# Schedule of Accreditation

**issued by**

# United Kingdom Accreditation Service

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

**0783**

**Accredited to ISO/IEC 17025:2017**

## Construction Testing Solutions Limited
## Trading as Calibration Testing Solutions

**Issue No:** 023 **Issue date:** 24 November 2021


**M1 Commerce Park**
**Markham Lane**
**Duckmanton**
**Chesterfield**
**S44 5HS**

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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**<br>M1 Commerce Park<br>Markham Lane<br>Duckmanton<br>Chesterfield<br>S44 5HS<br><br>**Local contact**<br>Luke Todd | Electrical<br><br>Dimensional<br><br>Mass<br>Weighing machines (non-automatic) | P<br><br>P<br><br>P |

**Site activities performed away from the locations listed above:**

| Location details | Activity | Location code |
|---|---|---|
| Customers' sites or premises<br><br>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 | MASS<br>Weighing machines (non-automatic) | S |

Calibration and Measurement Capability (CMC

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| **ELECTRICAL MEASUREMENTS** | | | | |
| DC VOLTAGE | | | | P |
| Measurement | 0 mV to 100 mV<br>100 mV to 1 V<br>1 V to 10 V<br>10 V to 100 V<br>100 V to 1000 V | 4.5 µV/V + 0.47 µV<br>3.3 µV/V<br>3.2 µV/V<br>4.8 µV/V<br>4.9 µV/V | Using digital multimeter with 10 MΩ input resistance. | |
| | 10 V to 100 V<br>100 V to 1000 V | 12 µV/V<br>31 µV/V | Using digital multimeter with 1 MΩ input resistance. | |
| Generation | 0 mV to 330 mV<br>330 mV to 3.3 V<br>3.3 V to 33 V<br>33 V to 330 V<br>330 V to 1020 V | 70 µV/V + 4.0 µV<br>58 µV/V + 6.0 µV<br>58 µV/V + 60 µV<br>67 µV/V<br>65 µV/V | Using multifunction calibrator | |
| DC CURRENT | | | | P |
| Measurement | 0 µA to 10 µA<br>10 µA to 100 µA<br>100 µA to 1 mA<br>1 mA to 10 mA<br>10 mA to 100 mA<br>100 mA to 1 A<br>1 A to 20 A<br>10 A to 30 A | 33 µA/A + 20 nA<br>17 µA/A<br>16 µA/A<br>21 µA/A<br>78 µA/A<br>270 µA/A<br>290 µA/A<br>810 µA/A | Using digital multimeter | |
| Generation | 0 mA to 3.3 mA<br>3.3 mA to 33 mA<br>33 mA to 330 mA<br>330 mA to 2.2 A<br>2.2 A to 11 A | 150 µA/A + 60 nA<br>120 µA/A + 0.40 µA<br>120 µA/A + 5.0 µA<br>350 µA/A + 60 µA<br>700 µA/A + 0.46 mA | Using multifunction calibrator | |

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| **ELECTRICAL MEASUREMENTS** (continued) | | | | |
| DC RESISTANCE | | | | P |
| Measurement | 0 Ω to 1 Ω | 12 μΩ/Ω + 26 μΩ | Using digital multimeter | |
| | 1 Ω to 10 Ω | 14 μΩ/Ω | | |
| | 10 Ω to 100 Ω | 11 μΩ/Ω | | |
| | 100 Ω to 1 kΩ | 11 μΩ/Ω | | |
| | 1 kΩ to 10 kΩ | 11 μΩ/Ω | | |
| | 10 kΩ to 100 kΩ | 12 μΩ/Ω | | |
| | 100 kΩ to 1 MΩ | 14 μΩ/Ω | | |
| | 1 MΩ to 10 MΩ | 34 μΩ/Ω | | |
| | 10 MΩ to 100 MΩ | 250 μΩ/Ω | | |
| | 100 MΩ to 1 GΩ | 0.27 % | | |
| | 0 MΩ to 10 MΩ | 20 μΩ/Ω + 15 Ω | At 200 V | |
| | 10 MΩ to 100 MΩ | 92 μΩ/Ω $10^6$ | At 200 V | |
| | 100 MΩ to 1 GΩ | 380 μΩ/Ω | At 200 V | |
| | 1 GΩ to 10 GΩ | 0.27 % | At 200 V | |
| Generation | | | | |
| Specific Values | | | | |
| Decade Values | 1 mΩ | 75 μΩ/Ω | Known resistance values for application to resistance measuring instruments | |
| | 10 mΩ | 59 μΩ/Ω | | |
| | 100 mΩ | 63 μΩ/Ω | | |
| | 1 Ω | 63 μΩ/Ω | | |
| | 10 MΩ | 1.2 % | At 100 V, 500 V and 1000 V | |
| | 100 MΩ | 1.3 % | At 100 V, 500 V and 1000 V | |
| | 1 GΩ | 2.6 % | At 100 V, 500 V and 1000 V | |
| | 10 GΩ | 1.0 % | At 100 V and 500 V | |
| Decade and non-decade values | 10 MΩ | 23 μΩ/Ω | Known resistance values for application to resistance measuring instruments | |
| | 20 MΩ | 46 μΩ/Ω | | |
| | 30 MΩ | 69 μΩ/Ω | | |
| | 40 MΩ | 92 μΩ/Ω | | |
| | 50 MΩ | 120 μΩ/Ω | | |
| | 60 MΩ | 140 μΩ/Ω | | |
| | 70 MΩ | 160 μΩ/Ω | | |
| | 80 MΩ | 190 μΩ/Ω | | |
| | 90 MΩ | 210 μΩ/Ω | | |
| | 100 MΩ | 230 μΩ/Ω | | |
| | 110 MΩ | 250 μΩ/Ω | | |
| Other values | 1 Ω to 10 Ω | 580 μΩ/Ω | Known resistance values for application to resistance measuring instruments | |
| | 10 Ω to 100 Ω | 120 μΩ/Ω | | |
| | 100 Ω to 1 kΩ | 120 μΩ/Ω | | |
| | 1 kΩ to 10 kΩ | 120 μΩ/Ω | | |
| | 10 kΩ to 100 kΩ | 120 μΩ/Ω | | |
| | 100 kΩ to 1 MΩ | 150 μΩ/Ω | | |

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| **ELECTRICAL MEASUREMENTS** (continued) | | | | |
| AC VOLTAGE | | | | P |
| Measurement | 10 mV to 100 mV | | Using digital multimeter | |
| | *10 Hz to 10 kHz* | 150 µV/V | | |
| | *10 kHz to 30 kHz* | 270 µV/V | | |
| | *30 kHz to 100 kHz* | 620 µV/V | | |
| | *100 kHz to 300 kHz* | 0.25 % | | |
| | *300 kHz to 1 MHz* | 1.3 % | | |
| | 100 mV to 1 V | | | |
| | *10 Hz to 10 kHz* | 140 µV/V | | |
| | *10 kHz to 30 kHz* | 270 µV/V | | |
| | *30 kHz to 100 kHz* | 620 µV/V | | |
| | *100 kHz to 300 kHz* | 0.25 % | | |
| | *300 kHz to 1 MHz* | 1.2 % | | |
| | 1 V to 10 V | | | |
| | *10 Hz to 10 kHz* | 140 µV/V | | |
| | *10 kHz to 30 kHz* | 270 µV/V | | |
| | *30 kHz to 100 kHz* | 620 µV/V | | |
| | *100 kHz to 300 kHz* | 0.25 % | | |
| | *300 kHz to 1 MHz* | 1.2 % | | |
| | 10 V to 100 V | | | |
| | *20 Hz to 10 kHz* | 130 µV/V | | |
| | *10 kHz to 30 kHz* | 270 µV/V | | |
| | *30 kHz to 100 kHz* | 680 µV/V | | |
| | 100 V to 1000 V | | | |
| | *40 Hz to 10 kHz* | 130 µV/V | | |
| | *10 kHz to 30 kHz* | 270 µV/V | | |
| Generation | 1 mV to 330 mV | | Using multifunction calibrator | |
| | *45 Hz to 10 kHz* | 0.10 % | | |
| | *10 kHz to 50 kHz* | 0.21 % | | |
| | 330 mV to 3.3 V | | | |
| | *45 Hz to 10 kHz* | 0.036 % | | |
| | *10 kHz to 50 kHz* | 0.039 % | | |
| | 3.3 V to 33 V | | | |
| | *45 Hz to 10 kHz* | 0.046 % | | |
| | *10 kHz to 50 kHz* | 0.22 % | | |
| | 33 V to 330 V | | | |
| | *45 Hz to 20 kHz* | 0.10 % | | |
| | 330 V to 1100 V | | | |
| | *45 Hz to 1 kHz* | 0.058 % | | |
| | *1 kHz to 20 kHz* | 0.23 % | | |

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| **ELECTRICAL MEASUREMENTS** (continued) | | | | |
| AC CURRENT | | | | P |
| Measurement | 1μA to 10 μA | | Using digital multimeter | |
| | *10 Hz to 10 kHz* | 0.24 % + 4.0 nA | | |
| | 10 μA to 100 μA | | | |
| | *10 Hz to 2 kHz* | 340 μA/A | | |
| | *2 kHz to 10 kHz* | 620 μA/A | | |
| | *10 kHz to 30 kHz* | 870 μA/A | | |
| | 100 μA to 1 mA | | | |
| | *10 Hz to 2 kHz* | 330 μA/A | | |
| | *2 kHz to 10 kHz* | 620 μA/A | | |
| | *10 kHz to 30 kHz* | 860 μA/A | | |
| | 1 mA to 10 mA | | | |
| | *10 Hz to 2 kHz* | 330 μA/A | | |
| | *2 kHz to 10 kHz* | 620 μA/A | | |
| | *10 kHz to 30 kHz* | 860 μA/A | | |
| | 10 mA to 100 mA | | | |
| | *10 Hz to 2 kHz* | 330 μA/A | | |
| | *2 kHz to 10 kHz* | 610 μA/A | | |
| | *10 kHz to 30 kHz* | 860 μA/A | | |
| | 100 mA to 1 A | | | |
| | *10 Hz to 2 kHz* | 370 μA/A | | |
| | *2 kHz to 10 kHz* | 650 μA/A | | |
| | 1 A to 10 A | | | |
| | *10 Hz to 10 kHz* | 980 μA/A | | |
| | 10 A to 30 A | | | |
| | *10 Hz to 1 kHz* | 0.11 % | | |
| Generation | 30 μA to 3.3 mA | | Using multifunction calibrator | |
| | *10 Hz to 5 kHz* | 0.23 % | | |
| | 3.3 mA to 33 mA | | | |
| | *10 Hz to 5 kHz* | 0.23 % | | |
| | 33 mA to 330 mA | | | |
| | *10 Hz to 5 kHz* | 0.23 % | | |
| | 330 mA to 2.2 A | | | |
| | *10 Hz to 1 kHz* | 0.23 % | | |
| | *1 kHz to 5 kHz* | 0.87 % | | |
| | 2.2 A to 11 A | | | |
| | *45 Hz to 500 Hz* | 0.12 % | | |
| | *500 Hz to 1 kHz* | 0.38 % | | |

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| **ELECTRICAL TEMPERATURE SIMULATION** | | | | P |
| Temperature Indicators and Simulators (t/c Types) calibration by Electrical Simulation | | | | |
| Base Metal Thermocouples | Type K -200°C to -100°C | 0.40 °C | Including Cold Junction Compensation | |
| | Type K -100°C to -25°C | 0.24 °C | | |
| | Type K -25°C to +120°C | 0.22 °C | | |
| | Type K 120°C to 1000°C | 0.32 °C | | |
| | Type K 1000°C to 1372°C | 0.48 °C | | |
| | Type J -210°C to -100°C | 0.33 °C | Including Cold Junction Compensation | |
| | Type J -100°C to -30°C | 0.22 °C | | |
| | Type J -30°C to +150°C | 0.20 °C | | |
| | Type J 150°C to 760°C | 0.23 °C | | |
| | Type J 760°C to 1200°C | 0.29 °C | | |
| | Type N -200°C to -100°C | 0.14 °C | Including Cold Junction Compensation | |
| | Type N -100°C to -25°C | 0.12 °C | | |
| | Type N -25°C to +120°C | 0.11 °C | | |
| | Type N 120°C to 410°C | 0.11 °C | | |
| | Type N 410°C to 1300°C | 0.11 °C | | |
| | Type T -250°C to -150°C | 0.74 °C | Including Cold Junction Compensation | |
| | Type T -150°C to 0°C | 0.30 °C | | |
| | Type T 0°C to 120°C | 0.22 °C | | |
| | Type T 120°C to 400°C | 0.20 °C | | |
| Nobel Metal Thermocouples | Type B 600°C to 800°C | 0.59 °C | Including Cold Junction Compensation | |
| | Type B 800°C to 1000°C | 0.23 °C | | |
| | Type B 1000°C to 1550°C | 0.21 °C | | |
| | Type B 1550°C to 1820°C | 0.22 °C | | |
| | Type R 0°C to 250°C | 0.68 °C | Including Cold Junction Compensation | |
| | Type R 250°C to 400°C | 0.42 °C | | |
| | Type R 400°C to 1000°C | 0.40 °C | | |
| | Type R 1000°C to 1767°C | 0.48 °C | | |
| | Type S 0°C to 250°C | 0.56 °C | Including Cold Junction Compensation | |
| | Type S 250°C to 1000°C | 0.44 °C | | |
| | Type S 1000°C to 1400°C | 0.44 °C | | |
| | Type S 1400°C to 1767°C | 0.55 °C | | |
| | Type E -250°C to -100°C | 0.59 °C | Including Cold Junction Compensation | |
| | Type E -100°C to -25°C | 0.22 °C | | |
| | Type E -25°C to +350°C | 0.20 °C | | |
| | Type E 350°C to 650°C | 0.22 °C | | |
| | Type E 650°C to 1000°C | 0.70 °C | | |

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| **ELECTRICAL TEMPERATURE SIMULATION** (continued) | | | | P |
| Cold Junction Compensation | At ambient temperature of 21 °C ± 3 °C | 0.20 °C | | |
| Temperature Indicators and Simulators (PT100 Types) calibration by Electrical Simulation | | | | |
| PT 100 Indicators | -200°C to 0°C<br>0°C to 100°C<br>100°C to 300°C<br>300°C to 400°C<br>400°C to 630°C<br>630°C to 800°C | 0.077 °C<br>0.095 °C<br>0.12 °C<br>0.13 °C<br>0.15 °C<br>0.27 °C | | |
| PT 100 Simulators | -200 °C to 0 °C<br>0 °C to 560 °C<br>560 °C to 850 °C | 0.053 °C<br>0.050 °C<br>0.072 °C | | |

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED | | | | |
| **DIMENSIONAL MEASUREMENTS**<br><br>NOTES<br>In addition to these items, other similar items, including parts of measuring instruments and machines, may be calibrated in accordance with the stated best measurement uncertainty capability. Where the item or part calibrated is of lower quality due to wear, errors in geometry or form, or poor surface texture, or where any other factor adversely affects the measurement capability, greater uncertainties may be quoted.<br><br>All linear calibrations may be given in inch units. | | | | |
| LENGTH | | | | P |
| Plain plug gauges (parallel) | 1 to 50 diameter<br>50 to 100 diameter<br>100 to 200 diameter | 1.0 on diameter<br>1.0 on diameter<br>1.5 on diameter | Comparison to end standards using a length measuring machine | |
| Plain ring gauges (parallel) | 2 to 10 diameter<br>10 to 50 diameter<br>50 to 100 diameter<br>100 to 200 diameter | 2.0 on diameter<br>2.0 on diameter<br>2.0 on diameter<br>2.4 on diameter | Comparison to master setting rings using a length measuring machine | |
| Length gauge, flat and spherical ended (excluding length bars) | 0 to 1200 | 1.0 + (8.0 x length in m) | Comparison to end standards | |
| Plain gap gauges (parallel) | 2 to 100<br>100 to 200<br>200 to 300 | 3.0<br>5.0<br>8.0 | BS 969:2008<br>Comparison to end standards | |
| Feeler gauges | 0.020 to 1 | 2.0 | BS 957:2008<br>Comparison to end standards using a length measuring machine | |
| Paint thickness setting foils | 0.020 to 1 | 2.0 | Comparison to end standards using a length measuring machine | |
| Parallels | up to<br>5 to 50 x 100 x 400 | Dependent on size and grade<br>From 2.0 to 5.0 | BS 906:Part 1:1972<br>Comparison to datum surfaces<br>and end standards | |
| Rule – steel | 0 to 1000<br>1000 to 2000 | 5.0 + (50 x length in m)<br>10 + (50 x length in m) | BS 4372:1968<br>Using a length measuring machine with microscope | |

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED | | | | |
| **DIMENSIONAL MEASUREMENTS** (continued) | | | | P |
| Thread measuring cylinders | 0.1 to 5 | 0.5 | As BS 3777, BS 5590 and specials. Comparison to end standards using a length measuring machine | |
| Screw plug gauges (parallel) including check and setting plugs | 1 to 100 diameter<br>100 to 200 diameter | 3.0<br>5.0 | Single start symmetrical thread gauges only Comparison to cylindrical setting standards and thread measuring cylinders using a length measuring machine | |
| Screw ring gauges (parallel) | 3 to 100 diameter<br>100 to 150 diameter | 4.0<br>6.0 | Single start symmetrical thread gauges only Comparison to master setting ring using a length measuring machine and T-shape ball probe method | |
| Screw pitch | 0.2 to 8 | 1.5 | Using a length measuring machine and pitch attachment | |
| Screw flank angle | 0° to 52° | 5.0 minutes of arc | Mechanical and optical comparison | |
| ANGLE<br>NOTE The best measurement uncertainty capabilities are for the departure from flatness, straightness, or squareness, i.e. the distance separating the two parallel planes which just enclose the surface under consideration. | | | | P |
| Squares Blade type | 50 to 300<br>300 to 600 | 3.0 On squareness<br>5.0 On squareness | BS 939:2007 Comparison to cylindrical square and datum surfaces | |

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED | | | | |
| **DIMENSIONAL MEASUREMENTS** (continued) | | | | |
| MEASURING INSTRUMENTS AND MACHINES | | | | P |
| Micrometers | | | Comparison to end standards and optical parallels | |
| External | 0 to 1000 | Heads<br>2.0 between any two points | As BS 870:2008 (and above) | |
| Internal | 0 to 900 | | As BS 959:2008 | |
| Depth | 0 to 300 | Setting and extension rods<br>1.0 + (8.0 x length in m) | As BS 6468:2008 | |
| Vernier, dial and digital gauges | | | Comparison to end standards | |
| Calliper | 0 to 1200 | Overall performance<br>10 + (30 x length in m) | BS 887:2008 (and above) | |
| Height | 0 to 1000 | Overall performance<br>10 + (30 x length in m) | BS 1643:2008 | |
| Depth | 0 to 600 | Overall performance<br>10 + (30 x length in m) | BS 6365:2008 | |
| Dial gauges and dial test indicators | 0 to 50 | 1.0 | BS 907:2008 and BS 2795:1981<br>Comparison to length measuring machine and end standards | |
| Electronic indicators | | | | |
| Lever type | 0 to 5 | 1.0 | Comparison to length measuring machine and end standards | |
| Linear type | 0 to 50 | 0.7 | Comparison to length measuring machine and end standards | |

| Measured Quantity Instrument or Gauge | Range | Expanded Measurement Uncertainty ($k$ = 2) | Remarks | Location Code |
|---|---|---|---|---|
| **MASS** | | | | |
| NON-AUTOMATIC WEIGHING MACHINES Digital | 200 mg<br>500 mg<br>1 g<br>2 g<br>5 g<br>10 g<br>20 g<br>50 g<br>100 g<br>200 g<br>500 g<br>1 kg<br>2 kg<br>5 kg<br>10 kg<br>20 kg<br>50 kg<br>100 kg | 0.031 mg<br>0.038 mg<br>0.046 mg<br>0.061 mg<br>0.077 mg<br>0.09 mg<br>0.12 mg<br>0.16 mg<br>0.27 mg<br>0.54 mg<br>1.4 mg<br>2.7 mg<br>15.0 mg<br>39 mg<br>0.76 g<br>1.5 g<br>3.8 g<br>7.7 g | Note 1<br>Weights are available in OIML class:<br><br>E2 1 mg to 2 kg.<br>max grouped load 11 kg.<br><br>F1 1 kg to 5 kg.<br>Max grouped load 8 kg.<br><br>M1 5 kg to 10 kg.<br>Max grouped load 100 kg<br><br>Note 2.<br>Other loads within the overall listed range may also be used.<br><br>Note 3.Method based on the requirements of Euramet guide cg-18 | P & S |
| 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: $Q[a, b] = [a^2 + b^2]^{1/2}$