Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0555

Accredited to ISO/IEC 17025:2017

GL Industrial Services UK Ltd

Issue No: 048 **Issue date:** 19 August 2021

Flow Centre
Chilton Way
Ferryhill
Co Durham
DL17 0SE

Contact: Mrs K Moore
Tel: +44 (0) 2038165315
E-Mail: flowcentre.oil&gas@dnvgl.com
Website: www.dnvgl.com/services/flow-testing-and-calibration-12888

Calibration performed at the above address only

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
FLOW			Calibration of devices with an electrical output may be undertaken Calibration of flow meters using reference meter methods
Volume Flow (Natural Gas)	8 m^3/hr to 20 m^3/hr	0.20 %	
	20 m^3/hr to 40 m^3/hr	0.20 %	
	40 m^3/hr to 400 m^3/hr	0.18 %	
	400 m^3/hr to 2500 m^3/hr	0.18 %	
	2500 m^3/hr to 6500 m^3/hr	0.18 %	
	6500 m^3/hr to 13000 m^3/hr	0.18 %	
	13000 m^3/hr to 19500 m^3/hr	0.20 %	
Mass Flow (Natural Gas)	304 kg/hr to 760 kg/hr	0.30%	
	760 kg/hr to 1920 kg/hr	0.30 %	
	1920 kg/hr to 19200 kg/hr	0.29 %	
	19200 kg/hr to 120000 kg/hr	0.29 %	
	120000 kg/hr to 312000 kg/hr	0.29 %	
	312000 kg/hr to 624000 kg/hr	0.29 %	
	624000 kg/hr to 936000 kg/hr	0.30 %	
TEMPERATURE			
Resistance thermometers	-20 °C to 90 °C	0.022 °C	
Base metal thermocouples	-20 °C to 90 °C	0.11 °C	
Temperature indicators with sensors	-20 °C to 90 °C	0.022 °C	
Liquid-in-glass thermometers	-20 °C to 90 °C	0.028 °C	
Metal block calibrators	-20 °C to 90 °C	0.30 °C	

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

0555
Accredited to
ISO/IEC 17025:2017

GL Industrial Services UK Ltd
Issue No: 048 **Issue date:** 19 August 2021

Calibration performed at main address only

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
PRESSURE			
Gas pressure (gauge) Calibration of pressure indicating instruments and gauges. Pressure equivalent calibration of a dead weight tester.	-96.5 kPa to - 3.5 kPa 1.5 kPa to 3.5 kPa 3.5 kPa to 30 kPa 30 kPa to 700 kPa 700 kPa to 10 MPa 10 MPa to 27.6 MPa 27.6 MPa to 30 MPa	0.011 % + 6.0 Pa 0.0085 % + 6.0 Pa 0.0070 % 0.0050 % 0.0063 % 0.0075 % 0.0097 %	Methods consistent with EURAMET CG3 and CG17 Absolute pressure calibrations may be undertaken by reference to an associated barometric pressure measurement with an additional uncertainty of 11 Pa
Gas pressure (absolute)	80 kPa to 115 kPa	11 Pa	Calibration of pressure indicating instruments and gauges
Gas pressure (differential)	0 Pa to 2 MPa (At line pressure of 0.5 MPa to 10 MPa) 0 Pa to 2 MPa (At line pressure of 10 MPa to 30 MPa)	0.0063 % + 1.0 ppm of line pressure + 6.0 Pa 0.0097 % + 1.0 ppm of line pressure + 26 Pa	Calibration of pressure indicating instruments and gauges
ELECTRICAL			
DC Voltage	0 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V	26 μV 60 μV 470 μV 6.0 mV	Measurement of sources
DC Resistance	0 Ω to 1 Ω 1 Ω to 1.6 kΩ 1 kΩ to 10 kΩ 10 kΩ to 100 kΩ 100 kΩ to 1 MΩ	6.0 μΩ 6.0 ppm 39 mΩ 1.3 Ω 19 Ω	Using Bridge Minimal current Direct measurement
DC Voltage	0 V to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1.1 kV	6 ppm + 7.0 μV 32 ppm + 5.0 μV 35 ppm 40 ppm 40 ppm	Source values available for calibration of measuring instruments.
DC Resistance specific values	100 mΩ 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 mΩ 1 GΩ	6.0 mΩ 6.0 mΩ 6.0 mΩ 62 ppm 49 ppm 49 ppm 50 ppm 53 ppm 230 ppm 0.15 % 0.20 %	

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
ELECTRICAL			
DC Current	0 A to 200 μA 200 μA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 30 A	54 nA 110 ppm 68 ppm 80 ppm 210 ppm 400 ppm	Source values available for calibration of measuring instruments.
Frequency	10 Hz to 500 kHz 10 MHz	13 ppm + 1.0 mHz 13 ppm	
Temperature indicators, calibration by electrical simulation:			
Resistance thermometer (Pt 100)	-200 °C to + 800 °C	0.10 °C	
Thermocouple			
Type K	-140 °C to 0 °C 0 °C to 1340 °C	1.3 °C 0.50 °C	Excluding cold junction compensation
	-140 °C to 0 °C 0 °C to 1370 °C	1.75 °C 0.50 °C	Including cold junction compensation
Type N	-270 °C to 0 °C 0 °C to 1300 °C	1.3 °C 0.50 °C	Excluding cold junction compensation
	-200 °C to 0 °C 0 °C to 1370 °C	1.75 °C 0.50 °C	Including cold junction compensation
Type T	-250 °C to 0 °C 0 °C to 400 °C	1.0 °C 0.43 °C	Excluding cold junction compensation
	-250 °C to 0 °C 0 °C to 400 °C	1.3 °C 0.44 °C	Including cold junction compensation
Type J	-180 °C to 0 °C 0 °C to 750 °C	0.8 °C 0.42 °C	Excluding cold junction compensation
	-180 °C to 0 °C 0 °C to 750 °C	1.0 °C 0.43 °C	Including cold junction compensation

0555 **Accredited to** **ISO/IEC 17025:2017**	**Schedule of Accreditation** **issued by** **United Kingdom Accreditation Service** 2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK **GL Industrial Services UK Ltd** **Issue No:** 048 **Issue date:** 19 August 2021

Calibration performed at main address only

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
DIMENSIONAL			
Orifice plates	Orifice plates with the following bore ‘d’ diameters:		As EN ISO 5167-2:2003
	25 mm to 50 mm	10 µm on diameter ‘d’	
	50 mm to 100 mm	10 µm on diameter ‘d’	
	100 mm to 150 mm	15 µm on diameter ‘d’	
	150 mm to 200 mm	17 µm on diameter ‘d’	
	200 mm to 300 mm	18 µm on diameter ‘d’	
	300 mm to 400 mm	19 µm on diameter ‘d’	
	400 mm to 500 mm	20 µm on diameter ‘d’	
	500 mm to 650 mm	22 µm on diameter ‘d’	

Methods:
Unless otherwise stated, all measurements are performed by direct comparison with the indication from a calibrated reference instrument.

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.