



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

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CALIBRATION

Valid To: August 31, 2019

Certificate Number: 2100.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,4} (\pm)	Comments
Calipers ³	Up to 20 in (20 to 48) in	(3.6 + 4.6L) μ in + 0.6R 4.8L μ in + 0.6R	Gage blocks
(Outside, Depth, and Groove) Micrometers ³	Up to 1 in (1 to 4) in (4 to 20) in (20 to 42) in	14L μ in + 0.6R (12 + 2.2L) μ in + 0.6R (2.8 + 4.5L) μ in + 0.6R 4.6L μ in + 0.6R	Gage blocks
Indicators, Analog, and Digital ³	Up to 1 in	18 μ in + 0.6R	Indicator calibrator, gage blocks
Height Gages	Up to 40 in	(10 + 4.1L) μ in + 0.6R	Gage blocks
Hole Micrometers	Up to 8 in	120 μ in + 0.6R	Ring gages

Parameter/Equipment	Range	CMC ^{2,4} (\pm)	Comments
Gage Blocks	(0.05 to 1.0) in (1.0 to 4) in (4 to 20) in	(4.6 + 3.2L) μ in (4.6 + 3.2L) μ in 4.6L μ in	ULM and gage blocks
Length Standards	Up to 4 in (4 to 20) in (20 to 36) in	(14 + 2.3L) μ in (5.5 + 4.3L) μ in (1.0 + 4.6L) μ in	Height master gage amplifier and probe
Thread Plugs – Pitch Diameter Major Diameter	Up to 4 in Up to 4 in	(110 + 0.4L) μ in (25 + 1.4L) μ in	Mahrs linear 100, master thread wires
Cylindrical Plug and Pin Gages	Up to 1 in (1 to 4) in (4 to 8) in	27 μ in 32 μ in 53 μ in	Mahrs linear 100 P & W Supermicrometer™
Plain Cylindrical Ring Gages	(0.04 to 1) in (1 to 4) in (4 to 8) in	19 μ in 30 μ in 41 μ in	P & W ULM, master setting rings
Optical Comparator ³ – Angle Length Magnification	0° to 360° Up to 6 in 10 \times , 20 \times , 31.25 \times , 50 \times , 100 \times	17 arc second 110 μ in 160 μ in	Glass scale Stage calibration fixture Magnification ball
Surface Plate – Flatness	(18 to 120) in diagonal	(36 + 0.17D) μ in	Mahr Federal differential leveling system
Thickness Testers (Dimensional)	Up to 1 in	1.8 mils	Steel step blocks
Linear Measuring Device – Force Length Flatness	Up to 10 lbs Up to 20 in Up to 1 in diameter	0.023 lbf (4.6 + 3.2L) μ in 5.2 μ in	Load cell Gage blocks Monochromatic light

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
DC Voltage – Measure ³	(1000 to 6000) V 100 mV 1 V 10 V 100 V 1000 V	58 V 8.5 μV 38 μV 0.28 mV 4.1 mV 42 mV	High voltage probe DMM HP 34401A
DC Voltage – Generate	Up to 329.9999 mV (0.33 to 3.299999) V (3.3 to 32.99999) V (33 to 329.9999) V (330 to 1020) V	7.2 μV 37 μV 0.37 mV 5.5 mV 24 mV	Multifunction calibrator Fluke 5522A
DC Current – Measure ³	Up to 10 mA (10 to 100) mA (0.1 to 1) A (1 to 3) A (3 to 20) A	8.2 μA 64 μA 1.3 mA 3.7 mA 22 mA	DMM, HP 34401A EL7520 w/34401A
DC Current – Generate	Up to 329.999 μA (0.33 to 3.29999) mA (3.3 to 32.9999) mA (33 to 329.999) mA (0.33 to 1.09999) A (1.1 to 2.99999) A (3 to 10.9999) A (11 to 20.5) A	0.22 μA 0.38 μA 2.9 μA 29 μA 0.21 mA 1.1 mA 4.9 mA 18 mA	Multifunction calibrator Fluke 5522A
Resistance – Measure ³	Up to 100 Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ	17 mΩ 0.13 Ω 1.3 Ω 13 Ω 0.14 kΩ 5.2 kΩ 1.1 MΩ	DMM, HP 34401A
Resistance – Generate	Up to 10.9999 Ω (11 to 32.9999) Ω (33 to 110.9999) Ω	2.2 mΩ 3.3 mΩ 5.8 mΩ	Multifunction calibrator Fluke 5522A

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Resistance – Generate (Cont.)	(111 to 329.9999) Ω (0.33 to 1.099999) kΩ (1.1 to 3.299999) kΩ (3.3 to 10.99999) kΩ (11 to 32.99999) kΩ (33 to 109.99999) kΩ (110 to 329.99999) kΩ (0.33 to 1.099999) MΩ (1.1 to 3.299999) MΩ (3.3 to 10.99999) MΩ (11 to 32.99999) MΩ (33 to 109.9999) MΩ (110 to 329.9999) MΩ (330 to 1100) MΩ	8.7 mΩ 50 mΩ 85 mΩ 0.33 Ω 1.0 Ω 3.5 Ω 12 Ω 30 Ω 0.82 kΩ 1.9 kΩ 81 kΩ 0.61 MΩ 0.93 MΩ 11 MΩ	Multifunction calibrator, Fluke 5522A
Resistance – Fixed Points	1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ 10 GΩ 100 GΩ 1 TΩ	27 mΩ 0.27 Ω 5.4 Ω 58 Ω 1.6 kΩ 93 kΩ 5.8 MΩ 62 MΩ 1.2 GΩ 31 GΩ	High resistance standards IET Labs VRS-100- 11-1K-BP
Calibration of Magnetic Particle Machines –			
Head/Coil Shot AC Amperage	(0.5 to 2) kA (2 to 4) kA (4 to 6) kA (6 to 8) kA (8 to 10) kA	37 A 60 A 82 A 0.11 kA 0.13 kA	Ammeter w/shunt Magwerks SMTS-25
Head/Coil Shot DC Full Wave Amperage	(0.5 to 2) kA (2 to 4) kA (4 to 6) kA (6 to 8) kA (8 to 10) kA	38 A 59 A 82 A 0.1 kA 0.13 kA	
Head/Coil Shot DC Half Wave Amperage	(0.5 to 2) kA (2 to 4) kA (4 to 6) kA (6 to 8) kA (8 to 10) kA	37 A 59 A 82 A 0.11 kA 0.13 kA	

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Capacitance – Generate	(0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 32.9999) nF (33 to 109.999) nF (110 to 329.999) nF (0.33 to 1.09999) μF (1.1 to 3.29999) μF (3.3 to 10.9999) μF (11 to 32.9999) μF (33 to 109.999) μF (110 to 329.999) μF (0.33 to 1.09999) mF (1.1 to 3.29999) mF (3.3 to 10.9999) mF	37 pF 49 pF 43 pF 0.19 nF 0.33 nF 1.5 nF 3.5 nF 15 nF 32 nF 0.17 μF 0.5 μF 1.8 μF 4.8 μF 14 μF 46 μF	Multifunction calibrator, Fluke 5522A

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
Capacitance – Fixed Points			
100 pF	(0.1 to 20) kHz	0.75 pF	Standard capacitor set Arco SS32
200 pF	(0.1 to 20) kHz	0.9 pF	
300 pF	(0.1 to 20) kHz	1 pF	
400 pF	(0.1 to 20) kHz	1.2 pF	
500 pF	(0.1 to 20) kHz	1.3 pF	
600 pF	(0.1 to 20) kHz	1.5 pF	
700 pF	(0.1 to 20) kHz	1.6 pF	
800 pF	(0.1 to 20) kHz	1.9 pF	
900 pF	(0.1 to 20) kHz	1.9 pF	
1 nF	(0.1 to 20) kHz	2.1 pF	
2 nF	(0.1 to 20) kHz	3.7 pF	
3 nF	(0.1 to 20) kHz	5.1 pF	
4 nF	(0.1 to 20) kHz	6.6 pF	
5 nF	(0.1 to 20) kHz	8.2 pF	
6 nF	(0.1 to 20) kHz	9.7 pF	
7 nF	(0.1 to 20) kHz	11 pF	
8 nF	(0.1 to 20) kHz	13 pF	
9 nF	(0.1 to 20) kHz	14 pF	
10 nF	(0.1 to 20) kHz	16 pF	
20 nF	(0.1 to 20) kHz	31 pF	
30 nF	(0.1 to 20) kHz	46 pF	
40 nF	(0.1 to 20) kHz	61 pF	
50 nF	(0.1 to 20) kHz	78 pF	
60 nF	(0.1 to 20) kHz	92 pF	
70 nF	(0.1 to 20) kHz	0.11 nF	



Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
Capacitance – Fixed Points (Cont.)			
80 nF	(0.1 to 20) kHz	0.12 nF	Standard capacitor set Arco SS32
90 nF	(0.1 to 20) kHz	0.14 nF	
100 nF	(0.1 to 20) kHz	0.15 nF	
200 nF	(0.1 to 20) kHz	0.31 nF	
300 nF	(0.1 to 20) kHz	0.46 nF	
400 nF	(0.1 to 20) kHz	0.63 nF	
500 nF	(0.1 to 20) kHz	0.78 nF	
1 µF	(0.1 to 20) kHz	1.7 nF	
Inductance – Fixed Point			
100 mH	(0.1 to 1) kHz	0.12 mH	Standard inductor, Genrad 1482L
AC Voltage – Measure ³			
Up to 100 mV	(5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.45 mV 0.12 mV 0.2 mV 0.79 mV 5.2 mV	DMM, HP34401A
(0.1 to 1) V	(5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	4.4 mV 1.0 mV 1.9 mV 7.9 mV 52 mV	
(1 to 10) V	(5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	44 mV 11 mV 19 mV 79 mV 0.58 V	
(10 to 100) V	(5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.44 V 0.11 V 0.19 V 0.79 V 5.2 V	
(100 to 750) V	(5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	3.3 V 0.8 V 1.4 V 5.9 V 39 V	
(750 to 6000) V	(0 to 500) Hz (500 to 1000) Hz	69 V 140 V	

Parameter/Range	Frequency	CMC ^{2, 5} (±)	Comments
AC Voltage – Generate			
(1 to 32.999) mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	26 µV 9.1 µV 10 µV 31 µV 0.1 mV 0.24 mV	Multifunction calibrator, Fluke 5522A
(33 to 329.999) mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	86 µV 44 µV 48 µV 99 µV 0.23 mV 0.57 mV	
(0.33 to 3.29999) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.85 mV 0.44 mV 0.58 mV 0.84 mV 1.9 mV 8.4 mV	
(3.3 to 32.9999) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	8.3 mV 4.4 mV 6.7 mV 9.8 mV 25 mV	
(33 to 329.999) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	51 mV 57 mV 70 mV 87 mV 0.56 V	
(330 to 1020) V	(0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.25 V 0.21 V 0.25 V	
AC Current – Measure ³			
Up to 1 A	(5 to 10) Hz (0.01 to 5) kHz	4 mA 2.3 mA	DMM, HP 34401A
(1 to 3) A	(5 to 10) Hz (0.01 to 5) kHz	16 mA 7.4 mA	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Current – Measure ³ (Cont.) (3 to 20) A	(5 to 10) Hz (0.01 to 1) kHz (1 to 5) kHz	73 mA 72 mA 0.13 A	EL7520 w/34401A
AC Current – Generate (29 to 329.99) µA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.62 µA 0.49 µA 0.43 µA 0.9 µA 2.2 µA 4.4 µA	Multifunction calibrator, Fluke 5522A
(0.33 to 3.299999) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	5.2 µA 3.3 µA 2.7 µA 5.3 µA 21 µA 31 µA	
(3.3 to 32.9999) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	49 µA 27 µA 17 µA 26 µA 56 µA 0.11 mA	
(33 to 329.999) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.8 mA 0.25 mA 0.78 mA 0.82 mA 0.59 mA 1.2 mA	
(0.33 to 1.09999) A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	1.7 mA 0.52 mA 5.9 mA 25 mA	
(1.1 to 2.99999) A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	4.4 mA 3.1 mA 15 mA 62 mA	

Parameter/Range	Frequency	CMC ^{2,5,6} (\pm)	Comments
AC Current – Generate (Cont.)			
(3 to 10.9999) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	6.8 mA 29 mA 0.75 A	Multifunction calibrator, Fluke 5522A
(11 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	23 mA 85 mA 0.68 A	
(20 to 150) A (150 to 1025) A	(45 to 440) Hz (45 to 440) Hz	0.76 % 0.61 %	Fluke 5522A w/coil
Oscilloscopes –			
Leveled Sine Wave into 50 Ω			
(0.005 to 5.5) V _{p-p}	50 kHz (0.05 to 100) MHz (100 to 300) MHz (300 to 600) MHz	2 % 2.9 % 3.4 % 5.0 %	Multifunction calibrator, Fluke 5522A
Leveled Sine Wave Referenced to 50 kHz into 50 Ω			
(0.005 to 5.5) V _{p-p}	(0.05 to 100) MHz (100 to 300) MHz (300 to 600) MHz	1.4 % 1.8 % 3.3 %	
Time Marker into 50 Ω			
>1 V _{pk}	(5 to 0.05) s (50 to 0.1) ms (100 to 20) ns (20 to 5) ns (5 to 2) ns	4.8 parts in 10 ⁴ 2.4 parts in 10 ⁶ 2 parts in 10 ⁷ 7.5 parts in 10 ⁹ 9.1 parts in 10 ⁹	

Parameter/Equipment	Range	CMC ² (±)	Comments
Gauss Meters	(0 to 100) Gauss	0.29 Amps/Gauss	Helmholtz coil power supply
Electrical Calibration of Thermocouple Indicators –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C	5.4 °C 3.9 °C 3.6 °C 3.5 °C	Multifunction calibrator, Fluke 5522A
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.48 °C 0.19 °C 0.19 °C 0.27 °C 0.3 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.32 °C 0.21 °C 0.18 °C 0.19 °C 0.24 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.32 °C 0.24 °C 0.20 °C 0.28 °C 0.36 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410- to 1300) °C	0.75 °C 0.58 °C 0.34 °C 0.28 °C 0.28 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	1.3 °C 0.97 °C 0.56 °C 0.53 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.68 °C 0.36 °C 0.35 °C 0.41 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.54 °C 0.27 °C 0.19 °C 0.17 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTD's –			
Pt 385, 100 Ω	(-200 to -80) °C	0.2 °C	Multifunction calibrator, Fluke 5522A
	(-80 to 0) °C	0.1 °C	
	(-0 to 100) °C	0.13 °C	
	(100 to 300) °C	0.14 °C	
	(300 to 400) °C	0.18 °C	
	(400 to 630) °C	0.26 °C	
	(630 to 800) °C	0.21 °C	
Pt 3926, 100 Ω	(-200 to -80) °C	0.18 °C	
	(-80 to 0) °C	0.22 °C	
	(0 to 100) °C	0.11 °C	
	(100 to 300) °C	0.21 °C	
	(300 to 400) °C	0.18 °C	
	(400 to 630) °C	0.12 °C	
Pt 3916, 100 Ω	(-200 to -190) °C	0.23 °C	
	(-190 to -80) °C	0.23 °C	
	(-80 to 0) °C	0.19 °C	
	(0 to 100) °C	0.13 °C	
	(100 to 260) °C	0.11 °C	
	(260 to 300) °C	0.14 °C	
	(300 to 400) °C	0.13 °C	
	(400 to 600) °C	0.14 °C	
Pt 385, 200 Ω	(-200 to -80) °C	0.66 °C	
	(-80 to 0) °C	0.1 °C	
	(0 to 100) °C	0.09 °C	
	(100 to 260) °C	0.21 °C	
	(260 to 300) °C	0.28 °C	
	(300 to 400) °C	0.31 °C	
	(400 to 600) °C	0.36 °C	
Pt 385, 500 Ω	(-200 to -80) °C	0.26 °C	
	(-80 to 0) °C	0.05 °C	
	(0 to 100) °C	0.05 °C	
	(100 to 260) °C	0.1 °C	
	(260 to 300) °C	0.06 °C	
	(300 to 400) °C	0.06 °C	
	(400 to 630) °C	0.07 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTD's – (Cont.)			
Pt 385, 1000 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.14 °C 0.11 °C 0.13 °C 0.13 °C 0.16 °C 0.1 °C 0.18 °C 0.2 °C	Multifunction calibrator, Fluke 5522A
Pt Ni 385, 120 Ω	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.2 °C 0.15 °C 0.29 °C	
Cu 427, 10 Ω	(-100 to 260) °C	3.2 °C	

III. Mechanical

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Load Cells –			
Compression	Up to 2000 lbf (2000 to 100 000) lbf	0.67 % 0.17 %	Comparison to master load cells
Tension	Up to 2000 lbf (2000 to 100 000) lbf	0.73 % 0.17 %	
Pressure Gages ³	(-12 to 15) psig (15 to 100) psig (100 to 5000) psig (5000 to 20 000) psig	0.022 psig 0.14 psig 3.5 psig 12 psig	Comparison to digital pressure gage
Scales and Balances	(1 to 100) mg (100 to 500) mg 500 mg to 5 g (5 to 20) g (20 to 100) g 100 g to 1 kg (1 to 5) kg (5 to 20) kg	0.12 mg 0.12 mg 0.12 mg 0.14 mg 0.32 mg 0.13 g 92 mg 0.29 g	Verification with mass standards

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Torque Wrenches	(0 to 20) in·lbf (25 to 250) in·lbf (60 to 200) ft·lbf (200 to 2000) ft·lbf	0.35 in·lbf 0.56 % 0.88 % 0.54 %	Torque tester
Indirect Verification of Rockwell and Rockwell Superficial Hardness Tester ³	HRA: Low Middle High HRBW: Low Middle High HRC: Low Middle High HREW: Low Middle High HR15N: Low Middle High HR15TW: Low Middle High HR30N: Low Middle High HR30T: Low Middle High	1.0 HRA 1.0 HRA 0.5 HRA 1.5 HRB 1.0 HRB 1.0 HRB 1.0 HRC 1.0 HRC 0.5 HRC 1.0 HREW 1.0 HREW 1.0 HREW 1.0 HR15N 1.0 HR15N 0.7 HR15N 1.5 HR15TW 1.0 HR15TW 1.0 HR15TW 1.0 HR30N 1.0 HR30N 0.7 HR30N 1.5 HR30T 1.0 HR30T 1.0 HR30T	Indirect verification per ASTM E18
Indirect Verification of Brinell Hardness Testers – HBW 10/3000/15 HBW 10/300/15	(229 to 433) HBW 125 HBW	1.9 HBW 1.6 HBW	ASTM E10

Parameter/Equipment	Range	CMC ² (±)	Comments
Contour Probes	10 lbs 30 lbs 40 lbs	0.16 lbs 0.25 lbs 0.5 lbs	ASTM E-1444 NAVSEA T9074

IV. Time & Frequency

Parameter/Equipment	Frequency	CMC ² (±)	Comments
Frequency – Measure	Up to 225 MHz	0.13 Hz	Frequency counter Agilent 53132A
Frequency – Measuring Equipment	(0.01 to 119.99) Hz (0.12 to 1.1999) kHz (1.2 to 11.999) kHz (12 to 119.99) kHz (0.12 to 1.1999) MHz (1.2 to 2) MHz (2 to 600) MHz	12 mHz 0.12 Hz 1.2 Hz 12 Hz 0.12 kHz 1.2 kHz 12 kHz	Multifunction calibrator, Fluke 5522A w/ Agilent 53132A
Timers & Stopwatches	1 s to 24 Hr	20 ms	Frequency counter Agilent 53132A

¹This laboratory offers commercial calibration and field calibration service.

²Calibration and Measurement Capability Uncertainty (CMC) 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 or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³Field 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 actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found 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 actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches and D is the diameter in inches. In the statement of CMC, R is the numerical value of the resolution of the UUT in inches.

⁵The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction/percentage of the reading plus a fixed floor specification.

⁶In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.



Accredited Laboratory

A2LA has accredited

QUALITY TESTING SERVICES, INC.

Maryland Heights, MO

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 R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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).



Presented this 15th day of June 2017.

A handwritten signature in black ink, written over a horizontal line.

President and CEO
For the Accreditation Council
Certificate Number 2100.01
Valid to August 31, 2019

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