


Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

 <p>UKAS CALIBRATION</p> <p>0436</p> <p>Accredited to ISO/IEC 17025:2005</p>	<p>Littlebrook Calibration Services Ltd</p> <p>Issue No: 054 Issue date: 26 April 2010</p>	
	<p>5 Optima Park Thomas Road (off Thames Road) Crayford DA1 4QX</p>	<p>Contact: Mr E A Thompson Tel: +44 (0)1322 556111 Fax: +44 (0)1322 520400 E-Mail: lcmdirector@17025calibrations.com Website: www.17025calibrations.com</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
<p>Address 5 Optima Park Thomas Road (off Thames Road) Crayford DA1 4QX</p> <p>Local contact Mr E A Thompson</p>	<p>Pressure Electrical Temperature Air velocity Humidity Air flow</p>	Lab

Site activities performed away from the locations listed above:

Location details	Activity	Location code
<p>The customer's site or premises must be suitable for the nature of the particular calibrations undertaken and will be the subject of contract review arrangements between the laboratory and the customer</p> <p>Contact: Mr E A Thompson</p>	<p>Calibration of wind tunnels, fans and similar systems</p>	Site



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DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty ($k = 2$)	Remarks	Location Code
DC VOLTAGE				LAB
Generation	0 V to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1000 V	9.1 ppm + 0.50 μ V 3.2 ppm + 0.20 μ V 1.6 ppm + 4.6 μ V 5.8 ppm 3.8 ppm		
Measurement	0 V to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	9.5 ppm + 0.60 μ V 4.7 ppm + 0.70 μ V 1.7 ppm + 4.6 μ V 6.1 ppm + 58 μ V 5.4 ppm + 1.2 mV		
DC CURRENT				LAB
Generation	20 μ A to 200 μ A 200 μ A to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 10 A	29 ppm + 1.5 nA 11 ppm + 1.9 nA 19 ppm + 79 nA 15 ppm + 0.97 μ A 26 ppm + 21 μ A 88 ppm + 510 μ A		
Specific Values	100 mA 500 mA 1 A 5 A 10 A	17 ppm 46 ppm 30 ppm 44 ppm 43 ppm		
Measurement	20 μ A to 200 μ A 200 μ A to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A	27 ppm + 1.2 nA 40 ppm + 12 nA 27 ppm + 20 nA 132 ppm + 0.18 μ A 94 ppm + 1.4 μ A		
DC RESISTANCE				LAB
Specific values	1 Ω 10 Ω 25 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω 1 G Ω 10 G Ω 100 G Ω	0.35 ppm 0.35 ppm 0.35 ppm 0.35 ppm 0.77 ppm 0.65 ppm 4.0 ppm 9.0 ppm 10 ppm 55 ppm 110 ppm 185 ppm 335 ppm	Intermediate values may be calibrated at increased uncertainties.	



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DC RESISTANCE (cont'd)				
Other values	0 Ω to 100 $\mu\Omega$ 100 $\mu\Omega$ to 1 m Ω 1 m Ω to 10 m Ω 10 m Ω to 100 m Ω 100 m Ω to 1 Ω	6.5 n Ω 62 ppm 56 ppm 51 ppm 60 ppm	Current carrying resistors	
	1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 k Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω	60 ppm 35 ppm 15 ppm 15 ppm 15 ppm	Minimal power resistors	
	100 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω 100 M Ω to 1 G Ω 1 G Ω to 10 G Ω	100 ppm 210 ppm 250 ppm 580 ppm 750 ppm	Coaxial resistors above 100 M Ω	
	10 G Ω to 100 G Ω 100 G Ω to 1 T Ω	0.18 % 0.72 %		
AC RESISTANCE				LAB
Specific Values (Shunts)	45 Hz to 55 Hz and 125 Hz to 135 Hz 0.01 Ω , 0.02 Ω , 0.05 Ω , 0.1 Ω , 0.2 Ω , 0.5 Ω , 1 Ω , 5 Ω and 10 Ω	0.070 %	Up to 20 Amperes	
Other Values (Shunts)	At 60 Hz 0.5 m Ω to 5 m Ω	280 ppm	Up to 10 Amperes	
Specific Value (Precision)	At 75 Hz: 10 Ω , 25 Ω , 100 Ω and 1 k Ω	3.0 ppm		
Other Values	At 75 Hz: 10 Ω to 1 k Ω	4.7 ppm		
AC VOLTAGE				LAB
Specific values	At 1 kHz: 10 mV 10 V 100 V	270 ppm 36 ppm 34 ppm		



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AC VOLTAGE (continued)	<p><i>40 Hz to 1 kHz:</i> 10 mV to 22 mV 22 mV to 220 mV 220 mV to 2.2 V 2.2 V to 22 V 22 V to 220 V 220 V to 1.1 kV</p> <p><i>1 kHz to 40 kHz:</i> 10 mV to 22 mV 22 mV to 220 mV 220 mV to 2.2 V 2.2 V to 22 V 22 V to 220 V 220 V to 1.1 kV</p> <p><i>40 kHz to 50 kHz:</i> 10 mV to 22 mV 22 mV to 220 mV 220 mV to 2.2 V 2.2 V to 22 V 22 V to 220 V 220 V to 1.1 kV</p> <p><i>50 kHz to 100 kHz:</i> 10 mV to 22 mV 22 mV to 220 mV 220 mV to 2.2 V 2.2 V to 22 V 22 V to 219 V</p>	<p>260 ppm + 7.0 μV 140 ppm + 12 μV 60 ppm 50 ppm 66 ppm 170 ppm</p> <p>530 ppm + 7.0 μV 180 ppm + 12 μV 88 ppm 65 ppm 70 ppm 290 ppm</p> <p>1100 ppm + 7.0 μV 920 ppm + 12 μV 280 ppm 220 ppm 280 ppm 460 ppm</p> <p>980 ppm + 10 μV 470 ppm + 35 μV 650 ppm 280 ppm 840 ppm</p>		LAB
AC CURRENT	<p>50 μA to 100 μA <i>40 Hz to 1 kHz</i> 100 μA to 1 mA <i>40 Hz to 1 kHz</i> 1 mA to 10 mA <i>40 Hz to 1 kHz</i> 10 mA to 100 mA <i>40 Hz to 1 kHz</i> 100 mA to 1 A <i>40 Hz to 1 kHz</i> 1 A to 10 A <i>40 Hz to 1 kHz</i></p>	<p>110 ppm + 35 nA 69 ppm + 48 nA 32 ppm + 470 nA 47 ppm + 4.7 μA 100 ppm + 48 μA 200 ppm + 240 μA</p>		LAB
TIME INTERVAL	<p>1 ms to 40 ms 40 ms to 400 ms 400 ms to 4 s 4 s to 10 s</p>	<p>0.020 ms 0.20 ms 2.0 ms 20 ms</p>	For the calibration of RCD testers and stopwatches.	LAB



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FREQUENCY				LAB
Measurement	0 Hz to 10 Hz 10 Hz to 120 MHz	10 nHz 5.0 in 10^9		
Generation	0 Hz to 1 MHz	1.0 in 10^6		
RPM	60 rpm to 6000 rpm	15 in $10^5 + 1$ LSD		LAB
Temperature indicators, calibration by electrical simulation				
Base metal thermocouples	- 200 °C to 1370 °C - 200 °C to 1370 °C	0.060 °C 0.22 °C	excluding cold junction compensation including cold junction compensation	LAB
Resistance thermometers (Pt 100)	- 200 °C to 100 °C 100 °C to 320 °C 320 °C to 650 °C 650 °C to 800 °C	0.0050 °C 0.0090 °C 0.016 °C 0.019 °C		
Specific value Normal method	0 °C	0.090 m°C		
Base metal thermocouples	- 200 °C to 1370 °C - 200 °C to 1370 °C	0.030 °C 0.22 °C	excluding cold junction compensation including cold junction compensation	LAB
Resistance thermometers (Pt 100)	- 200 °C to 100 °C 100 °C to 320 °C 320 °C to 650 °C 650 °C to 800 °C	0.0050 °C 0.0090 °C 0.016 °C 0.019 °C		
Specific value Normal method	0 °C	0.0030 °C		LAB



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PRESSURE			Calibrations of pressure measuring devices with an electrical output may be undertaken	LAB
<u>Gas pressure (absolute)</u>				LAB
Calibration of pressure indicating instruments and gauges	500 Pa to 135 kPa 135 kPa to 7.1 MPa	0.0085 % + 5.0 Pa 0.0070 % + 2.5 Pa	Gas absolute instruments maybe zeroed to an uncertainty of 10 Pa	
<u>Gas pressure (gauge)</u>				LAB
Calibration of pressure indicating instruments and gauges "Pressure equivalent" Calibration of dead weight testers (Pressure balance supplied with associated mass set)	- 100 kPa to 0 Pa 0 Pa to 20 Pa 20 Pa to 16 kPa 16 kPa to 350 kPa 350 kPa to 7 MPa	0.012 % + 3.0 Pa 0.15 % + 0.25 Pa 0.020 % + 0.13 Pa 0.0085 % + 3.5 Pa 0.0075 % + 0.30 Pa		
<u>Hydraulic pressure (gauge)</u>				LAB
Calibration of pressure indicating instruments and gauges	600 kPa to 70 MPa	0.0075 % + 10 Pa		
<u>Hydraulic pressure (absolute)</u>				LAB
Calibration of pressure indicating instruments and gauges	700 kPa to 70.1 MPa	0.0075 % + 10 Pa		
AIR VELOCITY				LAB
Air velocity measurement against a laser Doppler anemometer, Calibration of wind tunnels, fans and similar systems	0.05 m/s to 75 m/s	0.35 % + 0.0065 m/s	Uncertainties quoted will depend on the performance of the device under test	LAB and SITE
Calibration of Anemometers and Pitot Tubes against a laser Doppler anemometer	0.05 m/s to 50 m/s	0.60 % + 0.015 m/s		LAB
Calibration of Anemometers and Pitot Tubes against differential pressure systems	0.2 m/s to 8 m/s 8 m/s to 30 m/s	0.90 % + 0.040 m/s 0.80 % + 0.080 m/s		LAB



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FLOW Volume flow - air Calibration of Fans	1000 l/min to 40000 l/min 0.5 m ³ /min to 600 m ³ /s	3.0 % 3.0 %	Uncertainty achieved will depend on size of fan	LAB
TEMPERATURE Calibration at fixed points Quartz sheathed platinum resistance thermometers				
TP Mercury TP Water MP Gallium FP Indium FP Tin FP Zinc FP Aluminium	- 38.8344 °C 0.01 °C 29.7646 °C 156.5985 °C 231.928 °C 419.527 °C 660.323 °C	3.0 mK 2.0 mK 3.0 mK 4.0 mK 5.0 mK 6.0 mK 20 mK	TP = Triple Point FP = Freezing Point MP = Melting Point	LAB
Metal sheathed platinum resistance thermometers				
TP Mercury TP Water MP Gallium FP Indium FP Tin FP Zinc FP Aluminium	- 38.8344 °C 0.01 °C 29.7646 °C 156.5985 °C 231.928 °C 419.527 °C 660.323 °C	10 mK 8.0 mK 10 mK 13 mK 17 mK 22 mK 47 mK		
Calibration by comparison				
Platinum resistance thermometers and electronic thermometers with sensors	- 90 °C to - 40 °C - 40 °C to 0 °C 0 °C to 100 °C 100 °C to 155 °C 155 °C to 320 °C 320 °C to 650 °C	0.050 °C 0.025 °C to 0.021 °C 0.019 °C 0.019 °C to 0.025 °C 0.090 °C 0.14 °C	Includes thermometers built in to other measuring instruments	LAB
Thermocouples, base metal	- 90 °C to 650 °C	0.50 °C		
Calibration in air chamber	0 °C to 90 °C	0.40 °C to 0.60 °C		
Calibration in fluidised powder bath	50 °C to 300 °C	0.50 °C		



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Metal block calibrators and portable liquid baths	-90 °C to -39 °C -39 °C to 156 °C 156 °C to 232 °C 232 °C to 420 °C 420 °C to 660 °C	0.050 °C 0.030 °C 0.040 °C 0.060 °C 0.090 °C		
HUMIDITY Relative humidity instruments	10 %rh 35 %rh 50 %rh 65 %rh 75 %rh 80 %rh	1.4 %rh 1.9 %rh 2.0 %rh 2.2 %rh 2.2 %rh 2.3 %rh	At a temperature of 23 °C ± 2.0 °C	LAB
END				