


Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

 <p>0389</p> <p>Accredited to ISO/IEC 17025:2005</p>	<h3>Barrow Calibration Centre</h3> <p>Issue No: 028 Issue date: 26 February 2010</p>	
	<p>Building B05, Cavendish Park BAE SYSTEMS Marine Limited Barrow-in-Furness Cumbria LA14 1AF</p>	<p>Contact: MrP Lindley Tel: +44 (0)1229-873820 - 875432 - 875024 Fax: +44 (0)1229-875905 E-Mail: calibration.lab@baesystems.com Website: www.baesystems.com</p>
<p>Calibration performed at the above address only</p>		

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Best Measurement Capability Expressed as an Expanded Uncertainty ($k=2$)	Remarks
PRESSURE			
<u>Hydraulic pressure (gauge)</u>			
Determination of effective area of Dead Weight Testers	0.5 MPa to 111 MPa	0.008 %	
"Pressure equivalent" calibration of Dead Weight Testers (pressure balances supplied with an associated mass set) Calibration of pressure indicating instruments and gauges	0.5 MPa to 111 MPa 111 MPa to 420 MPa	0.008 % 0.01 % + 0.4 ppm/MPa	
<u>Gas pressure (gauge)</u>			
Determination of effective area of Dead Weight Testers "Pressure equivalent" calibration of Dead Weight Testers (pressure balances supplied with an associated mass set)	3.5 kPa to 700 kPa 700 kPa to 7 MPa	0.004 % 0.005 %	
Calibration of pressure indicating instruments and gauges	-90 kPa to 3.5 kPa 3.5 kPa to 700 kPa 700 kPa to 7 MPa 7 MPa to 70 MPa	34 Pa 0.004 % 0.005 % 0.17 %	
<u>Gas pressure (absolute)</u>			
Calibration of pressure indicating instruments and gauges. "Pressure equivalent" calibration of Dead Weight Testers (pressure balance supplied with an associated mass set)	3.5 kPa to 700 kPa 700 kPa to 7 MPa	0.004 % + 3.2 Pa 0.005 % + 3.2 Pa	



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TEMPERATURE			
Resistance thermometers	-30 °C to 0 °C	0.02 °C	Calibration by comparison
	0 °C to 80 °C	0.02 °C	
	80 °C to 250 °C	0.02 °C	
	250 °C to 550 °C	0.03 °C	
Thermocouples Base Metal	-30 °C to 0 °C	0.05 °C	
	0 °C to 80 °C	0.05 °C	
	80 °C to 250 °C	0.07 °C	
	250 °C to 550 °C	0.07 °C	
Liquid-in-glass thermometers	-30 °C to 0 °C	0.02 °C	+ 1/10 scale division
	0 °C to 80 °C	0.02 °C	
	80 °C to 250 °C	0.02 °C	
Electronic thermometers with sensors Analogue Digital	Range as per sensors	As for sensors plus	
		Half scale division	
		One least significant digit	
MASS			
<u>Weights and Artefacts</u>	Nominal value g	mg	Intermediate values can be calibrated but at an appropriate uncertainty which may exceed the value interpolated from the next highest and lowest values.
	0.001	0.015	
	0.002	0.015	
	0.005	0.015	
	0.01	0.020	
	0.02	0.025	
	0.05	0.030	
	0.1	0.035	
	0.2	0.040	
	0.5	0.05	
	1	0.06	
	2	0.08	
	5	0.10	
	10	0.12	
	20	0.16	
	50	0.2	
	100	0.3	
	200	0.6	
	500	1.5	
	1000	3	
	2000	6	
	5000	15	
	10 000	30	
	20 000	60	
	25 000	200	
	30 000	200	



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ELECTRICAL			
DC RESISTANCE			
Specific Values	1 m Ω , 10 m Ω 0.1 Ω , 1 Ω , 10 Ω 100 Ω , 1 k Ω , 10 k Ω	4.8 ppm 0.6 ppm	
	100 k Ω 1 M Ω 10 M Ω 100 M Ω 1 G Ω	1.0 ppm 2.1 ppm 4.4 ppm 7.2 ppm 45 ppm	
	10 $\mu\Omega$ to 1 m Ω 1 m Ω to 100 m Ω 100 m Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 10 k Ω 10 k Ω to 100 M Ω	250 ppm 5 ppm 3.8 ppm 0.8 ppm 0.7 ppm 0.8 ppm 12 ppm	Resistors suitable for oil immersion can be calibrated at specified temperatures from 18 °C to 26 °C Resistors suitable for high current can be calibrated at test currents up to 100 A
DC VOLTAGE			
Standard Cell Values	1.018 V	0.92 ppm	
Other Values	0.1 V 1 V 10 V 100 V 1000 V	7.5 ppm 0.92 ppm 0.19 ppm 2.3 ppm 3.0 ppm	
Range Values	Up to 1 mV 1 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 1100 V 1 kV to 5 kV 5 kV to 20 kV	0.6 % + 0.1 μ V 4 ppm + 1.2 μ V 4 ppm + 1.2 μ V 4 ppm + 1.2 μ V 5 ppm 10 ppm 1.1 % 0.4 %	
Values for Temperature simulation			
Measurement	-10 mV to 120 mV	1.84 μ V	
Sourcing	-10 mV to 120 mV	1.78 μ V	
DC CURRENT			
	1 μ A to 10 μ A 10 μ A to 1 A 1 A to 10 A 10 A to 100 A	35 ppm 20 ppm 25 ppm 27 ppm	
AC RESISTANCE			
	100 m Ω to 1 k Ω 40 Hz to 1 kHz	10 ppm	



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AC VOLTAGE			
Specific Values	0.3 V 10 Hz, 20 Hz, 40 Hz, 300 Hz, 1 kHz, 10 kHz and 20 kHz	30 ppm	Appropriate to the calibration of voltage measuring and sourcing equipment
	0.3 V 50 kHz and 100 kHz	50 ppm	
	0.3 V 300 kHz, 500 kHz and 1 MHz	0.075 %	
	1 V, 3 V, 10 V and 100 V 10 Hz, 20 Hz, 40 Hz, 300 Hz, 1 kHz, 10 kHz and 20 kHz	25 ppm	
	30 V 10 Hz, 300 Hz, 1 kHz, 10 kHz and 20 kHz	25 ppm	
	1 V, 3 V, 10 V and 100 V 50 kHz and 100 kHz	50 ppm	
	1 V and 10 V 300 kHz, 500 kHz and 1 MHz	0.071 %	Appropriate to the calibration of voltage measuring and sourcing equipment
	3 V 500 kHz and 1 MHz	0.071 %	
	300 V and 1000 V 10 Hz, 20 Hz, 40 Hz, 300 Hz, 1 kHz, 10 kHz and 20 kHz	31 ppm	
	300 V 50 kHz and 100 kHz	60 ppm	
	700 V 20 kHz, 50 kHz and 100 kHz	0.075 %	
Other values	1 mV to 10 mV 50 Hz to 5 kHz	0.13 %	Appropriate to the calibration of voltage measuring and sourcing equipment
	1 mV to 10 mV 5 kHz to 20 kHz	1.1 %	
	10 mV to 31 mV 50 Hz to 5 kHz	0.017 %	
	10 mV to 31 mV 5 kHz to 20 kHz	0.11 %	



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AC VOLTAGE (cont'd)			
Other values (cont'd)	0.03 V to 0.1 V 10 Hz to 20 kHz 20 kHz to 100 kHz 100 kHz to 1 MHz	42 ppm 100 ppm 0.11 %	Appropriate to the calibration of voltage measuring and sourcing equipment
	0.1 V to 30 V 10 Hz to 20 kHz 20 kHz to 100 kHz	44 ppm 97 ppm	
	0.1 V to 10 V 100 kHz to 1 MHz	0.11 %	
	30 V to 340 V 10 Hz to 20 kHz 20 kHz to 100 kHz	52 ppm 150 ppm	
	340 V to 1100 V 10 Hz to 20 kHz	58 ppm	
	340 V to 700 V 20 kHz to 100 kHz	0.075 %	
AC CURRENT	100 μ a TO 400 mA 40 Hz to 1 kHz	133 ppm	
	400 mA to 10 A 40 Hz to 1 kHz	186 ppm	
CAPACITANCE	10 pF to 1 μ f @ 1 kHz	130 ppm	
FREQUENCY MEASUREMENT	0.001 Hz to 0.01 Hz 0.01 Hz to 100 kHz 100 kHz to 500 MHz	0.35 % 2 in 10^{11} + 35 μ Hz 3 to 5 parts in 10^{11}	
Spot Values	10 MHz 5 MHz 1 MHz	1.5 parts in 10^{12} 1.5 parts in 10^{12} 1.5 parts in 10^{12}	Suitable for calibration of frequency standards
TIME INTERVAL	5 ms to 55 ms	0.34 %	
TEMPERATURE SIMULATION			
Type k thermocouples	-100 °C to 0 °C	0.132 °C	Devices fitted with an internal cold junction.
	0 °C to 1370 °C	0.124 °C	
PT 100	0 °C	0.028 °C	
END			