ANSI-ASQ National Accreditation Board/ACLASS

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid to: January 26, 2015 Certificate Number: AC-1255

I. Electromagnetic - DC/Low Frequency

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source	Up to 330 mV 330 mV to 33 V (33 to 100) V 100 V to 1 kV	0.03 mV/V + 3 µV 2.4 mV/V + 5 µV 26 mV/V + 50 µV 0.11 V/V + 1.5 mV	Fluke 5500A	OEM & GIDEP Sourced Procedures
DC Current - Source	Up to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 10) A	0.01 mA/A + 50 nA 0.01 mA/A + 0.25 µA 0.22 mA/A + 3.3 µA 3.9 mA/A + 44 µA 18 mA/A + 0.33 mA		
Resistance - Source	Up to 10 Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ	3.6 mΩ/Ω + 8 mΩ 17 mΩ/Ω + 15 mΩ 0.17 Ω/Ω + 60 mΩ 31 Ω/Ω + 6 Ω 0.7 kΩ/Ω + 55 Ω 8.3 kΩ/Ω + 0.55 kΩ		
Capacitance - Source	Up to 1 nF (1 to 100) nF 100 nF to 1 µF	0.01 nF/F + 10 pF 0.33 nF/F + 100 pF 4.6 nF/F + 1 nF		

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source	**(1 to 330) mV** (10 to 45) Hz 45 Hz to 1 kHz (1 to 10) kHz (10 to 50) kHz (50 to 100) kHz **330 mV to 10 V** (10 to 45) Hz 45 Hz to 1 kHz (1 to 10) kHz (10 to 50) kHz **(10 to 100) V** (10 to 45) Hz 45 Hz to 1 kHz (1 to 10) kHz **100 V to 1 kV** (10 to 45) Hz 45 Hz to 1 kHz (1 to 10) kHz	 0.13 mV/V + 20 µV 0.21 mV/V + 20 µV 0.26 mV/V + 20 µV 1.3 mV/V + 20 µV 2 mV/V + 33 µV 60 mV/V + 2.5 mV 28 mV/V + 0.60 mV 28 mV/V + 2.6 mV 83 mV/V + 5 mV 3.9 mV/V + 6.6 mV 0.55 V/V + 15 mV 0.75 V/V + 33 mV 0.82 V/V + 80 mV 3 mV/V + 0.10 V 2 m/V + 0.50 V	Fluke 5500A	OEM & GIDEP Sourced Procedures
AC Current - Source	**(29 to 190) µA** (10 to 45) Hz 45 Hz to 1 kHz **(190 to 329) µA** (10 to 45) Hz 45 Hz to 1 kHz **329 µA to 3.3 mA** (10 to 45) Hz 45 Hz to 1 kHz (1 to 10) kHz **(3.3 to 330) mA** (10 to 45) Hz 45 Hz to 1 kHz **330 mA to 2 A** (10 to 45) Hz 45 Hz to 1 kHz **(2 to 10) A** (10 to 45) Hz 45 Hz to 1 kHz	 0.28 µA/A+ 0.15 µA 0.28 µA/A + 0.25 µA 0.52 µA/A + 0.30 µA 0.57 µA/A + 3 µA 0.21 µA/A + 3 µA 0.12 mA/A + 3 µA 0.04 mA/A + 3 µA 1.4 mA/A + 30 µA 1.4 mA/A + 30 µA 0.33 A/A + 0.30 mA 0.33 A/A + 0.30 mA 0.33 A/A + 2 mA 0.33 A/A + 2 mA		

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PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Oscilloscopes - Amplitude	0 VDC - 50 Ω load 6 VDC - 50 Ω load 0 VDC - 1 MΩ load 66 VDC - 1 MΩ load 130 VDC - 1 MΩ load	12 mV 12 mV 12 mV 43 mV 78 mV	Fluke 5500A	OEM & GIDEP Sourced Procedures
Oscilloscopes - Flatness	50 kHz ref to 10 mV p-p 50 kHz ref to 5 V p-p 100 kHz to 30 mV 100 kHz to 5.5 V 300 MHz to 30 mV 300 MHz to 5.5 V 600 MHz to 30 mV 600 MHz to 5.5 V	1.9 mV 1.9 mV 1.9 mV 13 mV 13 mV 13 mV 13 µV 13 mV		
Oscilloscopes - Rise Time (V p-p)	400 ps 1 MHz, 1 V 400 ps 10 MHz, 0.5 V 400 ps 10 MHz, 1 V	7 ps 7 ps 7 ps		
Oscilloscopes - Square Wave 1 MΩ Load Square Wave 50 Ω Load	100 mV to 10 kHz 1 V to 10 kHz 10 v to 10 kHz 100 mV to 10 kHz 1 V to 10 kHz 5 V to 10 kHz	2.2 mV 31 mV 1.1 µV 3.9 mV 38 mV 87 mV		
Oscilloscopes – Time Markers	2 ns 20 ms 50 ms 5 s	0.01 ms/s 0.02 ms/s 0.03 ms/s 0.04 ms/s		

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PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Electrical Simulation of Thermocouples				
Type E	-100 °C	0.36 °C		
	0 °C	0.36 °C		
	500 °C	0.35 °C		
	1 000 °C	0.81 °C		
Type J	-150 °C	0.85 °C		
	0 °C	0.36 °C		
	375 °C	0.36 °C		
	750 °C	0.81 °C	Fluke 5500A	
Type K	-180 °C	0.37 °C		
	0 °C	0.36 °C		
	800 °C	0.55 °C		
	1 300 °C	0.55 °C		
Type T	-100 °C	0.36 °C		
	0 °C	0.36 °C		
	200 °C	0.36 °C		
	400 °C	0.35 °C		OEM & GIDEP Sourced Procedures
Electrical Simulation of Thermocouples				
Type E	-100 °C	0.38 °C		
	0 °C	0.36 °C		
	500 °C	0.35 °C		
	1 000 °C	0.81 °C		
Type J	-150 °C	0.36 °C		
	0 °C	0.35 °C		
	375 °C	0.35 °C		
	750 °C	0.81 °C	Fluke 744	
Type K	-180 °C	0.37 °C		
	0 °C	0.35 °C		
	800 °C	0.81 °C		
	1 300 °C	0.81 °C		
Type T	-100 °C	0.36 °C		
	0 °C	0.36 °C		
	200 °C	0.35 °C		
	400 °C	0.36 °C		

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AC Power	5-50 W @ 60 Hz 100 W @ 60 Hz 200 W @ 60 Hz 390 W @ 60Hz 550 W @ 60 Hz 900 W @ 60 Hz 100 W @ 400 Hz 100 W @ 1 kHz 100 W @ 5 kHz	0.11 mW 0.34 mW 0.67 mW 1.4 mW 1.7 mW 3.0 mW 0.34 mW 0.34 mW 0.34 mW	Fluke 5500A	OEM & GIDEP Sourced Procedures
DC Power	Up to 10 W (20 to 50) W 100 W (200 to 900) W	0.22 mW 1.9 mW 14 mW 24 mW		

II. Time & Frequency

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Source and Measure	Up to 100 Hz (1 to 10) kHz 100 kHz (1 to 10) MHz 20 MHz 50 MHz to 1 GHz	47 nHz 17 nHz 24 nHz 17 nHz 5.8 Hz 1.2 Hz	Rubidium MS-1009B, Marconi 2022A	OEM & GIDEP Sourced Procedures

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III. Thermodynamic

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature	(0 to 260) °C (-5 to 140) °C	0.60 °C 0.34 °C	Hart Microbath 9131 Hart Scientific 9105 Drywell	OEM & GIDEP Sourced Procedures
Microbath and Drywell Calibrators	(-200 to 660) °C	0.35 °C	HP 3458A and RTD Probe	
RTD and Thermocouple Probes (4 wires measure) RTD and Thermocouple Probes (3 wires measure) RTD and Thermocouple Probes (Source)	-180°C 100°C 780°C -180°C 100°C 780°C -180°C 100°C 780°C	0.35 °C 0.35 °C 0.35 °C 0.35 °C 0.35 °C 0.35 °C 0.27 °C 0.27 °C 0.27 °C	RTD Probe, 9105 Drywell Calibrator, 9173 Drywell Calibrator, 6102 Microbath, HP 3458A	

IV. Mechanical

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pressure and Vacuum	**(0 to 300) psi** 50 psi 100 psi 150 psi 200 psi 250 psi 300 psi Up to 30 in Hg Up to 100 psi (100 to 150) psi (150 to 1 000) psi (1 000 to 10 000) psi	0.21 psi 0.21 psi 0.21 psi 0.21 psi 0.21 psi 0.21 psi 0.12 in Hg 0.11 psi 1 psi 1.6 psi 3.1 psi	Druck DPI610 Precision Pressure calibrator Precision Pressure Calibrator, Dead Weight Tester, Ametek R-110-1	OEM & GIDEP Sourced Procedures

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Torque Tools	Up to 100 in oz Up to 250 ft lb Up to 600 ft lb	0.32 % of reading 1.3 % of reading	Torque Calibrator CDI Sure-test 5000-ST	OEM & GIDEP Sourced Procedures
Torque Calibrators	(4 to 50) in lb (30 to 400) in lb (100 to 1 000) in lb (20 to 250) ft lb	0.008 in lb 0.05 in lb 0.17 in lb 0.04 ft lb	Torque Arms & Class F Mass	
Durometers	Up to 100 units	1.2 % of full scale	Triple Beam Balance	
Pipettes	(2 to 20) µL (20 to 100) µL (100 to 1 250) µL (2 000 to 9 000) µL (9 000 to 10 000) µL	0.11 µL 0.14 µL 1.3 µL 5 µL 6.7 µL	Balance, Class 1 Weights	
Mass	(1 to 2) g (5 to 100) g 200 g 500 g 1 000 g (2 000 to 5 000) g (0.001 to 0.002) lb (0.005 to 0.02) lb (0.5 to 10) lb (10 to 50) lb	0.40 mg 0.41 mg 35 mg 54 mg 84 mg 84 mg 0.0000001 lb 0.000001 lb 0.0001 lb 0.001 lb	Standard Weights	NIST Handbook 105-1
Balances and Scales	Up to 200 g (200 to 600) g (600 to 6 000)g Up to 1.2 kg (0.1 g resolution) (1.2 to 2) kg (0.2 g resolution) (2 to 5) kg (0.5 g resolution) (5 to 30) kg (1 g resolution)	0.34 mg 14 mg 20 mg 0.18 g 0.26 g 0.58 g 1.2 g	Class F Weights	NIST Handbook 44

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PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Balances and Scales (cont.)	Up to 2 lb (0.0002 lb resolution) Up to 5 lb (0.0005 lb resolution) Up to 10 lb (0.001 lb resolution) Up to 20 lb (0.005 lb resolution) Up to 25 lb (0.002 lb resolution) Up to 50 lb (0.005 lb resolution) Up to 100 lb (0.01 lb resolution) Up to 150 lb (0.05 lb resolution) Up to 500 lb (0.05 lb resolution) Up to 1 000 lb (0.2 lb resolution) Up to 2 000 lb (0.5 lb resolution) Up to 5 000 lb (1 lb resolution) Up to 20 000 lb (2 lb resolution) Up to 200 000 lb (20 lb resolution)	0.0004 lb 0.001 lb 0.001 lb 0.01 lb 0.004 lb 0.01 lb 0.03 lb 0.1 lb 0.1 lb 0.3 lb 0.6 lb 1.3 lb 2.6 lb 27 lb	Class F Weights	NIST Handbook 44

V. Dimensional

PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Gage Blocks	Up to 1 in (1 to 4) in (4 to 10) in (10 to 13) in	7.4 µin 13 µin 22 µin 22 µin	Pratt & Whitney LMU-2130 Grade 1 Gage Blocks	OEM & GIDEP Sourced Procedures
Thread Measuring Wires	(4 to 120) tpi	9.5 µin (0.0002 mm)		

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Plain Plugs and Pins	(0.004 to 1) in (1 to 4) in (4 to 12) in	9.4 µin 16 µin 29 µin	Pratt & Whitney LMU-2130 Grade 1 Gage Blocks	OEM & GIDEP Sourced Procedures
Thread Plugs	Up to 1 in (1 to 7.5) in	15 µin 62 µin	Pratt & Whitney LMU-2130, Grade 1 Gage Blocks, Thread Measuring Wires	
Thread Rings	(0.112 to 8) in	60 µin	Pratt & Whitney LMU-2130, Class XXX Plain Rings	
Plain Rings	(0.04 to 1) in (1 to 4) in (4 to 12) in	20 µin 22 µin 27 µin		
Micrometers – OD, ID, Bore, Depth	Up to 1 in (1 to 10) in (10 to 48) in	84 µin 140 µin 170 µin	Grade 2 Gage Blocks, Optical Flat	
Calipers – Dial, Vernier, & Digital	Up to 48 in (6 to 12) in (12 to 48) in	580 µin 580 µin 590 µin		
Indicator Calibrators	Up to 1 in	59 µin		
Height Gages	Up to 12 in (12 to 48) in	630 µin 650 µin		
Indicators – Dial and Digital	Up to 6 in (0.001 in resolution) Up to 0.5 in (0.0001 in resolution) Up to 0.05 in (0.00005 in resolution) Up to 0.02 in (0.00002 in resolution) Up to 0.01 in (0.00001 in resolution)	290 µin 140 µin 60 µin 34 µin 14 µin	Grade 2 Gage Blocks, Indicator Calibrator	

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PARAMETER/ EQUIPMENT	RANGE	CALIBRATION & MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Surface Plates - Flatness Repeatability	To (36 x 48) in To (72 x 144) in (36 x 48)in (72 x 144)in	240 µin 240 µin 55 µin 55 µin	Planekators, Straight Indicators	OEM & GIDEP Sourced Procedures
Length Standards	Up to 1 in (1 to 4) in (4 to 10) in	9.4 µin 15 µin 26 µin	Pratt & Whitney LMU-2130, Grade 1 Gage Blocks, Electronic Height Gage	
Parallels	Up to 4 in	15 µin	Pratt & Whitney LMU-2130, Grade 1 Gage Blocks	
Optical Comparators	X Up to 6 in Y Up to 6 in	900 µin 900 µin	Glass Scale Standard, Check Balls	

Notes:

1. *Calibration and Measurement Capabilities (CMCs) (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of k=2.*
2. *This laboratory offers calibrations in its laboratory and on-site at customer-designated locations. Since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.*
3. *The use of (D) signifies the diagonal measurement of the surface plate in inches.*
4. *This scope is part of and must be included with the Certificate of Accreditation No. AC – 1255.*

Vice President

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