Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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

0785

Accredited to ISO/IEC 17025:2017

Trescal Limited

Issue No: 036 **Issue date:** 29 September 2023

Saxony Way
Blackbushe Business Park
Yateley
Hampshire
GU46 6GT

Contact: Mr Matt Gypps
Tel: + 44 (0)1438 212500
E-Mail: ukcal@trescal.com
Website: www.trescal.com

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 Trescal EMS - Collins Aerospace Stafford Road Fordhouses Wolverhampton West Midlands WV10 7EH	**Local contact** Brett Morris Tel +44 (0) 1902 624 644 Email: brett.morris@trescal.com	Capabilities: Electrical DC and LF Dimensional Temperature simulation	Wolverhampton
Address Trescal EMS - BAE Systems Warton Aerodrome Lytham Road Preston Lancashire PR4 1AX	**Local contact** Damion Potts Tel +44 (0) 161 406 7878 Email: damion.potts@trescal.com	Capabilities: Dimensional	Warton
Address Trescal EMS - Airbus Broughton Building 10 Chester Road Broughton CH4 0DR	**Local contact** Damion Potts Tel +44 (0) 161 406 7878 **Email: damion.potts@trescal.com**	Capabilities: Dimensional	Broughton

Site activities performed away from the locations listed above:

The 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.	**Local contact** Brett Morris Tel: +44 (0) 1902 624 644 Email: brett.morris@trescal.com	Temperature Electrical (Timers)	Site

Schedule of Accreditation
issued by
United Kingdom Accreditation Service
2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

0785

Accredited to ISO/IEC 17025:2017

Trescal Limited

Issue No: 036 **Issue date:** 29 September 2023

Calibration performed by the Organisation at the locations specified

Calibration and Measurement Capability (CMC)

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
ELECTRICAL MEASUREMENTS			Electrical Calibrations are performed as a comparison against a reference standard unless otherwise stated	Wolverhampton
DC RESISTANCE Measurement	0 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 200 kΩ 200 kΩ to 2 MΩ 2 MΩ to 20 MΩ 20 MΩ to 200 MΩ 200 MΩ to 1 GΩ	30 μΩ/Ω + 20 μΩ 13 μΩ/Ω 14 μΩ/Ω 24 μΩ/Ω 55 μΩ/Ω 450 μΩ/Ω 0.5 %		
DC VOLTAGE Measurement	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1 kV	6.5 μV/V + 1.3 μV 5.1 μV/V 6.1 μV/V 9.4 μV/V 9.6 μV/V		
DC CURRENT Measurement	0 μA to 200 μA 200 μA to 200 mA 200 mA to 2 A 2 A to 10 A 10 A to 100 A	100 μA/A 100 μA/A 170 μA/A 0.060 % 0.14 %		
AC VOLTAGE Measurement	10 mV to 200 mV *10 Hz to 40 Hz* *40 Hz to 100 Hz* *100 Hz to 2 kHz* *2 kHz to 10 kHz* 200 mV to 2 V *10 Hz to 40 Hz* *40 Hz to 100 Hz* *100 Hz to 2 kHz* *2 kHz to 10 kHz*	 130 μV/V + 4.0 μV 100 μV/V + 4.0 μV 110 μV/V + 2.0 μV 100 μV/V + 4.0 μV 110 μV/V + 20 μV 85 μV/V + 20 μV 72 μV/V + 20 μV 85 μV/V + 20 μV		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
AC VOLTAGE Measurement continued	2 V to 20 V *10 Hz to 40 Hz* *40 Hz to 100 Hz* *100 Hz to 2 kHz* *2 kHz to 10 kHz* 20 V to 200 V *10 Hz to 40 Hz* *40 Hz to 100 Hz* *100 Hz to 2 kHz* *2 kHz to 10 kHz* *40 Hz to 10 kHz* 200 V to 300 V 300 V to 400 V 400 V to 500 V 500 V to 600 V 600 V to 700 V 700 V to 800 V 800 V to 900 V 900 V to 1000 V 1000 V to 1100 V	 110 µV/V + 20 µV 85 µV/V + 20 µV 72 µV/V + 20 µV 85 µV/V + 20 µV 100 µV/V + 2.0 mV 84 µV/V + 2.0 mV 72 µV/V + 2.0 mV 87 µV/V + 2.0 mV 87 µV/V + 20 mV 87 µV/V + 44 mV 87 µV/V + 120 mV 87 µV/V + 240 mV 87 µV/V + 400 mV 87 µV/V + 620 mV 87 µV/V + 880 mV 87 µV/V + 1.2 mV 87 µV/V + 1.6 mV		Wolverhampton
AC CURRENT Measurement	*10 Hz to 5 kHz* 10 µA to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA *10 Hz to 1 kHz* 200 mA to 2 A	 310 µA/A + 20 nA 310 µA/A + 200 nA 310 µA/A + 2.0 µA 310 µA/A + 20 µA 600 µA/A + 400 µA		
DC RESISTANCE Generation	*0 Ω to 11 Ω* *11 Ω to 33 Ω* *33 Ω to 110 Ω* *110 Ω to 330 Ω* *330 Ω to 1.1 kΩ* *1.1 kΩ to 3.3 kΩ* 3.3 kΩ to 11 kΩ 11 kΩ to 33 kΩ 33 kΩ to 110 kΩ	180 µΩ/Ω + 11 mΩ 150 µΩ/Ω + 19 mΩ 110 µΩ/Ω + 19 mΩ 110 µΩ/Ω + 19 mΩ 110 µΩ/Ω + 90 mΩ 110 µΩ/Ω + 90 mΩ 110 µΩ/Ω + 900 mΩ 110 µΩ/Ω + 900 mΩ 140 µΩ/Ω + 9.0 Ω		Wolverhampton

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
DC RESISTANCE Generation continued	110 kΩ to 330 kΩ 330 kΩ to 1.1 MΩ 1.1 MΩ to 3.3 MΩ 3.3 MΩ to 11 MΩ 11 MΩ to 33 MΩ 33 MΩ to 110 MΩ 110 MΩ to 330 MΩ	150 μΩ/Ω + 9.0 Ω 180 μΩ/Ω + 80 Ω 200 μΩ/Ω + 80 Ω 710 μΩ/Ω + 800 Ω 0.14 % + 800 Ω 0.60 % + 8.0 kΩ 0.60 % + 21 kΩ		
DC VOLTAGE Generation	0 mV to 330 mV 330 mV to 3.3 V 3.3 V to 33 V 33 V to 330 V 330 V to 1 kV	75 μV/V + 6.0 μV 60 μV/V + 13 μV 60 μV/V + 130 μV 70 μV/V + 1.3 mV 70 μV/V + 11 mV		
DC CURRENT Generation	0 mA to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA 330 mA to 2.2 A 2.2 A to 10 A 10 A to 100 A	160 μA/A + 130 nA 130 μA/A + 1.1 μA 130 μA/A + 12 μA 370 μA/A + 120 μA 0.060 % 0.14 %		Wolverhampton
AC VOLTAGE Generation	1 mV to 33 mV *45 Hz to 10 kHz* 33 mV to 330 mV *45 Hz to 10 kHz* 330 mV to 3.3 V *45 Hz to 10 kHz* 3.3 V to 33 V *45 Hz to 10 kHz* 33 V to 330 V *45 Hz to 1 kHz* *1 kHz to 10 kHz* 330 V to 1 kV *45 Hz to 1 kHz* *1 kHz to 5 kHz* *5 kHz to 10 kHz*	1650 μV/V + 27 μV 600 μV/V + 29 μV 360 μV/V + 130 μV 470 μV/V + 1.3 mV 600 μV/V + 14 mV 900 μV/V + 22 mV 600 μV/V + 150 mV 2100 μV/V + 170 mV 2100 μV/V + 600 mV		Wolverhampton

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
AC CURRENT				Wolverhampton
Generation	29 µA to 0.33 mA *45 Hz to 1 kHz*	0.18 % + 320 nA		
	0.33 mA to 3.3 mA *45 Hz to 1 kHz*	0.12 % + 380 nA		
	3.3 mA to 33 mA *45 Hz to 1 kHz*	0.11 % + 3.8 µA		
	33 mA to 330 mA *45 Hz to 1 kHz*	0.11 % + 38 µA		
	330 mA to 2.2 A *45 Hz to 1 kHz*	0.12 % + 380 µA		
	2.2 A to 11 A *45 Hz to 500 Hz* *500 Hz to 1 kHz*	0.13 % + 2.7 mA 0.38 % + 2.7 mA		
CAPACITANCE	10 µF to 1 mF *100 Hz*	1.5 %		
	10 pF to 1 µF *1 kHz*	0.060 %		
	100 pF to 1 µF *10 kHz*	0.080 %		
INDUCTANCE	10 µH to 100 µH *1 kHz*	0.50 %		
	100 µH to 10 H *1 kHz*	0.10 %		
FREQUENCY	0.1 Hz to 10 Hz	35 parts in 10^6		Wolverhampton
	10 Hz to 100 Hz	3.5 parts in 10^6		
	100 Hz to 1 kHz	0.70 parts in 10^6		
	1 kHz to 10 kHz	8.0 parts in 10^8		
	10 kHz to 10 MHz	2.0 parts in 10^8		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)		Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED					
TEMPERATURE SIMULATION				Temperature simulators, calibration by electrical simulation	Wolverhampton
Base metal thermocouples		Without CJC	With CJC		
Type J	-210 ºC to -100 ºC	0.22 ºC	0.21 ºC	Source	
	-100 ºC to -30 ºC	0.15 ºC	0.17 ºC		
	-30 ºC to +150 ºC	0.14 ºC	0.16 ºC		
	150 ºC to 760 ºC	0.15 ºC	0.17 ºC		
	760 ºC to 1200 ºC	0.19 ºC	0.21 ºC		
	-210 ºC to +1200 ºC	0.070 ºC	0.12 ºC	Measure	
Type K	-200 ºC to -100 ºC	0.27 ºC	0.20 ºC	Source	
	-100 ºC to -25 ºC	0.16 ºC	0.18 ºC		
	-25 ºC to +120 ºC	0.14 ºC	0.17 ºC		
	120 ºC to 1000 ºC	0.22 ºC	0.20 ºC		
	1000 ºC to 1372 ºC	0.32 ºC	0.20 ºC		
	-200 ºC to +1372 ºC	0.070 ºC	0.12 ºC	Measure	
Type N	-200 ºC to -100 ºC	0.32 ºC	0.20 ºC	Source	
	-100 ºC to -25 ºC	0.17 ºC	0.20 ºC		
	-25 ºC to +120 ºC	0.16 ºC	0.18 ºC		
	120 ºC to 410 ºC	0.16 ºC	0.18 ºC		
	410 ºC to 1300 ºC	0.22 ºC	0.20 ºC		
	-200 ºC to +1300 ºC	0.070 ºC	0.12 ºC	Measure	
Type T	-250 ºC to -150 ºC	0.50 ºC	0.50 ºC	Source	
	-150 ºC to 0 ºC	0.20 ºC	0.20 ºC		
	0 ºC to +120 ºC	0.14 ºC	0.17 ºC		
	120 ºC to 400 ºC	0.13 ºC	0.16 ºC		
	-250 ºC to +400 ºC	0.070 ºC	0.11 ºC	Measure	
Noble metal thermocouples					
Type R	0 ºC to 250 ºC	0.45 ºC	0.46 ºC	Source	
	250 ºC to 400 ºC	0.28 ºC	0.20 ºC		
	400 ºC to 1000 ºC	0.27 ºC	0.20 ºC		
	1000 ºC to 1767 ºC	0.32 ºC	0.21 ºC		
	0 ºC to 1767 ºC	0.079 ºC	0.14 ºC	Measure	
Type S	0 ºC to 250 ºC	0.38 ºC	0.39 ºC	Source	
	250 ºC to 1000 ºC	0.29 ºC	0.20 ºC		
	1000 ºC to 1400 ºC	0.30 ºC	0.32 ºC		
	1400 ºC to 1767 ºC	0.37 ºC	0.38 ºC		
	0 ºC to 1767 ºC	0.079 ºC	0.13 ºC	Measure	
RTD Pt100	-250 ºC to 850 ºC	0.22 ºC		Source and measure	

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 LENGTH				
Plain plug gauges (parallel) cylindrical setting standards and rollers	1 to 50 diameter 50 to 100 100 to 150	0.80 1.0 1.2	By comparison with end standards using a length measuring machine	Wolverhampton and Warton
Plain ring gauges (parallel)	6 to 50 diameter 50 to 100 100 to 150	1.0 1.6 2.0	By comparison with master rings using a length measuring machine	Warton
Screw plug gauges (parallel) including check and setting plugs See Note 3	3 to 100 diameter	3.0 on pitch diameter	By comparison with end standards using a length measuring machine	Warton
Pitch: 1.5Flank angle: 2.0 + ((800/*MxP*)) Minutes of arc Where *M* is the projector magnification and *P* is pitch in mm				
Parallels	As BS 906:1972	Dependent on size and grade 1.5 to 5.0		Wolverhampton
ANGLE				
Squares Blade type	As BS 939:2007 up to 300 300 up to 600	3.0 on squareness 5.0 See note 2		Warton
External Internal	0 to 350 diameter 3 to 350 diameter	0.050 on radius 0.050 on radius		

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
MEASURING INSTRUMENTS AND MACHINES				
Micrometers				
External Internal Depth	As BS 870:2008 and above As BS 959:2008 As BS 6468:2008	Heads: 2.0 between any two points Setting and extension rods: 1.0 + 5.0 x length in m	Note: Internal micrometers not covered at Airbus.	Wolverhampton, Broughton and Warton
Bore micrometers (3 point)	0 mm to 100mm	Overall performance 5.0	Using master rings or adjustable setting gauge.	Wolverhampton and Broughton
Micrometer heads	As BS 1734:1951	1.3		Warton
Bench micrometer		Overall performance 2.0	In-house method based on MOY/SCMI/22	
Height setting micrometer	0 to 300	Heads: 1.5 between any two points stepped column 2.5 Overall performance: 3.0	By comparison with end standards using surface table, indicator and length standards.	Warton
Riser blocks for above	150 300	2.5 5.0	By comparison with end standards	
Vernier gauges Caliper Height Depth	As BS 887:2008 As BS 1643:2008 As BS 6365:2008	Overall performance: 10 + (30 x length in m)		Wolverhampton, Broughton and Warton
Dial gauges and dial test indicators	As BS 907:2008 and BS 2795:1981	1.0		
Bevel protractors	As BS 1685:2008	1.0 min of arc + 1.0 vernier division		Wolverhampton

Measured Quantity Instrument or Gauge	Range	Expanded Measurement Uncertainty (k = 2)	Remarks	Location Code
RANGE IN MILLIMETRES AND UNCERTAINTY IN MICROMETRES UNLESS OTHERWISE STATED				
NOTES 1. In addition to the items listed above, other similar items, including parts of measuring instruments and machines, may be calibrated to the uncertainties stated. 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 must be quoted. 2. The uncertainty quoted if for the departure from flatness, straightness, or squareness, i.e. the distance separating the two parallel planes, which just enclose the surface under consideration. 3. Single start, symmetrical thread forms only.				
TEMPERATURE				
Temperature controlled, ovens, environmental chambers, fridges and freezers.	-80 °C to +400 °C 400 °C to 1000 °C 1000 °C to 1300 °C	1.8 °C 2.0 °C 2.3 °C	Single and multipoint time dependent temperature profiling, also referred to as spatial temperature surveying or mapping using procedures: QCL/111/700 and 806	SITE
Frequency / Timers	1 s to 24 Hr	1.7 s	Real time timers measurement	
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: $Q[a, b] = [a^2 + b^2]^{1/2}$