Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0375

Accredited to ISO/IEC 17025:2017

SERCAL Materials Testing Machines Services Ltd

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Calibration performed by the Organisations at the locations specified below

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address Southern Avenue Leominster Herefordshire HR6 0QH	**Local contact** Dr N Wrigley	Force	P

Site activities performed away from the locations listed above:

Location details		Activity	Location code
Customer's sites or premises The customer's sites or premises must be suitable for the nature of the particular calibrations undertaken and will be subject of contract review arrangements between the laboratory and the customer	**Contact** Dr N Wrigley	Force Hardness	S

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
FORCE			NOTES	
UNIVERSAL MATERIALS TESTING MACHINES			1. Calibration also includes the alignment and restraint of the upper machine platen required by BS EN 12390-4:2000.	S
Verification and calibration of the force measuring system by force proving instruments in tension	25 N to 600 kN for Class 0.5, 1, 2 and 3 machines to BS EN ISO 7500-1:2018	0.20 %		
	From 50 N up to 2000 kN for Class 1, 2 and 3 machines to BS EN ISO 7500-1:2018 and ASTM E4-16	0.32 %	2 The indirect verification shall be in accordance with the requirements of BS EN ISO 6508-2:2015 and ASTM E18-17.	
Verification and calibration of the force measuring system by force proving instruments in compression	5 N to 600 kN for Class 0.5, 1, 2 and 3 machines to BS EN ISO 7500-1:2018	0.20 %		
	5 N to 16.5 MN for Class 1, 2 and 3 machines to BS EN ISO 7500-1:2018 and ASTM E4-16	0.32 %	3 The indirect verification shall be in accordance with the requirements of BS EN ISO 6506-2:2014 ASTM E10-17.	
Verification and calibration of the force measuring system by calibrated masses in tension	0.01 N to 1000 N for Class 0.5, 1, 2 and 3 machines to BS EN ISO 7500-1:2018 and ASTM E4-16	0.10 %	4 The indirect verification shall be in accordance with the requirements of BS EN ISO 6507-2:2005 and ASTM E92-17.	
Verification and calibration of the force measuring system by calibrated masses in compression	0.01 N to 1000 N for Class 0.5, 1, 2 and 3 machines to BS EN ISO 7500-1:2018 and ASTM E4-16	0.10 %		
FORCE MEASURING DEVICES				P
Calibration of force measuring devices, eg, strain gauged load cells and load measuring rings (but excluding proving devices in) Tension and Compression	From 0,1 N up to1 0000 N	0.10 %		
	From 500 N up to 500 kN	0.41 %		
COMPRESSION TESTING MACHINES FOR CONCRETE				S
Verification of concrete testing machines by proving devices in Compression	100 kN to 16.5 MN for Class 1, 2 and 3 machines to BS EN ISO 7500-1:2018	0.32 % See note 1		
Rate of application of force (Pacer rate)	As BS EN 12390-2:2000 3 kN/min to 1300 kN/min	2.25 %		
Flatness of platens and spacing blocks	As BS EN 12390-4:2000 40 mm to 300 mm	0.010 mm		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
TENSION CREEP TESTING MACHINES				S
Verification of the applied load using force proving instruments	25 N to 500 kN for Class 0.5, 1 and 2 machines to BS EN ISO 7500-2:2006 and ASTM E4-16	0.20 %		
Verification of the applied load using masses	0.01 N to 1000 N for Class 0.5, 1 and 2 machines to BS EN ISO 7500-2:2006 and ASTM E4-16	0.10 %		
LENGTH				S
Extensometers	As BS EN ISO 9513:2012 for the following classes and gauge lengths: Class 0.2 from 25 mm Class 0.5 from 10 mm Class 1 from 5 mm Class 2 from 5 mm As ASTM:E83-16 for the following classes and gauge lengths: B-1 from 20 mm B-2 from 10 mm C from 5 mm Displacements 0.005 mm to 50 mm	2.4 µm per mm		
Long Travel Extensometry	As BS EN ISO 5893:2019 Displacements 3 mm to 600 mm	0.015 mm + 0.2 mm/m		
Crosshead Rate	Timed between 30 seconds and 10 minutes	0.15 seconds		
Testing machine crosshead displacement and actuator displacement	1 mm to 1200 mm	0.011 mm + (0.13 mm per metre)		
TORSION TESTING MACHINES				S
Torque	4 N.m to 5000 N·m	0.43 %		
Angle	0º to 360º	0.25º		

Calibration performed by the Organisation at the locations specified

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (*k*=2)	Remarks	Location Code
IMPACT TESTING MACHINES				S
Charpy	Absorbed Energy (joules) 1 J to 600 J BS EN ISO 148-2:2016 ASTM E23-18	0.70 J		
Izod	BS 131:Part 4:1972	0.70 J		
Plastics	BS ISO 13802:2015	0.11J		
VERIFICATION OF HARDNESS TESTING MACHINES				S
Indirect verification of Rockwell Hardness Testing Machines	Rockwell scales: A, B, C, D, E, F, G, H, K, N and T		See Note 2	
	HRA Scale			
	80 to 85	0.15 HRA		
	70 to 79	0.16 HRA		
	60 to 69	0.28 HRA		
	HRB Scale			
	80	0.42 HRB		
	51 to 79	0.87 HRB		
	10 to 50	1.36 HRB		
	HRC Scale			
	60 to 70	0.31 HRC		
	40 to 59	0.32 HRC		
	20 to 39	0.37 HRC		
	HRD Scale			
	70 to 80	0.17 HRD		
	50 to 69	0.25 HRD		
	40 to 49	0.27 HRD		
	HRE Scale			
	89	0.54 HRE		
	75 to 88	0.54 HRE		
	65 to 87	0.54 HRE		
	HRF Scale			
	87	0.40 HRF		
	70 to 86	0.40 HRF		
	40 to 69	0.54 HRF		
	HRG Scale			
	80	0.30 HRG		
	40 to 79	0.30 HRG		
	10 to 39	0.76 HRG		
	HRH Scale			
	90	0.40 HRH		
	80 to 89	0.40 HRH		
	60 to 79	0.68 HRH		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k=2)	Remarks	Location Code
VERIFICATION OF HARDNESS TESTING MACHINES				
Indirect verification of Rockwell Hardness Testing Machines (cont'd)	Rockwell scales:		See Note 2	
	HRK Scale			
	70	0.40 HRK		
	30 to 69	0.40 HRK		
	10 to 29	0.64 HRK		
	HR45N Scale			
	67 to 75	0.18 HR45N		
	50 to 66	0.21 HR45N		
	10 to 49	0.43 HR45N		
	HR45T Scale			
	50 to 75	0.40 HR45T		
	40 to 49	0.40 HR45T		
	10 to 39	0.73 HR45T		
	HR30N Scale			
	77 to 85	0.27 HR30N		
	60 to 76	0.27 HR30N		
	40 to 59	0.55 HR30N		
	HR30T Scale			
	57 to 85	0.39 HR30T		
	50 to 56	0.66 HR30T		
	20 to 49	0.90 HR30T		
	HR15N Scale			
	90 to 95	0.18 HR15N		
	80 to 89	0.18 HR15N		
	40 to 79	0.39 HR15N		
	HR15T Scale			
	88 to 100	0.21 HR15T		
	80 to 87	0.21 HT15T		
	20 to 79	0.37 HR15T		
Indirect verification of Brinell Hardness Testing and Calibration machines	Brinell scales:		See Note 3	
	Scale 10/3000			
	600HBW to 140 HBW	8.0 HBW to 2.2 HBW		
	Scale 10/1500			
	299 HBW to 55 HBW	4.1 HBW to 1.2 HBW		
	Scale 10/1000			
	169 HBW to 55 HBW	2.3 HBW to 1.2 HBW		
	Scale 5/750			
	600 HBW to 140 HBW	9.8 HBW to 2.4 HBW		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (*k*=2)	Remarks	Location Code
VERIFICATION OF HARDNESS TESTING MACHINES				
Indirect verification of Brinell Hardness Testing machines (cont'd)	Brinell scales: Scale 5/250 169 HBW to 55 HBW	2.7 HBW to 1.3 HBW	See Note 3	
	Scale 2.5/187.5 600 HBW to 140 HBW	16 HBW to 2.9 HBW		
	Scale 1/1 21.8 HBW to 3.18 HBW	1.04 HBW to 0.09 HBW		
Indirect verification of Vickers hardness testing machines	Vickers scales:		See Note 4	
	HV 100 200	1.2 HV		
	HV 100 400	3.4 HV		
	HV 100 700	4.1 HV		
	HV 50 200	1.9 HV		
	HV 50 400	3.5 HV		
	HV 50 700	6.3 HV		
	HV 30 200	2.0 HV		
	HV 30 400	4.4 HV		
	HV 30 700	9.3 HV		
	HV 20 200	2.5 HV		
	HV 20 400	6.2 HV		
	HV 20 700	11.0 HV		
	HV 10 200	3.1 HV		
	HV 10 400	7.7 HV		
	HV 10 700	14.9 HV		
	HV5 200	3.9 HV		
	HV5 400	11.0 HV		
	HV5 700	19.7 HV		
	HV3 200	6.9 HV		
	HV3 400	16.3 HV		
	HV3 700	31.0 HV		
	HV1 200	8.7 HV		
	HV1 400	21.4 HV		
	HV1 700	44.0 HV		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (*k*=2)	Remarks	Location Code
VERIFICATION OF HARDNESS TESTING MACHINES				
Indirect verification of Vickers hardness testing machines (cont'd)	Vickers Scales:		See Note 4	
	HV 0.5 200	5.0 HV		
	HV 0.5 400	15.0 HV		
	HV 0.5 700	17.0 HV		
	HV 0.3 200	6.0 HV		
	HV 0.3 400	16.0 HV		
	HV 0.3 700	19.0 HV		
	HV 0.2 200	7.0 HV		
	HV 0.2 400	17.0 HV		
	HV 0.2 700	20.0 HV		
	HV 0.1 200	10.0 HV		
	HV 0.1 400	30.0 HV		
	HV 0.1 700	40.0 HV		
	HV 0.05 200	8.5 HV		
	HV 0.05 400	19.0 HV		
	HV 0.05 700	27.0 HV		
	HV 0.025 200	9.0 HV		
	HV 0.025 400	20.0 HV		
	HV 0.025 700	30.0 HV		
	HV 0.01 200	10.0 HV		
	HV 0.01 400	30.0 HV		
	HV 0.01 700	40.0 HV		

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.

<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 %$\cdot V$ + 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 $1.5 \cdot 0.01 \cdot i$, where i is the instrument indication.