Schedule of Accreditation
issued by
United Kingdom Accreditation Service
2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

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Accredited to ISO/IEC 17025:2017

ITS Testing Services (UK) Limited (Aberdeen) trading as Calibration and Metering Services

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Calibration performed by the Organisation at the locations specified below

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details	**Activity**	**Location code**
Unit 4B Howe Moss Drive Airport Industrial Park Dyce Aberdeen Scotland AB21 0GL	Volumetric measures, proving tanks and pipe provers	Lab A
Exploration Drive Aberdeen Science and Energy Park Aberdeen AB23 8HZ	DC & LF Electrical Gas Density Liquid Density Orifice plates Pressure Temperature	Lab B

Site activities performed away from the locations listed above:

Location details	**Activity**	**Location code**
The customers' site or premises 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.	Volume - pipe provers Flow	Site

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location
ELECTRICAL MEASUREMENTS				
DC RESISTANCE				Lab B
Measurement	0 Ω to 1 Ω	75 μΩ	Measurement of resistors with negligible power dissipation	
	1 Ω to 10 Ω	60 ppm		
	10 Ω to 100 Ω	60 ppm		
Specific Value	50 Ω	14 ppm		
	100 Ω to 1 kΩ	20 ppm	Using Digital multimeter	
	1 kΩ to 10 k Ω	10 ppm		
	10 kΩ to 100 kΩ	13 ppm		
	100 kΩ to 1 MΩ	30 ppm		
	1 MΩ to 10 MΩ	130 ppm		
	10 MΩ to 100 MΩ	410 ppm		
	100 MΩ to 1 GΩ	0.36 %		
Generation	1 Ω	66 ppm	Known values of resistance for application to resistance measuring instruments	
	10 Ω	12 ppm		
	100 Ω	7.2 ppm		
	1 kΩ	10 ppm		
	10 kΩ	10 ppm		
	100 kΩ	7.0 ppm		
	1 MΩ	20 ppm		
	10 MΩ	25 ppm		
DC VOLTAGE				Lab B
Measurement	0 mV to 10 mV	2.0 μV	Using digital multimeter	
	10 mV to 100 mV	5.0 ppm +1.3 μV		
	100 mV to 1 V	5.0 ppm + 1.6 μV		
	1 V to 10 V	18 ppm		
	10 V to 100 V	18 ppm		
	100 V to 1 kV	18 ppm		
Generation	0 mV to 220 mV	7.5 ppm + 1.0 μV	Known values of DC voltage for application to voltage measuring instruments	
	220 mV to 2.2 V	6.0 ppm + 1.5 μV		
	2.2 V to 11 V	7.0 ppm		
	11 V to 22 V	8.0 ppm		
	22 V to 220 V	8.0 ppm		
	220 V to 1000 V	12 ppm		
DC CURRENT				Lab B
Measurement	0 μA to 1 μA	150 pA	Using digital multimeter	
	1 μA to 10 μA	140 ppm		
	10 μA to 100 μA	120 ppm		
	100 μA to 1 mA	100 ppm		
	1 mA to 10 mA	100 ppm		
	10 mA to 100 mA	100 ppm		
	100 mA to 1 A	250 ppm		

Calibration performed by the Organisation at the locations specified below

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location
ELECTRICAL MEASUREMENTS (continued)				
DC CURRENT (continued) Generation	0 mA to 2.2 mA 2.2 mA to 22 mA 22 mA to 220 mA 220 mA to 2.2 A 2.2 A to 20 A	20 ppm + 12 nA 17 ppm + 120 nA 30 ppm + 1.2 µA 35 ppm + 35 µA 190 ppm + 1.3 mA	Known values of DC current for application to current measuring instruments.	Lab B
	20 A to 1000 A	0.20 %	Simulated using multi-turn coils; for the calibration of clamp-on ammeters and similar devices.	
AC VOLTAGE Measurement	*50 Hz to 1 kHz* 1 mV to 10 mV 10 mV to 100 mV	5.0 µV 15 µV	Using digital multimeter.	Lab B
	50 Hz to 20 kHz 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 700 V	500 ppm 500 ppm 500 ppm 500 ppm		
Generation	*60 Hz to 20 kHz* 10 mV to 220 mV 220 mV to 2.2 V 2.2 V to 220 V	90 ppm 70 ppm 71 ppm	Known values of AC voltage for application to voltage measuring instruments.	
	60 Hz to 1 kHz 220 V to 1100 V	90 ppm		
AC CURRENT Measurement	*50 Hz to 1 kHz* 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	70 nA 600 nA 250 ppm + 3.0 µA 250 ppm + 30 µA 250 ppm + 300 µA	Known values of AC current for application to current measuring Instruments.	Lab B
Generation	*60 Hz* 2.2 mA to 2.2 A 2.2 A to 20 A	250 ppm 750 ppm + 9 mA		Lab B
	20 A to 1000 A	0.35 %	Simulated using multi-turn coils: for the calibration of clamp-on ammeters and similar instruments.	

Calibration performed by the Organisation at the locations specified below

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability Expressed as an Expanded Uncertainty (*k* = 2)	Remarks	Location
Frequency				Lab B
Measurement	0.01 Hz to 0.1 Hz 0.1 Hz to 1 Hz 1 Hz to 10 Hz	2.0 in 10^2 2.0 in 10^3 2.0 in 10^4	By multi-period measurement	
	10 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 10 kHz 10 kHz to 100 kHz 100 kHz to 1 MHz 1 MHz to 1.3 GHz	2.0 in 10^5 2.0 in 10^6 2.0 in 10^7 2.0 in 10^7 7.0 in 10^8 5.0 in 10^8	By direct frequency measurement	
Generation	10 MHz	3.0 in 10^{10}		
Time Interval	100 ns to 1000 s	50 ns	Electrically triggered devices	Lab B
	10 s to 1000 s	0.11 s	Mechanically triggered devices, e.g. stopwatches	Lab B
TEMPERATURE SIMULATION				
Temperature indicators, calibration by electrical simulation				Lab B
Resistance thermometers (PT 100)	-200 °C to +800 °C	0.050 °C	Application of known values of resistance corresponding to the equivalent temperatures.	Lab B
Thermocouples:				
Type K	-200 °C to +1200 °C	0.080 °C	By application of DC millivolts corresponding to the equivalent temperatures for the stated thermocouple types, with the reference junction disabled.	
Type J	-200 °C to +1190 °C	0.060 °C		
Type T	-200 °C to +400 °C	0.080 °C		
Type B	500 °C to 1800 °C	0.21 °C		
Type R	-40 °C to +250 °C	0.26 °C		
Type R	250 °C to 1750 °C	0.11 °C		
Type S	-40 °C to +300 °C	0.21 °C		
Type S	300 °C to 1750 °C	0.12 °C		
Type E	-200 °C to +990 °C	0.06 °C		
Type N	-200 °C to +1290 °C	0.12 °C		

Calibration performed by the Organisation at the locations specified below

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location
TEMPERATURE SIMULATION (continued)				
Temperature indicators, calibration by electrical simulation (continued)				Lab B
Thermocouples:				
Type K	-200 °C to +1200 °C	0.37 °C	By application of DC millivolts corresponding to corresponding tothe equivalent temperatures for the stated thermocouple types, with the reference junction enabled.	
Type J	-200 °C to +1190 °C	0.37 °C		
Type T	-200 °C to +400 °C	0.37 °C		
Type B	500 °C to 1800 °C	0.41°C		
Type R	-40 °C to +250 °C	0.44 °C		
Type R	250 °C to 1750 °C	0.38 °C		
Type S	-40 °C to +300 °C	0.41 °C		
Type S	300 °C to 1750 °C	0.38 °C		
Type E	-200 °C to +990 °C	0.36 °C		
Type N	-200 °C to +1290 °C	0.38 °C		
Temperature simulators, calibration by electrical simulation				Lab B
Resistance thermometers (PT 100)	-200 °C to +800 °C	0.020 °C	Measurement of resistance values corresponding to the equivalent temperatures	
Thermocouples:				
Type K	-200 °C to +1200 °C	0.13 °C	By measurement of DC millivolts corresponding to corresponding to the equivalent temperatures for the stated thermocouple types, with the reference junction disabled.	
Type J	-200 °C to +1190 °C	0.090 °C		
Type T	-200 °C to +400 °C	0.11 °C		
Type B	500 °C to 1800 °C	0.31 °C		
Type R	-40 °C to +450 °C	0.38 °C		
Type R	450 °C to 1750 °C	0.15 °C		
Type S	-40 °C to +400 °C	0.31 °C		
Type S	400 °C to 1750 °C	0.16 °C		
Type E	-200 °C to +990 °C	0.070 °C		
Type N	-200 °C to +1290 °C	0.16 °C		
Thermocouples:				
Type K	-200 °C to +1200 °C	0.38 °C	By measurement of DC millivolts corresponding to corresponding to he equivalent temperatures for the stated thermocouple types, with the reference junction enabled.	
Type J	-200 °C to +1190 °C	0.37 °C		
Type T	-200 °C to +400 °C	0.37°C		
Type B	500 °C to 1800 °C	0.44 °C		
Type R	-40 °C to +450 °C	0.52°C		
Type R	450 °C to 1750 °C	0.39 °C		
Type S	-40 °C to +400 °C	0.47 ^{0}C		
Type S	400 °C to 1750 °C	0.39 ^{0}C		
Type E	-200 °C to +990 °C	0.37 ^{0}C		
Type N	-200 °C to +1290 °C	0.39 ^{0}C		
Reference Junction Compensation	Nominal Ambient 17 °C to 23 °C	0.16 °C		Lab B

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability Expressed as an Expanded Uncertainty (*k* = 2)	Remarks	Location
TEMPERATURE MEASUREMENTS			Calibration performed within Liquid Baths	Lab B
Analogue and Digital Thermometers				
PRT Sensor	-25 °C to +140 °C 140 °C to 200°C	0.03 °C 0.18 °C		
Thermocouple and Thermistor Sensors	-25 °C to +140 °C 140 °C to 200 °C	0.10 °C 0.18 °C		
Resistance Thermometer (100 Ω)	-25 °C to +200 °C 140 °C to 200 °C	0.03 °C 0.18 °C		
PRESSURE MEASUREMENTS			Methods consistent with EURAMET CG3 and CG17	Lab B
<u>Gas Pressure (gauge)</u>				
“Pressure equivalent” calibration of Dead Weight Testers (pressure balances supplied with an associated mass set)	2.5 kPa to 3.5 kPa 3.5 kPa to 100 kPa 100 kPa to 2.6 MPa	0.013 % + 0.30 Pa 0.0080 % + 0.30 Pa 0.0080 % + 1.5 Pa	Calibrations may be undertaken expressed in other units of pressure if required.	
“Pressure equivalent” calibration of Ametek gas pressure standards	2.5 kPa to 3.5 kPa 3.5 kPa to 100 kPa 100 kPa to 2.6 MPa	0.013 % + 0.30 Pa 0.010 % + 0.30 Pa 0.010 % + 1.5 Pa	Pressure and Differential pressure transmitters with electrical outputs may be calibrated.	
Calibration of pressure indicating instruments and gauges	-90 kPa to -3.5 kPa 1.5 kPa to 3.5 kPa 3.5 kPa to 100 kPa 100 kPa to 1 MPa 1 MPa to 21 MPa	0.010 % + 0.30 Pa 0.012 % + 0.30 Pa 0.0080 % + 0.30 Pa 0.0080 % + 1.5 Pa 0.0080 %	Differential pressure cells may be calibrated using the digital communication protocol.	
Gas pressure (absolute)				
Calibration of pressure indicating instruments and gauges	100 Pa to 1.5 kPa 1.5 kPa to 130 kPa 130 kPa to 200 kPa 200 kPa to 2.1 MPa	0.0045 % + 28 Pa 0.0032 % + 8 Pa 0.0045 % + 28 Pa 0.0045 % + 120 Pa		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location
PRESSURE (continued)				Lab B
Hydraulic Pressure (gauge)			Methods consistent with EURAMET CG3 and CG17	
“Pressure equivalent” calibration of Dead Weight Testers (pressure balances supplied with an associated mass set) and calibration of pressure indicating instruments and gauges	0.5 MPa to 7 MPa 7 MPa to 70 MPa 70 MPa to 140 MPa	0.0090 % + 30 Pa 0.0090 % + 300 Pa 0.010 % + 600 Pa		
Gas Pressure (differential)				
Calibration of pressure indicating instruments and gauges	*Line pressure 1 MPa to 21 MPa* 1.5 kPa to 1 MPa	0.60 ppm of line pressure, plus 0.0080 % of differential pressure, plus 10 Pa		
DIMENSIONAL				
Orifice Plates	BS EN ISO 5167-2:2003 Orifice plates with the following bore ‘d’ diameters 12.5 mm to 300 mm 300 mm to 500 mm	0.013 mm 0.015 mm		Lab B
DENSITY MEASUREMENTS				
Liquid density transducers				Lab B
Air Oil	1.2 kgm^{-3} 886 kgm^{-3} to 888 kgm^{-3}	0.10 kgm^{-3} 0.22 kgm^{-3}	By comparison with liquids of a known density at temperatures between 20 °C and 20.5 °C	
Gas density transducers				Lab B
Nitrogen	6 kgm^{-3} to 256 kgm^{-3}	0.080 %	By comparison with known gases at controlled temperatures and pressures	
Argon	35 kgm^{-3} to 413 kgm^{-3}	0.11 %		

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Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability Expressed as an Expanded Uncertainty (*k* = 2)	Remarks	Location
FLOW and VOLUME MEASUREMENTS				
Volumetric measures and pipe provers				
Calibration of small volume piston prover	20 l to 40 l 40 l to 50 l 50 l to 120 l 120 l to 130 l	0.036 % 0.023 % 0.018 % 0.016 %	Gravimetric calibration using water	Lab A
Calibration of Volumetric measures	20 l 40 l 60 l 80 l 100 l 120 l 140 l	0.031 % 0.019 % 0.016 % 0.015 % 0.014 % 0.014 % 0.013 %	Gravimeteric calibration using water	Lab A
Volume				
Calibration of pipe Provers			Using piston provers and volume measures	
Water	At flow rates of 300 l/min to 3000 l/min	0.025 %	Pipe provers from 4” to 36”	Site
Hydrocarbons	At flow rates of 300 l/min to 3000 l/min	0.040 %	Pipe provers from 4” to 36”	
Flow				
Water volume flow rate	0.95 l/min to 6623 l/min	0.025 %	Suitable for the calibration of 2” to 6” turbine meters	Site
Hydrocarbon volume flow rate	0.95 l/min to 6623 l/min	0.040 %		

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 %$\cdot p$ + ($0.12\cdot10^{-6}\cdot p\cdot10^{-6}$) + 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.