Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0318

Accredited to ISO/IEC 17025:2017

CoMech Metrology Ltd

Issue No: 048 **Issue date**: 10 July 2024

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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 Metrology Division Calibration House Castings Road Derby DE23 8YL **Local contact**	Dimensional Torque	A
Address 1 Pride Park View, Victoria Way, Pride Park, Derby DE24 8AN **Local contact**	Electrical Humidity Pressure Temperature	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	Electrical Pressure Temperature	C

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Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNDERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
DIMENSIONAL				
Micrometers				A
External	BS 870:2008, 0 to 600			
	Traverse of micrometer screw	2.6		
	Flatness of anvils	1.0		
	Parallelism of anvils	1.5		
	Alignment	4.3		
	(Zero) Setting, 0 to 25	1.0		
	(Zero) Setting, 25 to 600	1.0 + (8.0 x length in m)		
Internal	BS 959:2008, 0 to 600			
	Traverse of micrometer screw	2.8		
	(Zero Setting) and Extension Rods	1.0 + (5.0 x length in m)		
Depth	BS 6468:2008, 0 to 300			
	Traverse of micrometer screw	4.8		
	Flatness	1.0		
	Parallelism	2.3		
	Squareness of rods	7.7		
	Axis of rotation of rods	7.7		
	(Zero Setting) and Extension rods	1.0 + (5 x length in m)		
Vernier gauges (inc. digital and dial)				A
Caliper	BS 887:2008 0 to 600			
	Linear error	10 + (30 x length in m)		
	Flatness	1.0		
	Parallelism	1.3		
	Squareness	8.4		
	Coplanar of jaws	8.3		
Height	BS 1643:2008, 0 600			
	Linear error	10 + (30 x length in m)		
	Flatness of measuring jaws	0.40		
	Size of measuring jaw	3.2		
	Flatness of base	1.1		
	Parallelism of jaw to base	1.6		
Depth	BS 6365:2008, 0 to 300	10 + (30 x length in m)		
	Linear error	4.0		
	Flatness and parallelism			
Dial gauges and dial test indicators	0 to 50 BS 907:2008 and BS 2795:1981	3.6		A
Surface texture of Gauges (excluding surface texture standards)	As BS 1134:Part 1:1988	7.0 % (minimum 1.0 μm Ra)		A

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
DIMENSIONAL (cont'd)				
Length gauges, flat and spherical ended (excluding length bars	25 to 1200 Length Parallelism	1.0 + (5.0 x length in m) 1.0	Using a length measuring Machine or by comparison with End standards	A
Plain plug gauges parallel	0 to 100	2.1	Using a length measuring machine	A
Receiver and position gauges, jigs, fixtures	Track Grinding Gauges (HB221) 0 to 1440	29	Procedure CM-C-686	A
	Autocoupler Pin Checking Gauges (HB035) 0 to 1.0	3.0	Procedure CM-C-706	
	Brake Pad Wear Gauge (HB100) 0 to 10.0	2.7	Procedure CM-C-705	
	Back to Back Gauges (HB018) 0 to 1360	9.3	Procedure CM-C-704	

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
PRESSURE				
<u>Gas pressure (gauge)</u> Calibration of pressure measuring instruments and gauges.	- 95 kPa to 0 Pa 0 Pa to 2 MPa	Q [0.0067 %, 250 Pa] Q [0.0067 %, 90 Pa]	Methods consistent with EURAMET CG17	B
	- 95 kPa to 2 MPa 2 MPa to 10 MPa	Q [0.0067 %, 250 Pa Q [0.0067 %, 3.8 kPa]		B, C
<u>Gas pressure (absolute)</u> Calibration of pressure measuring instruments and gauges.	70 kPa to 2 MPa	Q [0.0067 %, 90 Pa]		B
<u>Hydraulic pressure (gauge)</u> Calibration of pressure measuring instruments and gauges.	500 kPa to 5.5 MPa 5 MPa to 110 MPa	0.031 % 0.030 %		B
TORQUE				A
Hand torque tools (excluding torque screwdrivers)	As BS EN ISO 6789 :2017 0.7 N·m to 1500 N·m	0.30 %	Calibrations may also be given in lbf.in and lbf.ft.	
ELECTRICAL				B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
Electrical values and uncertainties listed below are applicable for the calibration of both measurement instruments and for instruments with an output. The method used is by direct comparison against laboratory standards unless otherwise stated in the remark's column.				
DC Voltage	0 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1.1 kV	7.5 µV/V + 420 nV 2.9 µV/V + 1.5 µV 2.9 µV/V + 14 µV 4.3 µV/V + 340 µV 4.4 µV/V + 10 mV		B
	0 V to 90 mV 90 mV to 20 V	0.012 % + 12 µV 0.013 % + 2.3 mV	These output values can be measured	C
	0 V to 100 mV 90 mV to 20 V	0.012 % + 12 µV 0.013 % + 2.3 mV	Values available for direct measurement	C
High Voltage	1 kV to 40 kV	0.70 % + 15 V	These output values can be measured.	B
DC Current	0 µA to 10 µA 10 µA to 100 µA 100 µA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 10 A 10 A to 20 A	540 pA 870 pA 9.2 µA/A + 10 nA 14 µA/A + 70 n A 57 µA/A + 1.6 µA 130 µA/A + 100 µA 230 µA/A + 580 nA 0.020 % + 4.9 mA		B
	1 A to 2 A 2 A to 20 A 20 A to 120 A	82 µA/A + 370 µA 76 µA/A + 9.8 mA 50 µA/A	Values available for direct measurement	B
	0 A to 24 mA	0.031 % + 2.3 µA	These output values can be measured	C
	0 A to 24 mA	0.031 % + 3.4 µA	Values available for direct measurement	C
DC Current	1 A to 10.5 A 10.5 A to 20 A 20 A to 105 A 105 A to 525 A 525 A to 1000 A 1000 A to 2500 A	0.074 % + 1.2 mA 0.45 % + 26 mA 0.075 % + 12 mA 0.075 % + 60 mA 0.50 % + 1.3 A 0.069 % + 520 mA	Output values above 10 A – simulation Using a multiturn coil	B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
ELECTRICAL continued				
Resistance	0 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 10 kΩ 10 kΩ to 100 kΩ 100 kΩ to 1 MΩ 1 MΩ to 100 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1.1 GΩ 1 GΩ to 10 GΩ	17 μΩ/Ω + 10 nΩ 9.0 μΩ/Ω + 50 nΩ 9.0 μΩ/Ω + 220 nΩ 9.0 μΩ/Ω + 25 μΩ 9.0 μΩ/Ω + 890 μΩ 9.0 μΩ/Ω +10 Ω 12 μΩ/Ω + 15 kΩ 39 μΩ/Ω + 110 kΩ 650 μΩ/Ω + 120 MΩ 1300 μΩ/Ω + 210 MΩ		B
AC Voltage	1 mV to 100 mV *10 Hz to 1 kHz* *1 kHz to 20 kHz* *20 kHz to 100 kHz* 100 mV to 1 V *10 Hz to 1 kHz* *1 kHz to 10 kHz* *10 kHz to 50 kHz* 1 V to 10 V *10 Hz to 1 kHz* *1 kHz to 10 kHz* *10 kHz to 50 kHz* 10 V to 100 V *10 Hz to 1 kHz* *1 kHz to 10 kHz* *10 kHz to 50 kHz* 100 V to 1050 V *10 Hz to 1 kHz*	 88 μV/V + 10 μV 230 μV/V + 8.2 μV 530 μV/V + 3.7 μV 76 μV/V + 28 μV 230 μV/V + 64 μV 530 μV/V + 140 μV 76 μV/V + 560 μV 76 μV/V + 430 μV 230 μV/V + 1.5 V 250 μV/V + 2.6 mV 250 μV/V + 17 mV 590 μV/V + 25 mV 250 μV/V + 25 mV		B
High Voltage	1 kV to 40 kV *50 Hz to 60 Hz*	1.5 % + 45 V	These output values can be measured.	B
AC Current	1 μA to 100 μA *40 Hz to 1 kHz* 100 μA to 1 mA *40 Hz to 1 kHz* 1 mA to 10 mA *40 Hz to 1 kHz* 10 mA to 100 mA *40 Hz to 1 kHz*	 0.0010 % + 7.6 nA 0.030 % + 90 nA 0.030 % + 1.1 μA 0.030 % + 2.5 μA		B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
AC Current (continued)	100 mA to 1 A			B
	40 Hz to 1 kHz	0.030 % + 4.6 µA		
	10 A to 20 A	.		
	40 Hz to 1 kHz	0.20 % + 4.9 mA		
	1 A to 3.2 A			
	10 Hz to 3 kHz	0.12 % + 560 µA	Values available for	
	3 kHz to 10 kHz	0.13 % + 3.0 mA	direct measurement	
	3.2 A to 10.5 A			
	10 Hz to 3 kHz	0.23 % + 4.4 mA		
	3 kHz to 10 kHz	0.58 % + 12 mA		
	10.5 A to 120 A			
	50 Hz	0.36 % + 140 mA	Simulation using a	
	51 Hz to 100 Hz	0.58 % + 110 mA	Multiturn coil	
	10.5 A to 105 A			
	10 Hz to 400 Hz	0.28 % + 44 mA		
	105 A to 525 A			
	10 Hz to 400 Hz	0.28 % + 220 mA		
	500 A to 1000 A			
	50 Hz	0.043 % + 130 mA		
	51 Hz to 100 Hz	0.043 % + 310 mA		
	1000 A to 2500 A			
	50 Hz to 100 Hz	0.043 % + 1.3 A		
Capacitance 1 kHz	0.1 nF to 1 nF	0.18 % + 10 pF	Simulated values for	B
	1 nF to 10 nF	0.080 % + 4.6 pF	the calibration of	
	10 nF to 100 nF	0.049 % + 58 pF	capacitance meters.	
	100 nF to 1 µF	0.041 % + 140 pF		
	1 µF to 10 µF	0.042 % + 2.5 nF		
	10 µF to 100 µF	0.061 % + 28 nF		
	100 µF to 1 mF	0.062 % + 0.31 µF		
	1 mF to 10 mF	0.071 % + 3.3 µF		
	10 mF to 100 mF	0.071 % + 3.3 µF		
Oscilloscopes				
Vertical deflection	*At 1 kHz*			B
	10 mV to 100 mV	0.040 % + 27 µV		
	100 mV to 120 V	0.050 %		
Horizontal deflection	2 ns to 5 s	0.12 %		
Tachometers	0 RPM to 6 000 RPM	0.10 RPM		B
	6000 RPM to 60 000 RPM	1.0 RPM		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
17th Edition capability				
				B
Insulation Resistance	10 kΩ to 40 kΩ 40 kΩ to 200 kΩ 200 kΩ to 10 MΩ 10 MΩ to 1 GΩ 1 GΩ to 2 GΩ	0.020 % + 15 Ω 0.025 % + 15 Ω 0.050 % + 590 Ω 0.22 % + 120 kΩ 0.52 % + 120 kΩ		
Insulation Resistance: test current	0 mA to 9.9 mA	76 µA		
Continuity resistance	100 mΩ to 400 mΩ 400 mΩ to 5 Ω 5 Ω to 30 Ω 30 Ω to 200 Ω 200 Ω to 2 kΩ 2 kΩ to 10 kΩ	1.0 % + 1.5 mΩ 0.80 % + 8.3 mΩ 0.12 % 0.11 % 0.11 % 0.17 %		B
Continuity resistance current	50 mA to 400 mA	21 %		B
Voltage Output	3 V to 600 V 3 V *50 Hz* to 600 V *50 Hz*	0.15 % 0.18 %		
Voltage measurement	180 mV to 1 kV 130 mV *50 Hz* to 1 kV *50 Hz*	0.060 % + 180 mV 0.10 % + 130 mV		B
High Voltage 50 Hz	1 kV to 7 kV 10 kV to 25 kV	0.25 % + 24 V 0.25 % +120 V		B
High Voltage DC	1 kV to 10 kV 10 kV to 25 kV	0.060 % + 40 V 0.060 % + 120 V		B
High Voltage Current 50 Hz	300 µA 3 mA 30 mA 300 mA	0.36 % + 3.4 µA 0.24 % + 8.5 µA 0.58 % + 27 µA 0.23 % + 180 µA		B
High Voltage Current DC	300 µA 3 mA 30 mA 300 mA	0.36 % + 3.4 µA 0.24 % + 8.5 µA 0.58 % + 25 µA 0.23 % + 180 µA		B
Loop impedance 50 Hz	10 mΩ to 90 mΩ 90 mΩ to 320 mΩ 320 mΩ to 490 mΩ 490 mΩ to 1 Ω 1 Ω to 5 Ω 5 Ω to 500 Ω 500 Ω to 1.8 kΩ	3.7 % + 18 mΩ 1.8 % + 18 mΩ 0.90 % + 23 mΩ 0.60 % + 24 mΩ 0.30 % + 43 mΩ 0.10 % + 200 mΩ 0.10 % + 24 Ω		B
RCD Trip Current 50 Hz	1 mA to 30 mA 30 mA to 300 mA 300 mA to 3 A	0.20 % + 38 µA 0.20 % + 1.4 mA 0.20 % + 11 mA		B
RCD Trip time	0 ms to 5 s	0.10 % + 4.7 ms		B

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
17th Edition capability				
PAT Insulation resistance	10 kΩ to 40 kΩ 40 kΩ to 200 kΩ 200 kΩ to 10 MΩ 10 MΩ to 1 GΩ 1 GΩ to 2 GΩ	0.020 % + 15 Ω 0.025 % + 15 Ω 0.050 % + 590 Ω 0.22 % + 120 kΩ 0.52 % + 120 kΩ		B
Earth Bond resistance	0 Ω to 10 Ω 10 Ω to 1 kΩ	0.30 % + 40 mΩ 0.11 % + 200 mΩ		B
Earth bond current	100 µA to 100 mA 100 mA to 20 A	4.0 mA 0.53 % + 32 mA		B
Leakage current	1 µA to 30 mA	0.52 % + 20 µA		B
Temperature simulation Thermocouple type				B
K	-180 °C to 0 °C 0 °C to 1300 °C	0.16 °C 0.14 °C	Excluding internal reference junction compensation	
J	-200 °C to 0 °C 0 °C to 1190 °C	0.15 °C 0.13 °C		
K	-180 °C to 0 °C 0 °C to 1300 °C	0.64 °C 0.63 °C	Including internal reference junction compensation	
J	-200 °C to 0 °C 0 °C to 1190 °C	0.63 °C 0.63 °C		
Resistance thermometer simulation				
PT 100	-200 °C to 0 °C 0 °C to 850 °C	0.21 °C 0.21 °C		
K	-200 °C to 0 °C 0 °C to 1000 °C 1000 °C to 1362 °C	0.46 °C 0.23 °C 0.24 °C	Excluding internal reference junction compensation	C
J	-210 °C to 0 °C 0 °C to 800 °C 800 °C to 1200 °C	0.46 °C 0.30 °C 0.38 °C		
K	-200 °C to 0 °C 0 °C to 1000 °C 1000 °C to 1362 °C	0.77 °C 0.68 °C 0.65 °C	Including internal reference junction compensation	C
J	-210 °C to 0 °C 0 °C to 800 °C 800 °C to 1200 °C	0.89 °C 0.78 °C 0.82 °C		

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Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
TEMPERATURE			By comparison with a reference thermometer in a dry block calibrator.	B & C
Electronic thermometers with indicators and data-loggers	-25 °C to +28 °C +28 °C to +350 °C	0.48 °C 0.43 °C		
	5 °C to 50 °C	0.19 °C	Performed in air using a portable chamber	B
Temperature controlled ovens, environmental chambers, fridges/refrigerators, freezers (inclusive of associated indicators, controllers and recorders, all with sensors, within the specified parameters and ranges)	-25 °C to 0°C 0 °C to +250 °C	0.60 °C 0.40 °C	Single and multipoint time dependent temperature profiling, also referred to as spatial temperature surveying or mapping.	C
HUMIDITY				
Relative Humidity	10 %rh to 95 %rh Performed at 25 °C	2.0 %rh 0.19 °C	By comparison with a reference hygrometer.	B
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: $Q[a, b] = [a^2 + b^2]^{1/2}$