The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

PRECISION METROLOGY, INC. - SOUTH

Dade City, FL

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION CORPORATE SEAL 1978 DISTRICT OF COLUMBIA A2LA

Presented this 24th day of July 2009.

President & CEO
For the Accreditation Council
Certificate Number 1078.02
Valid to September 30, 2011

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

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

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CALIBRATION

Valid until: September 30, 2011 Certificate Number: 1078.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Chemical

Parameter/Equipment	Range	Best Uncertainty[2] (±)		Comments
		Laboratory	Field	
pH Meter[3]	(4, 7, 10) pH units 4 pH units 7 pH units 10 pH units	0.034 pH units 0.036 pH units 0.06 pH units	See Footnote 6	Standard buffers

II. Dimensional

Parameter/Equipment	Range	Best Uncertainty[2, 4] (±)		Comments
		Laboratory	Field	
Gage Blocks	Up to 6 in	$(4.2 + 5.4L)$ µin	Field Not Available	Gage block comparator
Micrometers[3]	Up to 42 in	$(0.6R + 30L)$ µin	$(0.6R + 40L)$ µin	Gage blocks

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Parameter/Equipment	Range	Best Uncertainty[2, 4] (±)		Comments
		Laboratory	Field	
Calipers[3]	Up to 80 in	(0.6*R* + 30*L*) µin	(0.6*R* + 40*L*) µin	Gage blocks
Indicators[3]	Up to 4 in	(0.6*R* + 30*L*) µin	(0.6*R* + 40*L*) µin	Gage blocks
Length Standards	Up to 14 in	(25 + 18*L*) µin	Field Not Available	Universal measuring machine (UMM)
Threaded Plug Gages – Pitch Diameter Major Diameter	 Up to 14 in Up to 14 in	 (110 + 9*D*) µin (25 + 9*D*) µin	 Field Not Available	 UMM, thread wires (best thread wire size)
Threaded Rings – Pitch Diameter Functional Diameter	 Up to 14 in Up to 14 in	 (140 + 9*D*) µin (300 + 8*D*) µin	 Field Not Available	 UMM, set plug
Cylindrical Rings	Up to 14 in	(15 + 10*D*) µin	Field Not Available	Federal ring comparator
Cylindrical Plugs	Up to 14 in	(28 + 9*D*) µin	Field Not Available	UMM
Bore Gages[3]	Up to 12 in	(0.6*R* + 30*L*) µin	(0.6*R* + 40*L*) µin	Rings
Gage Amp w/probe[3]	----	(0.6*R* + 10*L*) µin	(0.6*R* + 12*L*) µin	Gage blocks
Height Gages[3]	Up to 48 in	(0.6*R* + 30*L*) µin	(0.6*R* + 30*L*) µin	Standard reference bar
Indicator Calibrators[3]	----	16 µin + 0.6*R*	0.6*R* + 19 µin	Gage amp w/probe

Parameter/Equipment	Range	Best Uncertainty[2, 4, 8] (±)		Comments
		Laboratory	Field	
Micrometers[3] –				
Depth Tri-Bores Outside Groove	Up to 12 in Up to 6 in Up to 42 in Up to 4 in	30 μin/in + 0.6*R*	40 μin/in + 0.6*R*	Gage blocks
Protractors[3]	(0 to 180)°	0.08*R* + 0.08°/180°	See Footnote 6	Angle blocks
Rules/Linear Scales[3]	Up to 24 in	0.002 in + 16*L*	(920 + 16 *L*) μin	Digiscope master rule
Surface Plate Flatness[3]	6 in × 6 in to 72 in × 144 in	8√*D* μin	See Footnote 6	Level meters
Tape Measures[3]	Up to 50 ft	(0.08 + 0.003*L*) in	See Footnote 6	Master rule
V-Blocks –				
Parallelism Centering Squareness	(8 × 8 × 8) in	17 μin 30 μin (25 + 12*H*) μin	Field Not Available	Gage Amp w/probe Cylindrical plug Cylindrical square
CMM[3] –				
Linear	(0 to 60) in, in x, y (0 to 20) in, in z	Not Available	(42 + 22*L*) μin	ASME B89.4.1
Probing Analysis	---		2 μm	
Volumetric	Up to 36 in for shortest axis		(120 + 5*L*) μin	
Bi-Directional	---		(42 + 22*L*) μin	

Parameter/Equipment	Range	Best Uncertainty[2] (±)		Comments
		Laboratory	Field	
Optical Comparators[3] –				
Squareness	0º to 360°	Not Available	2 minutes	Calibration sphere
Linear	Up to 12 in		0.0002 in	Glass scale
Magnification	10x, 20x, 50x, 62.5x, 100x		0.00012 in	Calibration sphere + overlay

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	Best Uncertainty[2, 5, 7] (±)		Comments
		Laboratory	Field	
DC Voltage – Generate[3]	(0 to 330) µV 330 µV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1000) V	16 µV + 1 µV 9.1 µV/V + 2 µV 11 µV/V + 20 µV 15 µV/V + 150 µV 15 µV/V + 1500 µV	See Footnote 6	Fluke 5520A
DC Voltage – Measure[3]	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	10 µV/V + 0.3 µV 6.9 µV/V + 0.3 µV 6.1 µV/V + 0.5 µV 8.1 µV/V + 30 µV 8.3 µV/V + 1 mV	See Footnote 6	HP 3458A
DC Current – Generate[3]	(0 to 330) µA 330 µA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3.0) A (3 to 11) A (11 to 20.5) A	0.012 % + 0.02 µA 79 µA/A + 0.05 µA 79 µA/A + 0.25 µA 79 µA/A + 2.5 µA 0.016 % + 40 µA 0.03 % + 40 µA 0.04 % + 500 µA 0.078 % + 750 µA	See Footnote 6	Fluke 5520A

Parameter/Equipment	Range	Best Uncertainty[2, 5, 7, 8] (±)		Comments
		Laboratory	Field	
DC Current – Measure[3]	100 nA 100 nA to 1 μA (1 to 10) μA (10 to 100) μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 2) A (2 to 20) A	52 μA/A + 0.04 nA 25 μA/A + 0.04 nA 25 μA/A + 0.1 nA 26 μA/A + 0.8 nA 27 μA/A + 5 nA 26 μA/A + 50 nA 42 μA/A + 0.5 μA 0.013 % + 10 μA 0.013 % + 16 μA 0.035 % + 0.4 mA	See Footnote 6	HP 3458A
DC Power[3] – 33 mV to 1020 V	330 μA to 330 mA 330 mA to 3 A (3 to 20.5) A	0.068 % 0.07 % 0.12 %	See Footnote 6	Fluke 5520A
Capacitance – Generate[3]	(0.19 to 3.3) nF (3.3 to 11) nF (11 to 110) nF (110 to 330) nF 330 nF to 1.1 μF (1.1 to 3.3) μF (3.3 to 11) μF (11 to 33) μF (33 to 110) μF (110 to 330) μF 330 μF to 1.1 mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF	0.5 % + 0.01 nF 0.25 % + 0.01 nF 0.25 % + 0.1 nF 0.25 % + 0.3 nF 0.25 % + 1 nF 0.25 % + 3 nF 0.25 % + 10 nF 0.4 % + 30 nF 0.45 % + 100 nF 0.45 % + 300 nF 0.45 % + 1 μF 0.45 % + 3 μF 0.45 % + 10 μF 0.75 % + 30 μF	See Footnote 6	Fluke 5520A
Resistance – Measure[3]	(0 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	19 μΩ/Ω + 50 μΩ 14 μΩ/Ω + 0.5 mΩ 12 μΩ/Ω + 0.5 mΩ 12 μΩ/Ω + 5 mΩ 12 μΩ/Ω + 50 mΩ 17 μΩ/Ω + 2 Ω 59 μΩ/Ω + 100 μΩ 0.058 % + 1 kΩ 0.58 % + 10 kΩ	See Footnote 6	HP 3458A

Parameter/Equipment	Range	Best Uncertainty[2, 5, 7] (±)		Comments
		Laboratory	Field	
Resistance – Generate[3]	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (330 to 1100) Ω (1.1 to 3.3) kΩ (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω (330 to 1100) k Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω (330 to 1100) M Ω	34 μΩ/Ω + 0.001 Ω 30 μΩ/Ω + 0.015 Ω 25 μΩ/Ω + 0.015 Ω 27 μΩ/Ω + 0.02 Ω 24 μΩ/Ω + 0.02 Ω 25 μΩ/Ω + 0.2 Ω 24 μΩ/Ω + 0.1 Ω 24 μΩ/Ω + 1 Ω 24 μΩ/Ω + 1 Ω 31 μΩ/Ω + 10 Ω 28 μΩ/Ω + 10 Ω 47 μΩ/Ω + 0.15 kΩ 0.011 % + 0.25 kΩ 0.02 % + 2.5 kΩ 0.039 % + 3 kΩ 0.24 % + 0.1 MΩ 1.2 % + 0.5 MΩ	See Footnote 6	Fluke 5520A
Oscilloscope Calibration[3] –				
Squarewave Signal 50 Ω at 1 kHz Source	± 1 mV to 6.6 V_{p-p}	0.28 % + 40 μV	See Footnote 6	Fluke 5520A/SC1100
Squarewave Signal 1 MΩ at 1 kHz Source	± 1 mV to 130 V_{p-p}	0.12 % + 40 μV		
Leveled Sine Wave Amplitude –				
Range: 5 mV to 5.5 V_{p-p}	50 kHz reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	2 % + 300 μV 3.5 % + 300 μV 4 % + 300 μV 6 % + 300 μV		
Range: 4 mV to 3.5 V_{p-p}	(600 to 1100) MHz	7 % + 300 μV		
Leveled Sine Wave Flatness (relative to 50 kHz)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	1.5 % + 100 μV 2 % + 100 μV 4 % + 100 μV 5 % + 100 μV		
Time Marker into 50 Ω Source and Measure	5 s to 50 ms 20 ms to 1 ns	(26 + t*1000) parts in 10^6 2.6 parts in 10^6		*t* is in seconds
Rise Time	≤ 300 ps	+0 / -100 ps		

Parameter/Equipment	Range	Best Uncertainty[2] (±)		Comments
		Laboratory	Field	
Electrical Simulation of Thermocouple[3] –				
Type E	-250 °C to -100 °C -100 °C to 650 °C 650 °C to 1000 °C	0.5 °C 0.16 °C 0.21 °C	See Footnote 6	Fluke 5520A
Type J	-210 °C to -100 °C -100 °C to 760 °C 760 °C to 1200 °C	0.28 °C 0.17°C 0.23 °C		
Type K	-200 °C to -100 °C -100 °C to 120 °C 120 °C to 1000 C 1000 °C to 1372 °C	0.34 °C 0.18 °C 0.26 °C 0.4 °C		
Type S	0 °C to 250 °C 250 °C to 1400 °C 1400 °C to 1767 °C	0.47 °C 0.37 °C 0.46 °C		
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 400 °C	0.63 °C 0.24 °C 0.15 °C		
Electrical Simulation of RTDs[3] –				
Pt 385, 100 Ω	-200 °C to 0 °C 0 °C to 100 °C 100 °C to 300 °C 300 °C to 400 °C 400 °C to 630 °C 630 °C to 800 °C	0.05 °C 0.07 °C 0.09 °C 0.1 °C 0.12 °C 0.14 °C	See Footnote 6	Fluke 5520A
Pt 3926, 100 Ω	-200 °C to 0 °C 0 °C to 100 °C 100 °C to 300 °C 300 °C to 400 °C 400 °C to 630 °C	0.05 °C 0.07 °C 0.09 °C 0.1 °C 0.12 °C		

Parameter/Equipment	Range	Best Uncertainty[2, 7] (±)		Comments
		Laboratory	Field	
Electrical Simulation of RTDs[3] (cont) –				
PtNi 385, 120 Ω	-80 °C to 100 °C 100 °C to 260 °C	0.08 °C 0.14 °C	See Footnote 6	Fluke 5520A
Pt 385, 200 Ω	-200 °C to 100 °C 100 °C to 260 °C 260 °C to 300 °C 300 °C to 400 °C 400 °C to 600 °C 600 °C to 630 °C	0.04 °C 0.05 °C 0.12 °C 0.13 °C 0.14 °C 0.16 °C		
Pt 385, 500 Ω	-200 °C to -80 °C -80°C to 100 °C 100 °C to 260 °C 260 °C to 400 °C 400 °C to 600 °C 600 °C to 630 °C	0.04 °C 0.05 °C 0.06 °C 0.08 °C 0.09 °C 0.11 °C		
Pt 385, 1000 Ω	-200 °C to 0 °C 0 °C to 100 °C 100 °C to 260 °C 260 °C to 300 °C 300 °C to 600 °C 600 °C to 630 °C	0.03 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.23 °C		
Pt 3916, 100 Ω	-200 °C to -190 °C -190 °C to -80 °C -80 °C to 0 °C 0 °C to 100 °C 100 °C to 260 °C 260 °C to 300 °C 300 °C to 400 °C 400 °C to 600 °C	0.25 °C 0.04 °C 0.05 °C 0.06 °C 0.07 °C 0.08 °C 0.09 °C 0.1 °C		
AC Current – Generate[3]				
(29 to 330) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 0.1 µA 0.12 % + 0.1 µA 0.1 % + 0.1 µA 0.24 % + 0.15 µA 0.62 % + 0.2 µA 1.3 % + 0.4 µA	See Footnote 6	Fluke 5520A

Parameter/Range	Frequency	Best Uncertainty[2, 7] (±)		Comments
		Laboratory	Field	
AC Current – Generate[3] (cont)				
330 µA to 3.3 mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 0.15µA 0.1 % + 0.15 µA 0.08 % + 0.15 µA 0.16 % + 0.2 µA 0.38 % + 0.3 µA 0.8 % + 0.6 µA	See Footnote 6	Fluke 5520A
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % + 2 µA 0.07 % + 2 µA 0.031 % + 2 µA 0.062 % + 2 µA 0.16 % + 3 µA 0.31 % + 4 µA		
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % + 20 µA 0.07 % + 20 µA 0.032 % + 20 µA 0.08 % + 50 µA 0.16 % + 0.12 mA 0.31 % + 0.2 mA		
330 mA to 1.1 A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 0.1 mA 0.039 % + 0.1 mA 0.46 % + 1 mA 1.94 % + 5 mA		
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 0.1 mA 0.047 % + 0.1 mA 0.46 % + 1 mA 1.9 % + 5 mA		
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.048 % + 5 mA 0.081 % + 2 mA 2.4 % + 2 mA		
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.095 % + 5 mA 0.12 % + 5 mA 2.4 % + 5 mA		

Parameter/Range	Frequency	Best Uncertainty[2, 5] (±)		Comments
		Laboratory	Field	
AC Current – Measure[3]				
Up to 100 µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.46 % + 0.03 µ A 0.18 % + 0.03 µA 0.073 % + 0.03 µA 0.073 % + 0.03 µA	See Footnote 6	HP 3458A
1 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.46 % + 0.2 µA 0.18 % + 0.2 µA 0.072 % + 0.2 µA 0.043 % + 0.2 µA 0.072 % + 0.2 µA 0.46 % + 0.4 µA 0.64 % + 1.5 µA		
10 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.46 % + 2 µA 0.18 % + 2 µA 0.072 % + 2 µA 0.043 % + 2 µA 0.072 % + 2 µA 0.46 % + 4 µA 0.64 % + 15 µA		
100 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.46 % + 20 µA 0.18 % + 20 µA 0.072 % + 20 µA 0.043 % + 20 µA 0.072 % + 20 µA 0.46 % + 40 µA 0.64 % + 0.25 mA		
100 mA to 1 A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.46 % + 0.2 mA 0.19 % + 0.2 mA 0.1 % + 0.2 mA 0.13 % + 0.2 mA 0.35 % + 0.2 mA 1.2 % + 0.4 mA		
(1 to 2) A	10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.06 % + 0.2 mA 0.07 % + 0.2 mA 0.3 % + 0.2 mA		
(2 to 20) A	10Hz to 2 kHz (2 to 10) kHz	0.084 % + 2 mA 0.25 % + 2 mA		

Parameter/Range	Frequency	Best Uncertainty[2, 7] (±)		Comments
		Laboratory	Field	
AC Voltage – Generate[3]				
(1 to 33) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.063 % + 6 µV 0.017 % + 6 µV 0.02 % + 6 µV 0.08 % + 6 µV 0.27 % + 12 µV 0.62 % + 50 µV	See Footnote 6	Fluke 5520A
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.023 % + 8 µV 0.012 % + 8 µV 0.013 % + 8 µV 0.028 % + 8 µV 0.062 % + 32 µV 0.16 % + 70 µV		
330 mV to 3.3 V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500)kHz	0.023 % + 50 µV 0.012 % + 60 µV 0.016 % + 60 µV 0.024 % + 50 µV 0.055 % + 0.13 mV 0.19 % + 0.6 mV		
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.023 % + 0.65 mV 0.012 % + 0.6 mV 0.019 % + 0.6 mV 0.028 % + 0.6 mV 0.072 % + 1.6 mV		
(33 to 330) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.015 % + 2 mV 0.016 % + 6 mV 0.02 % + 6 mV 0.026 % + 6 mV 0.16 % + 50 mV		
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.024 % + 10 mV 0.02 % + 10 mV 0.024 % + 10 mV		

Parameter/Range	Frequency	Best Uncertainty[2, 5] (±)		Comments
		Laboratory	Field	
AC Voltage – Measure[3]				
10 mV	(1 to 40) Hz 40Hz to 1kHz 1k to 20kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.039 % + 3 µV 0.03 % + 1.1 µV 0.039 % + 1.1 µV 0.12 % + 1.1 µV 0.58 % + 1.1 µV 4.6 % + 2 µV	See Footnote 6	HP 3458A
100 mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100)kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	0.014 % + 4 µV 0.012 % + 2 µV 0.018 % + 2 µV 0.031 % + 2 µV 0.092 %+ 2 µV 0.34 % + 10 µV 1.2 % + 10 µV 1.8 % + 10 µV		
1 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100)kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	0.014 % + 40 µV 0.012 % + 20 µV 0.018 % + 20 µV 0.031 % + 20 µV 0.092 %+ 20 µV 0.34 % + 0.1 mV 1.2 % + 0.1 mV 1.8 % + 0.1 mV		
10 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100)kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	0.014 % + 0.4 mV 0.012 % + 0.2 mV 0.018 % + 0.2 mV 0.031 % + 0.2 mV 0.092 %+ 0.2 mV 0.34 % + 1 mV 1.2 % + 1 mV 1.8 % + 1 mV		
100 V	(1 to 40)Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.025 % + 4 mV 0.025 % + 2 mV 0.025 % + 2 mV 0.04 % + 2 mV 0.14 % + 2 mV 0.46 % + 10 mV 1.7 % + 10 mV		

Parameter/Range	Frequency	Best Uncertainty[2, 5, 7, 8] (±)		Comments
		Laboratory	Field	
AC Voltage– Measure[3] (cont)				
1000 V	(1 to 40)Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.047 % + 40 mV 0.047 % + 20 mV 0.07 % + 20 mV 0.14 % + 20 mV 0.34 % + 20 mV	See Footnote 6	HP 3458A
DC Power –				
33 mV to 1020 V	330 µA to 330 mA 330 mA to 3 A (3 to 20.5) A	0.068 % 0.07 % 0.12 %	See footnote 6	Fluke 5520A
AC Power[3] –				
PF = 1				
(3.3 to 9)mA (9 to 33) mA (33 to 90) mA (90 to 330) mA 330 mA to 0.9 A (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 20.5)A	(10 to 65) Hz (33 mV to 1020 V)	0.15 % 0.1 % 0.13 % 0.1 % 0.08 % 0.08 % 0.28 % 0.15 %	See Footnote 6	Fluke 5520A
(3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA 330 mA to 0.9 A (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 20.5) A	(65 to 500) Hz (33 mV to 1020 V)	0.09 % 0.07 % 0.1 % 0.11 % 0.08 % 0.08 % 0.18 % 0.18 %		
(3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA 330 mA to 0.9 A (0.9 to 2.2) A (2.2 to 4.5) A (4.5 to 20.5) A	500 Hz to 1 kHz (33 mV to 1020 V)	0.1 % 0.07 % 0.1 % 0.11 % 0.06 % 0.08 % 0.18 % 0.18 %		

Parameter/Range	Frequency	Best Uncertainty[2, 7, 8] (±)		Comments
		Laboratory	Field	
AC Power[3] – (cont)				
PF = 1				
(3.3 to 9) mA	(1 to 5) kHz	0.14 %	See Footnote 6	Fluke 5520A
(9 to 33) mA	(33 mV to 1020 V)	0.12 %		
(33 to 90) mA		0.21 %		
(90 to 330) mA		0.15 %		
330 mA to 0.9 A		0.69 %		
(0.9 to 2.2) A		0.56 %		
(2.2 to 4.5) A		2.5 %		
(4.5 to 20.5) A		2.5 %		
(3.3 to 9) mA	(5 to 10) kHz	0.38 %		
(9 to 33) mA	(33 mV to 1020 V)	0.35 %		
(33 to 90) mA		0.52 %		
(90 to 330) mA		0.38 %		
330 mA to 0.9 A		3.1 %		
(0.9 to 2.2) A		2.4 %		
(3.3 to 9)mA	(10 to 30) kHz	1.3 %		
(9 to 33) mA	(33 mV to 1020 V)	1.2 %		
(33 to 90) mA		1.4 %		
(90 to 330) mA		1.3 %		

IV. Mechanical

Parameter/Equipment	Range	Best Uncertainty[2, 4, 8] (±)		Comments
		Laboratory	Field	
Pressure Gages[3]	(0 to 2000) psig	(0.24 + 0.025 % FS) psi	See Footnote 6	Heise HQS pressure calibrator
	(2000 to 30 000) psig	(13 + 0.07 % FS) psi		Heise 901A pressure calibrator
Torque Wrenches[3]	(0 to 1000) ft·lb (0 to 1200) in·lb	0.62 % + 0.12 ft·lb 0.7 % + 1.04 in·lb	See Footnote 6	Torque calibrator

Parameter/Equipment	Range	Best Uncertainty[2, 4, 8] (±)		Comments
		Laboratory	Field	
Torque Testers	(0.1 to 1000) ft·lb	0.1 % + 0.6*R*	Field Not Available	Class F weights
Tensile Testers[3]	Up to 50 000 lb	Not Available	0.4 % + 0.08 % FS	Load cells
Force Gages[3]	(0 to 250) lbf	0.12 % + 0.6*R*	See Footnote 6	Deadweights Load cell
Microscopes[3] – Reticle Magnification	 (0 to 25) mm Up to 1000x	 23 μm 2.4 %	See Footnote 6	Stage micrometer
Scales/Balances[3]	(1 to 162) mg 162 mg to 400 g (1 to 50) lb	0.26 mg 2.6 mg 0.0028 lb	See Footnote 6	Class S1 weights
Tachometers[3] – Contact Photo	 0 to 5000 rpm 5000 to 15000 rpm Up to 100,000 rpm	 1.3 rpm 0.032 % + 0.6 rpm 0.014 % + 1.2*R*	See Footnote 6	 Tachometer calibrator Function generator
Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Testers[3]	HRA: Low, Middle, High HRB: Low, Middle, High HRC: Low, Middle, High HRE: Low, Middle, High HR15N: Low, Middle, High	Not Available	0.7 HRA 0.8 HRB 0.7 HRC 0.7 HRE 0.7 HR15N	ASTM E18

Parameter/Equipment	Range	Best Uncertainty[2] (±)		Comments
		Laboratory	Field	
Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Testers[3] (cont)	HR30N: Low, Middle, High HR45N: Low, Middle, High HR15T: Low, Middle, High HR30T: Low, Middle, High HR45T: Low, Middle, High	Not Available	0.7 HR30N 0.7 HR45N 0.9 HR15T 0.7 HR30T 0.7 HR45T	ASTM E18
Indirect Verification of Brinell Hardness Testers[3] (at Test Conditions)	(150 to 260) HBW	Not Available	0.008 *d*	ASTM E10 *d* is the mean of the *n* mean test diameter in millimeters.

V. Time and Frequency

Parameter/Equipment	Range	Best Uncertainty[2] (±)		Comments
		Laboratory	Field	
Frequency[3]	0.1 Hz to 5 GHz	2.5 parts in 10^6	See Footnote 6	Agilent 53131

[1] This laboratory offers commercial calibration service and field calibration service (where noted).

[2] "Best Uncertainty" is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] Field calibration service is available for this calibration and this laboratory meets A2LA *R104 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the uncertainties achievable on a customer's site can normally be expected to be larger than the Best Measurement Capabilities (BMC) that the accredited laboratory has been assigned as Best Uncertainty on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the calibration uncertainty being larger than the BMC

[4] In the statement of best uncertainty, *L* is the linear displacement in inches; *R* is the resolution of the unit under test; *D* is the linear displacement in inches; *H* is the height of the V-block in inches.

[5] Best measurement uncertainty for calibrations performed in the laboratory with the HP 3458A is based upon 90-day specifications and is read as a portion or percent of reading plus a portion or percent of range. Best measurement uncertainty for calibrations performed field with the HP 3458A is based upon 1-year specifications and is also read as a portion or percent of reading plus a portion or percent of range.

[6] The best uncertainty stated for calibrations performed in the laboratory is applicable for field calibrations.

[7] Best measurement uncertainty for calibrations performed with the Fluke 5520A is based upon 1-year specifications and is read as a portion or percent of reading plus a portion or percent of range or as a portion or percent of reading plus floor specification.

[8] In the statement of best uncertainty, percentages are to be read as percent of reading, unless noted otherwise.