 15 °C* 15 %rh to 90 %rh *15 °C to 40 °C*	1.5 %rh	Dependant on probe length	A
Temperature probes built into humidity meters	10 °C to 40 °C	0.15 °C	Dependant on probe length	
Dew Point	- 15 °C to 0 °C 0 °C to 20 °C 20 °C to 40 °C	0.35 °C 0.18 °C 0.21 °C		
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.

DC voltage, 100 mV to 1 V: 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.

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 $0.0036\ \%\cdot p + (0.12\cdot 10^{-6}\cdot p\cdot 10^{-6}) + 4.0$ 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 $1.5 \cdot 0.01 \cdot i$, where i is the instrument indication.