


Schedule of Accreditation

issued by

United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

| | | |
|---|---|--|
|  <p style="text-align: center;">0495</p> <p style="text-align: center;">Accredited to ISO/IEC 17025:2005</p> | <h3 style="margin: 0;">Lambda Calibration Ltd</h3> <p style="margin: 0;">Issue No:023 Issue date: 23 July 2008</p> | |
| | <p>C.B.T.C. Euxton Lane Chorley Lancashire PR7 6TE</p> | <p>Contact: Mr P Davies Tel: +44 (0)845 241 1533 Fax: +44 (0)845 241 1544 E-Mail: mail@lambda-cal.co.uk Website: www.lambda-cal.co.uk</p> |
| <p>Calibration performed by the Organisations at the locations specified below</p> | | |

Locations covered by the organisation and their relevant activities

Laboratory locations:

| Location details | Activity | Location code | | |
|--|---|-------------------------------------|---|---|
| <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Address C.B.T.C. Euxton Lane Chorley Lancashire PR7 6TE</td> <td style="width: 50%;">Local contact Mr P Davies</td> </tr> </table> | Address C.B.T.C. Euxton Lane Chorley Lancashire PR7 6TE | Local contact Mr P Davies | Dimensional Electrical Pressure Torque | A |
| Address C.B.T.C. Euxton Lane Chorley Lancashire PR7 6TE | Local contact Mr P Davies | | | |

Site activities performed away from the locations listed above:

| Location details | Activity | Location code | | |
|--|-----------------------|---------------|---------------------------|---|
| <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">At customers premises</td> <td style="width: 50%;">Mr P Davies</td> </tr> </table> | At customers premises | Mr P Davies | Dimensional Electrical | B |
| At customers premises | Mr P Davies | | | |



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DETAIL OF ACCREDITATION

| Measured Quantity Instrument or Gauge | Range | Best Measurement Capability Expressed as an Expanded Uncertainty ($k=2$) | Remarks | Location Code |
|--|--|---|--|------------------|
| RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED | | | | |
| LENGTH | | | NOTES | |
| Gauge blocks Inch (Steel and carbide) | As BS 4311:Parts 1 & 3:1993 Up to 0.4 in. Above 0.4 in. up to 1 in. Size 2 in. Size 3 in. Size 4 in. | Class (see Notes below) C D E 3 4 6 4 5 8 5 7 10 6 8 12 7 10 14 | <p>Class C uncertainties apply to the measurement of length of gauges by comparison with grade K standards of length of a similar material. Class C uncertainties apply to grade 0,1 & 2 gauges to BS EN ISO 3650:1999 and represent the best capability for all grades of used gauges to BS 4311:Part 3:1993.</p> <p>Class D and E uncertainties are the maximum applicable to the measurement of length of grade 3 and 4 gauges respectively to BS4311:Part 3:1993, by comparison with grade K standards of length of a similar material. Class D uncertainties also represent the best capability for the measurement of length of grade 3 and 4 gauges by comparison with grade K standards of length of a dissimilar material.</p> <p>1. All calibrations must be carried out in accordance with procedures agreed by UKAS.</p> | A |
| Millimetre (Steel and Carbide) | As BS 4311:Parts 1 & 3:1993 and BS EN ISO 3650:1999 Up to 10 Above 10 up to 25 Sizes 30, 40, 50 60, 70, 75 80, 90, 100 | 0.08 0.10 0.15 0.1 0.13 0.20 0.12 0.17 0.25 0.15 0.21 0.30 0.18 0.25 0.35 | | A |
| Gauge block accessories | As BS 4311:Part 2:1993 | 0.3 | | A |
| Length gauges, flat and spherical ended (excluding Length Bars) | Up to 1 m | 1 + (5 x length m) | | A |
| Plain plug gauges parallel, cylindrical setting standards and rollers. | From 1 up to 50 diameter above 50 up to 100 Above 100 up to 300 | 0.8 1 1.5 | | A |
| Plain ring gauges (parallel) | From 2 up to 10 diameter Above 10 up to 50 Above 50 up to 100 Above 100 up to 300 | 1 0.8 1.0 2.5 | | A |
| Precision balls (steel, carbide, ceramic) | From 1 up to 70 diameter | 0.8 | | A |
| Feeler gauges | As BS 957:Part 1:1959 and BS 957:Part 2:1969 | 1 | | A |
| Gap gauges (Plain parallel) | As BS 969:1982 From 2 up to 100 Above 100 up to 200 Above 200 up to 300 | 3 5 8 | | A |
| Paint thickness setting foils | Up to 8 | 1.0 | | A |
| Rule - steel | Up to 1000 to BS 4372:1968 | 5 + (10 x length in m) | A | |



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| RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED | | | | |
| SCREW THREAD GAUGES | | | NOTES (cont'd) | |
| Screw plug gauges (parallel) including check and setting plugs See Note 4 Screw ring gauges (parallel) See Note 4 | From 1 to 100 diameter Above 100 up to 150 diameter From 1 mn up to 75 diameter Above 75 up to 150 diameter | 3 on pitch 5 diameter 5 on pitch 7 diameter pitch: 1.5 flank angle: $(2 + (800 (M \times P)))$ Where M is projector magnification and P is pitch in mm | 2. In addition to all items other similar items, including parts of measuring instruments and machines, may be calibrated (see Note 1) to the uncertainties stated. Where the item or part calibrated is of lower quality due to wear, errors in geometry or from, poor surface texture, or where any other factor adversely affects the measurement capability, greater uncertainties must be quoted. | A |
| Screw thread adjustable caliper gauges (parallel) See Note 4 | From 1 up to 150 diameter | By setting plugs | | A |
| Thread measuring cylinders | As BS 5590:1978 and specials | 0.5 | | A |
| Parallels | As BS 906:Parts 1 & 2:1992 up to 50 x 100 x 400 | Dependent on size and grade From 1.5 up to 5 | 3. The uncertainty quoted is for the departure from flatness, straightness, parallelism or squareness, i.e. the distance separating the two parallel planes which just enclose the surface under consideration | A |
| Vee blocks | As BS 3731:1987 up to 200 | Dependent on size and grade From 2.5 up to 5 | | A |
| Receiver and position gauges, jigs, fixtures | 600 x 600 x 600 | Dependent on size and features measured | | A |
| Thread vee groove jaw blades | Down to 0.6 (40 T.P.I.) | 3 | 4. Single start, symmetrical thread forms only. | A |
| ANGLE | | | | |
| Squares | | | 5. The uncertainty quoted is for the application of the calibration torque and does not take into account the characteristics of the device being calibrated. | A |
| Blade type | As BS 939:1977 up to 300 Above 300 up to 600 | 3 5 | | A |
| Cylindrical | As BS 939:1977 up to 300 Above 300 up to 600 | 3 4 | On squareness see Note 3 | A |
| Block | As BS 939:1977 up to 300 Above 300 up to 600 | 3 5 | 6. Calibrations may also be given in lbf.in and lbf.ft | A |
| Right angle and box angle plates | As BS 5535:1978 | Squareness: 3 + 1 per 100 mm Parallelism: 1 + 1 per 100 mm See Note 3 | | A |



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| RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED | | | | |
| ANGLE (cont'd) | | | | |
| Sine bars and tables | As BS 3064:1978 and up to 500 length | Linear dimensions $1 + (10 \times \text{length in m})$ Overall performance 3 seconds of arc | | A |
| Clinometers | Up to 360° | 10 seconds of arc or greater Dependant on sensitivity | | A |
| MEASURING INSTRUMENTS | | | | |
| Micrometers | | | | |
| External Internal Depth | As BS 870:1959 As BS 959:1959 As BS 6468:1984 | Heads 2.0 Setting and extension rods $1 + (5 \times \text{length in m})$ | | A |
| Micrometer, 3 point bore | From 6 up to 250 | $3 + (12 \times \text{length in m})$ | | A |
| Micrometer Heads | As BS 1734:1951 | 1.0 | | A |
| Height setting micrometer | Up to 300 | Heads 1.5 between any two points Stepped column 2.5 Overall performance 3.0 | | A |
| Riser blocks for above | 150 300 | 2.5 5 | | A |
| Vernier caliper, height and depth gauges | As BS 887:1982 and BS 1643:1983 up to 1.2 m | Overall performance $10 + (30 \times \text{length in m})$ | | A |
| Bevel protractors | As BS 1685:1959 | 1 min of arc + 1 vernier division | | A |
| Dial gauges and dial test indicators | As BS 907:1965 and BS 2795:1981 | 1.0 | | A |
| Height gauges (digital and electronic) | Up to 1000 | $2 + (10 \times \text{length in m})$ | | A |
| FORM | | | | |
| Surface plates | | | | |
| Granite Cast Iron | BS 817:1988 | $1.5 + (1.0 \times \text{diagonal in m})$ | | A,B |



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| ELECTRICAL MEASUREMENT | | | Published uncertainties apply for an environment of 18°C to 28°C. Measurements can take place outside these limits but at increased uncertainties. | |
| RESISTANCE | Up to 20 Ω 20 Ω to 200 Ω 200 Ω to 2 k Ω 2 k Ω to 20 k Ω 20 k Ω to 200 k Ω 200 k Ω to 2 M Ω 2 M Ω to 20 M Ω 20 M Ω to 200 M Ω 200 M Ω to 2 G Ω | 23 ppm + 21 $\mu\Omega$ 15 ppm + 68 $\mu\Omega$ 12 ppm + 700 $\mu\Omega$ 12 ppm + 7 m Ω 14 ppm + 70 m Ω 26 ppm + 1.5 Ω 46 ppm + 4 Ω 360 ppm + 10 k Ω 0.36% + 900 k Ω | | A & B |
| AC RESISTANCE | 0.5 Ω to 2 k Ω 50 Hz | 0.65% | | A & B |
| DC VOLTS | Up to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1050 V | 10.4 ppm + 62 nV 7.5 ppm + 482 nV 7.4 ppm + 2 μ V 12 ppm + 86 μ V 12 ppm + 256 μ V | | A & B |
| DC CURRENT | 1 kV to 10 kV | 0.5% | | |
| DC CURRENT | Up to 200 μ A 200 μ A to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 1 A 1 A to 10 A 10 A to 1 kA | 120 ppm + 0.5 nA 117 ppm + 5 nA 117 ppm + 48 nA 118 ppm + 1.2 μ A 234 ppm + 11 μ A 168 ppm + 13 μ A 356 ppm + 1.3 mA | | A & B |
| DC CURRENT Generation only | 3.2 A to 105 A 105 A to 200 A 16 A to 160 A 160 A to 525 A 525 A to 1 KA | 0.07% + 11 mA 0.07% + 50 mA 0.07% + 7 mA 0.07% +55 mA 0.07% + 250 mA | Suitable for Clamp Meters Using 10 turn coil Using 10 turn coil Using 50 turn coil Using 50 turn coil Using 50 turn coil | A & B |
| AC VOLTAGE | Up to 200 mV 20 Hz to 40 Hz 40 Hz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz | 300 ppm + 14 μ V 281 ppm + 2 μ V 363 ppm + 5 μ V 720 ppm + 20 μ V | | A & B |
| | 200 mV to 2 V 20 Hz to 40 Hz 40 Hz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz | 210 ppm + 120 μ V 164 ppm + 11 μ V 240 ppm + 30 μ V 496 ppm + 100 μ V | | A & B |



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| ELECTRICAL MEASUREMENT (cont'd) | | | | |
| AC VOLTAGE (cont'd) | 2 V to 20 V 20 Hz to 40 Hz 40 Hz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz | 210 ppm + 1.2 mV 164 ppm + 0.1 mV 239 ppm + 0.3 mV 496 ppm + 1.0 mV | | A & B |
| | 20 V to 200 V 20 Hz to 40 Hz 40 Hz to 10 kHz 10 kHz to 30 kHz 30 kHz to 100 kHz | 212 ppm + 13 mV 168 ppm + 1.6 mV 240 ppm + 4 mV 525 ppm + 11 mV | | |
| | 200 V to 1050 V 20 Hz to 40 Hz 40 Hz to 10 kHz 10 kHz to 30 kHz | 212 ppm + 71 mV 168 ppm + 51 mV 340 ppm + 152 mV | | |
| | 1 kV to 10 kV @ 50 Hz | 2.2% | | |
| AC CURRENT | Up to 200 μ A 10 Hz to 1 kHz 1 kHz to 5 kHz | 378 ppm + 21 nA 693 ppm + 21 nA | | A & B |
| | 200 μ A to 2 mA 10 Hz to 1 kHz 1 kHz to 5 kHz | 378 ppm + 210 nA 693 ppm + 210 nA | | |
| | 2 mA to 20 mA 10 Hz to 1 kHz 1 kHz to 5 kHz | 361 ppm + 2.1 μ A 693 ppm + 2.1 μ A | | |
| | 20 mA to 200 mA 10 Hz to 1 kHz 1 kHz to 5 kHz | 378 ppm + 21 μ A 693 ppm + 21 μ A | | |
| | 200 mA to 1 A 10 Hz to 1 kHz 40 Hz to 3 kHz 3 kHz to 5 kHz | 755 ppm + 209 μ A 0.12% 0.15% | | |
| | 1 A to 10 A 40 Hz to 3 kHz 3 kHz to 5 kHz | 0.16% 0.27% | | |



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| ELECTRICAL MEASUREMENT (cont'd) | | | | |
| AC CURRENT Generation only | 3.2 A to 32 A (10 to 100 Hz) 32 A to 200 A (10 to 100 Hz) 3.2 A to 32 A (100 to 440 Hz) 32 A to 200 A (100 to 440 Hz) 16 A to 160 A (10 to 100 Hz) 160 A to 1 kA (10 to 100 Hz) | 0.33% + 6 mA 0.33% + 104 mA 0.93% + 31 mA 0.81% + 288 mA 0.33% + 323 mA 0.33% + 519 mA | Suitable for Clamp Meters Using 10 turn coil Using 10 turn coil Using 10 turn coil Using 10 turn coil Using 50 turn coil Using 50 turn coil | A & B |
| ELECTRICAL SIMULATION OF THERMOCOUPLES | | | | |
| Type: B C E J K K L N R S T T | +500 °C to +1820 °C + 0 °C to +2320 °C -250 °C to +1000 °C -210 °C to +1200 °C -200 °C to -250 °C -200 °C to +1372 °C -200 °C to +900 °C -200 °C to +1300 °C + 0 °C to +1767 °C + 0 °C to +1767 °C -250 °C to -200 °C -200 °C to +400 °C | 0.56 °C 0.42 °C 0.46 °C 0.27 °C 0.58 °C 0.29 °C 0.28 °C 0.34 °C 0.53 °C 0.50 °C 0.60 °C 0.29 °C | | A & B |
| CAPACITANCE Generation only | Up to 350 Hz 0.5 nF to 4 nF 4 nF to 40 nF 40 nF to 400 nF 400 nF to 4 µF 4 µF to 40 µF 40 µF to 400 µF 400 µF to 4 mF 4 mF to 40 mF 350 Hz to 1.5 Hz 0.5 nF to 4 nF 4 nF to 40 nF 40 nF to 400 nF 400 nF to 4 µF 4 µF to 40 µF 40 µF to 400 µF 400 µF to 4 mF 4 mF to 40 mF | 0.35% + 18 pF 0.35% + 35 pF 0.35% + 185 pF 0.47% + 2 nF 0.57% + 19 nF 0.58% + 185 nF 0.58% + 2 µF 1.16% + 69 µF 0.70% +35 pF 0.70% + 69 pF 0.70% + 370 pF 0.93% + 3 nF 1.16% + 37 nF 1.16% + 370 nF 1.16% + 4 µF 2.31% +139 µF | Suitable for the testing of capacitance measuring devices | A & B |



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| ELECTRICAL MEASUREMENT (cont'd) | | | | |
| BANDWIDTH | 3 dB point with respect to set point 10 Hz to 50 kHz 50 kHz to 100 MHz 100 MHz to 250 MHz | 0.6% 2.4 % 5.2% | Appropriate for calibration of oscilloscopes | A & B |
| FREQUENCY | 2 Hz to 250 MHz | 2 in 10^9 | May be expressed as time (1/f) for repetitive measurements | A |
| FREQUENCY Generation only | 0.2 Hz to 250 MHz | 0.29 ppm | May be expressed as time (1/f) for repetitive measurements | A & B |
| TIME Electronically Triggered | | | | |
| Interval/Period Average | 25 ns to 10 s | 2 in 10^9 + (100 ns/No of periods) | Actual uncertainties quoted on certificate will include an allowance for the characteristics of the measured signal | A & B |
| Time Interval (A-A Event) | 100 ns to 10^9 s | 2 in 10^9 + 100 ns | | A & B |
| Time Interval (A-B Event) | 100 ns to 10^9 s | 2 in 10^9 + 100 ns | | |
| Time Interval | 0.1 ms to 10 s | 1.8 % | Appropriate for the calibration of RCD testers | A & B |
| TIME Mechanically Triggered | over 1 second | 50 ms | | A & B |
| TORQUE | | | | |
| Hand torque tools (including drivers) | To BS EN ISO 6789:2003 0.2 N.m to 1000 N.m | 1.5 % See Notes 5 & 6 | | A |
| PRESSURE | | | | |
| <u>Hydraulic pressure (gauge)</u> | | | | |
| Calibration of pressure indicating instruments and gauges | 500 kPa to 7 MPa 7 MPa to 110 MPa 110 MPa to 400 MPa | 0.025% 0.02% 0.02% | Calibration of devices with an electrical output may be undertaken | A |
| Calibration of Piezoelectric pressure transducers at quasi- static pressures | 500 kPa to 7 MPa 10 MPa to 400 MPa | 0.35% 0.35% | Calibration of devices with a charge output may be undertaken | A |



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| <u>Gas pressure (gauge)</u> Calibration of pressure indicating instruments and gauges | -95 kPa to -9.8 kPa -9.8 kPa to 7 kPa 7 kPa to 2 MPa | 100 Pa 25 Pa 0.02% | Absolute pressure calibrations can be undertaken using associated barometric pressure measurement correction. The uncertainties quoted will be increased by 100 Pa. | A |
| <u>Gas pressure (absolute)</u> Calibration of pressure indicating instruments and gauges | 200 Pa to 200 kPa | 100 Pa | | A |
| END | | | | |