Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

8239

Accredited to ISO/IEC 17025:2005

PASS (Portable Appliance Safety Services) Ltd

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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
DC RESISTANCE			
Generation	0.1 Ω 0.2 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ	3.5 mΩ 46 mΩ 46 mΩ 46 mΩ 47 mΩ 67 mΩ 0.48 Ω 4.8 Ω 120 Ω 4.1 kΩ 0.36 MΩ	
Measurement	0 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 10 kΩ 10 kΩ to 100 kΩ 100 kΩ to 1MΩ 1MΩ to 10 MΩ 10MΩ to 100 MΩ	120 ppm + 4.6 mΩ 20 ppm + 0.012 Ω 120 ppm + 0.12 Ω 120 ppm + 1.2 Ω 120 ppm + 14 Ω 460 ppm + 220 Ω 0.93 % + 12 kΩ	
DC VOLTAGE			
Generation	0 mV to 202 mV 202 mV to 2.02 V 2.02 V to 20.2 V 20.0 V to 202 V 202 V to 1020 V	4.5 ppm + 4.2 µV 5.6 ppm + 10 µV 4.4 ppm + 73 µV 5.1 ppm + 0.70 mV 5.7 ppm + 7.0 mV	
Measurement	0 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	58 ppm + 4.2 µV 46 ppm + 8.8 µV 40 ppm + 71 µV 52 ppm + 0.70 mV 52 ppm + 12 mV	

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
DC CURRENT			
Generation	0 µA to 202 µA 202 µA to 2.02 mA 2.02m A to 20.2 mA 20.2 mA to 202 mA 202 mA to 2.02 A 2.02 A to 20 A	0.025 % + 25 nA 95 ppm + 72 nA 58 ppm + 6.0 µA 140 ppm + 4.8 µA 0.019 % + 0.19 mA 0.052 % + 0.50 mA	
Measurement	0 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 3 A	0.058 % + 2.3 µA 0.068 % + 5.8 µA 0.12 % + 0.13 mA 0.14 % + 23 mA	
AC VOLTAGE			
Generation	20 mV to 202 mV *40 Hz to 1 kHz*	 0.052 % + 53 µV	
	202 mV to 2.02 V *40 Hz to 1 kHz* *1 kHz to 20 kHz* *20 Hz to 40 kHz*	 0.049 % + 0.21 mV 0.11 % + 0.92 mV 0.27 % + 3.7 mV	
	2.02 V to 20.2 V *40 Hz to 1 kHz* *1 kHz to 20 kHz* *20 kHz to 30 kHz*	 0.038 % + 1.9 mV 0.11 % + 9.3 mV 0.27 % + 37 mV	
	20.2 V to 202 V *50 Hz to 1 kHz* *1 kHz to 10 kHz*	 0.049 % + 23 mV 0.073 % + 92 mV	
	202 V to 1020 V *50 Hz to 1 kHz* *1 kHz to 10 kHz*	 0.049 % + 0.23 V 0.17 % + 1.2 V	
Measurement	5 mV to 100 mV *200 Hz*	 0.069 % + 60 µV	
	100 mV to 1 V *200 Hz*	 0.069 % + 0.37 mV	
	1 V to 10 V *40 Hz to 1 kHz* *1 kHz to 10 kHz*	 0.070 % + 3.7 mV 0.070 % + 4.4 mV	
	10 V to 100 V *200 Hz*	 0.069 % + 37 mV.	
	100 V to 750 V *200 Hz*	 0.069 % + 26 mV	

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
AC CURRENT			
Generation	20 µA to 202 µA *50 Hz to 1 kHz*	0.13 % + 0.80 µA	
	202 µA to 2.02 mA *50 Hz to 1 kHz*	0.13 % + 0.98 µA	
	2.02 mA 20.2 mA *50 Hz to 1 kHz*	0.13 % + 3.1 µA	
	20.2 mA to 202 mA *50 Hz to 1 kHz*	0.13 % + 24 µA	
	202 mA to 2.02 A *30 Hz to 1 kHz*	0.12 % + 0.23 mA	
	2.02 A to 20.2 A *30 Hz to 200 Hz*	0.13 % + 2.3 mA	
Measurement	50 mA to 1 A *50 Hz to 1 kHz*	0.13 % + 560 µA	
	1 A to 3 A *50 Hz to 60 Hz*	0.18 % + 2.2 mA	
FREQUENCY			
Generation	10 Hz to 10 MHz	14 ppm	
Measurement	10 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to10 kHz 10 kHz to 100 kHz	0.058 % + 3.1 mHz 0.012 % + 31 mHz 0.012 % + 0.31 Hz 0.012 % + 31 Hz	
CAPACITANCE			
Generation	*At 1 kHz:* 1 nF, 10 nF, 20 nF, 50 nF and 100 nF 1 µF 10 µF 100 µF	0.29 % + 26 pF 0.47 % 0.70 % 0.93 %	

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
EQUIPMENT FOR IEE 16TH / 17TH EDITION WIRING TESTING			
LOOP TESTERS			
	Nominal applied resistances		
AC Resistance at 50 Hz	0.06 Ω	6.2 mΩ	
	0.10 Ω	6.3 mΩ	
	0.23 Ω	6.3 mΩ	
	0.34 Ω	6.5 mΩ	
	0.5 Ω	6.9 mΩ	
	1 Ω	8.6 mΩ	
	5 Ω	30 mΩ	
	10 Ω	58 mΩ	
	100 Ω	0.57 Ω	
	1.kΩ	5.8 Ω	
CONTINUITY TESTERS			
DC Resistance	20 mΩ	30 mΩ	
	200 mΩ	30 mΩ	
	210 mΩ	30 mΩ	
	220 mΩ	30 mΩ	
	230 mΩ	30 mΩ	
	240 mΩ	30 mΩ	
	250 mΩ	30 mΩ	
	260 mΩ	30 mΩ	
	270 mΩ	30 mΩ	
	280 mΩ	30 mΩ	
	290 mΩ	30 mΩ	
	300 mΩ	30 mΩ	
	400 mΩ	30 mΩ	
	500 mΩ	30 mΩ	
	600 mΩ	31 mΩ	
	700 mΩ	31 mΩ	
	800 mΩ	31 mΩ	
	900 mΩ	32 mΩ	
	1 Ω	32 mΩ	
	2 Ω	38 mΩ	
	4 Ω	55 mΩ	
	6 Ω	76 mΩ	
	8 Ω	97 mΩ	
	10 Ω	0.12 Ω	
	20 Ω	0.23 Ω	
	100 Ω	1.2 Ω	
	1 kΩ	12 Ω	
Continuity Current Measurement	100 mA	1.7 mA	
	200 mA	3.1 mA	
	300 mA	4.6 mA	

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INSULATION TESTERS			
DC Resistance	10 kΩ 20 kΩ 30 kΩ 40 kΩ 60 kΩ 100 kΩ 200 kΩ 400 kΩ 600 kΩ 1 MΩ 2 MΩ 3 MΩ 4 MΩ 5 MΩ 6 MΩ 7 MΩ 8 MΩ 9 MΩ 10 MΩ 20 MΩ 30 MΩ 40 MΩ 50 MΩ 60 MΩ 70 MΩ 80 MΩ 90 MΩ 100 MΩ 200 MΩ 400 MΩ 600 MΩ 800 MΩ 1 GΩ	35 Ω 69 Ω 100 Ω 0.14 kΩ 0.21 kΩ 0.35 kΩ 0.69 kΩ 1.4 kΩ 2.1 kΩ 3.5 kΩ 6.9 kΩ 10 kΩ 14 kΩ 0.17 MΩ 0.21 MΩ 0.24 MΩ 0.28 MΩ 0.31 MΩ 0.35 MΩ 0.69 MΩ 1.0 MΩ 1.4 MΩ 1.7 MΩ 2.1 MΩ 2.4 MΩ 2.8 MΩ 3.1 MΩ 3.5 MΩ 7.1 MΩ 14 MΩ 21 MΩ 28 MΩ 36 MΩ	
DC Voltage	50 V 100 V 150 V 200 V 250 V 500 V 1000 V	1.1 V 1.5 V 2.1 V 2.6 V 3.1 V 5.9 V 12 V	

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks
EARTH BOND TESTERS			
AC Resistance at 50 Hz	Nominal applied resistance 0.04 Ω 0.1 Ω 0.15 Ω 0.27 Ω 0.38 Ω 0.55 Ω 1 Ω 5 Ω 10 Ω 100 Ω 1 kΩ	 6.6 mΩ 6.6 mΩ 6.7 mΩ 6.8 mΩ 7.0 mΩ 7.4 mΩ 9.3 mΩ 30 mΩ 58 mΩ 0.57 Ω 5.8 Ω	
AC Current at 50 Hz	100 mA 8 A 10 A 20 A	7.3 mA 0.16 A 0.19 A 0.35 A	
LEAKAGE TESTERS			
DC Current	2 mA 4.7 mA 7.7 mA	0.040 mA 0.080 mA 0.13 mA	
RCD TESTERS			
RCD Trip Time	20 ms 40 ms 200 ms 390 ms 900 ms	0.95 ms 0.95 ms 0.95 ms 0.95 ms 8.1 ms	
RCD Trip Current at 50 Hz	10 mA 30 mA 90 mA 100 mA 110 mA 300 mA 1 A 2 A	0.62 mA 1.8 mA 5.2 mA 5.8 mA 6.4 mA 18 mA 58 mA 120 mA	
AC Voltage Source at 50 Hz	100 V 200 V 230 V 300 V 400 V	0.30 V 0.50 V 0.65 V 0.73 V 0.96 V	
Line Voltage Measurement	200 V to 260 V	2.4 V	

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, and an indication of how they are to be interpreted, are shown 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 %·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.