



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

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CALIBRATION

Valid To: May 31, 2019

Certificate Number: 3781.01

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} (±)	Comments
3 Point Bore Micrometers – Digital Vernier	(1 to 6) in (1 to 6) in	(86 + 8L) μin (120 + 5L) μin	Master setting rings
Angle Blocks	Up to 45°	3"	Sine bar, dial indicator, gage blocks
Calipers ³ – Digital Dial/Vernier	Up to 24 in (24 to 80) in Up to 24 in (24 to 80) in	(280 + 2.7L) μin (190 + 6.1L) μin (580 + 0.67L) μin (500 + 4.3L) μin	Mic-Trac universal measuring machine, gage blocks

(A2LA Cert. No. 3781.01) 05/22/2017

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Dial Indicators ³	Up to 1 in (1 to 4) in	21 µin 23.5 µin	Mic-Trac universal measuring machine
Gage Blocks –			
Length	(0.50 to 4) in (4 to 12) in	(2.6 + 3.1L) µin (1.9 + 4.2L) µin	Mechanical comparison
Flatness	Up to 12 in	1.7 µin	Optical flat
Glass Scales	Up to 16 in	(26 + 1.2L) µin	Mic-Trac universal measuring machine, microscope
Height Gages ³ –			
Digital	Up to 24 in	(300 + 1.8L) µin	Gage blocks
Dial / Vernier	Up to 24 in	(550 + 4.5L) µin	
Micrometer Length Standards ³	Up to 1 in (1 to 80) in	21 µin (14 + 3.6L) µin	Mic-Trac universal measuring machine, gage blocks
Micrometers ³ –			
Inside	Up to 1 in (1 to 80) in	38 µin (40 + 3.9L) µin	Mic-Trac universal measuring machine, gage blocks
Outside	Up to 2 in (2 to 80) in	41 µin (27 + 3.9L) µin	
Depth	Up to 80 in	(35 + 7L) µin	
Plain Ring Gages ³	(0.20 to 4) in (4 to 36) in	(36 + 4.5L) µin (46 + 1.6L) µin	Mic-Trac universal measuring machine, gage blocks

Parameter/Equipment	Range	CMC ^{2, 4, 6} (±)	Comments
Protractors, Levels & Clinometers	(0 to 360)°	3"	Sine bar, gage blocks, angle blocks, dial indicator
Rigid Rules/Tapes ³	Up to 80 in	(130 + 1.6L) μin	Mic-Trac universal measuring machine, microscope
Sine Bars – Flatness/Parallelism & Parallelism Cylinder to Base	Up to 5 in	47 μin	Mic-Trac universal measuring machine, test indicator,
Spheres / Ball Gages ³	Up to 1 in (1 to 2) in	20 μin 23 μin	Mic-Trac universal measuring machine
Squares – Parallelism & Flatness Angle	Up to 48 in 90°	120 μin 0.0012°	Mic-Trac universal measuring machine, test indicator
Parallel Bars	Up to 48 in	120 μin	Test Indicator, surface plate
Stage Micrometers	Up to 10 mm	43 μm	Mic-Trac universal measuring machine, microscope
Surface Plates ³ – Flatness Repeatability	Up to 72 in × 72 in Up to 72 in × 72 in	37 μin 48 μin	Electronic level system Repeat-O-Meter

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Thickness Gages – Ferrous Only	Up to 184 mils	0.67 % + 0.13 mils	Coating thickness standards
Coating Thickness Standards – Ferrous Only	Up to 184 mils	0.05 mils	Test indicator
Thread Wires/Pin Gages	Up to 1.0 in	19 μin	Mic-Trac universal measuring machine
Feeler Gages	(0.0010 to 0.025) in	19 μin	Mic-Trac universal measuring machine
Threaded Plugs – Pitch Diameter Major Diameter	(0.1 to 6) in (0.1 to 6) in	(20 + 8.8L) μin (21 + 8.7L) μin	Mic-Trac universal measuring machine, master thread wires
Threaded Rings ⁹ – Pitch Diameter Minor Diameter	Up to 6 in Up to 0.5 in (0.5 to 6) in	XX (Set Plug Tolerance) 290 μin (130 + 19L) μin	Set using master plug gages Bore micrometers, pin gages
Radius Gages	Up to 2 in	0.13 in	Radius overlay and optical comparator
Lead Gage Standards	Up to 6 in	(40 + 30L) μin	Mic-Trac universal measuring machine

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Optical Comparator ³ –			
Linear Axis	Up to 30 in	120 μin	Ball checker, glass scale, and gage blocks
Magnification	10x, 20x, 31.25x, 50x, 62.5x, 100x	130 μin	Master magnification scale
Angle	Up to 360°	50"	Angle blocks

II. Dimensional Testing/Calibration

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Length ⁸ –			
One Dimensional ³	Up to 1 in (1 to 80) in	8 μin (7.7 + 0.8L) μin	Renishaw laser system
Length ⁸ –			
One Dimensional ³	Up to 1 in (1 to 80) in Up to 10 in	22 μin (17 + 3.9L) μin 280 μin	Mic-Trac universal measuring machine Optical comparator
Angular Measurement ⁸	Up to 180°	0.031°	Optical comparator

III. Dimensional Testing

Parameter/Equipment	Range	Comments
Thread Profile ⁷ – Visual Inspection	(2 to 20) pitch	Comparison to MFR standard template and optical comparator

IV. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
DC Voltage – Generate ³	(0 to 330) mV (0.33 to 33) V (3.3 to 33) V (33 to 330) V (330 to 1020) V	73 $\mu\text{V}/\text{V} + 3\mu\text{V}$ 61 $\mu\text{V}/\text{V} + 5\mu\text{V}$ 61 $\mu\text{V}/\text{V} + 50\mu\text{V}$ 67 $\mu\text{V}/\text{V} + 500\mu\text{V}$ 66 $\mu\text{V}/\text{V} + 1500\mu\text{V}$	Fluke 5500A
DC Voltage – Measure ³	Up to 200 mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1050) V	9.4 $\mu\text{V}/\text{V} + 0.1\mu\text{V}$ 4.6 $\mu\text{V}/\text{V} + 0.4\mu\text{V}$ 4.4 $\mu\text{V}/\text{V} + 4\mu\text{V}$ 6.6 $\mu\text{V}/\text{V} + 40\mu\text{V}$ 6.7 $\mu\text{V}/\text{V} + 500\mu\text{V}$	Fluke 8508A

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage – Generate ³			
Up 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	0.47 % + 20 μV 0.19 % + 20 μV 0.25 % + 20 μV 0.31 % + 20 μV 0.47 % + 33 μV 1.2 % + 60 μV	Fluke 5500A
(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	0.31 % + 50 μV 0.07 % + 20 μV 0.14 % + 20 μV 0.33 % + 40 μV 0.4 % + 170 μV 2.2 % + 330 μV	
(0.33 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	0.12 % + 250 μV 0.05 % + 60 μV 0.12 % + 60 μV 0.31 % + 300 μV 0.4 % + 1700 μV 2.2 % + 3300 μV	
(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	0.28 % + 2.5 mV 0.08 % + 0.6 mV 0.012 % + 2.6 mV 0.43 % + 5 mV 0.5 % + 17 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.09 % + 6.6 mV 0.14 % + 15 mV 0.17 % + 33 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.09 % + 80 mV 0.33 % + 100 mV 0.33 % + 500 mV	

Parameter/Range	Frequency	CMC ^{2, 5, 6} (±)	Comments
AC Voltage – Measure ³			
200 mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (100 to 2000) Hz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	14 μV + 0.037 % 4 μV + 0.018 % 4 μV + 0.031 % 2 μV + 0.015 % 4 μV + 0.018 % 8 μV + 0.04 % 20 μV + 0.094%	Fluke 8508A
2 V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (100 to 2000) Hz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (300 to 1000) kHz	0.12 mV + 0.021 % 20 μV + 0.018 % 20 μV + 0.014 % 20 μV + 0.01 % 20 μV + 0.014 % 40 μV + 0.028 % 0.2 mV + 0.07% 2 mV + 0.37 % 20 mV + 1.7 %	
20V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (100 to 2000) Hz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (300 to 1000) kHz	1.2 mV + 0.021 % 0.2 mV + 0.017 % 0.2 mV + 0.012 % 0.2 mV + 0.01 % 0.2 mV + 0.014 % 0.4 mV + 0.026 % 2 mV + 0.067 % 20 mV + 0.37 % 0.2 V + 1.2 %	
200V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (100 to 2000) Hz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (300 to 1000) kHz	12 mV + 0.03 % 2 mV + 0.016 % 2 mV + 0.014 % 2 mV + 0.012 % 2 mV + 0.015 % 4 mV + 0.027 % 20 mV + 0.067 % 200 mV + 0.37 % 2 V + 1.2 %	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage – Measure ³ (cont)			
1000V	(1 to 10) Hz (10 to 40) Hz (40 to 10 000) Hz (10 to 30) kHz (30 to 100) kHz	70 mV + 0.019 % 21 mV + 0.016 % 20 mV + 0.015 % 40 mV + 0.032 % 0.2 V + 0.077 %	Fluke 8508A

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
DC Current – Generate ³	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 2.2) A (2.2 to 11) A (11 to 110) A (110 to 550) A	0.016 % + 150 µA 0.023 % + 120 µA 0.046 % + 120 µA 0.06 % + 470 µA 0.13 % + 710 µA 0.32 % of output + 0.5 A 0.4 % of output + 0.5 A	Fluke 5500A, 50 turn coil
DC Current – Measure ³	(0 to 200) µA (0.2 to 2) mA (2 to 20) mA 200 mA 2 A 20 A	18 µA/A + 0.4 nA 19 µA/A + 4 nA 17 µA/A + 40 nA 97 µA/A + 0.8 µA 220 µA/A + 20 µA 470 µA/A + 0.4 mA	Fluke 8508A

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Current – Generate ³			
Up to 330 µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.37 % + 0.15 µA 0.27 % + 0.15 µA 0.27 % + 0.25 µA 0.53 % + 0.15 µA 0.37 % + 0.15 µA	Fluke 5500A, 50 turn coil
(0.33 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	0.32 % + 0.3 µA 0.23 % + 0.3 µA 0.23 % + 0.3 µA 0.31 % + 0.3 µA 0.73 % + 0.3 µA	
(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	0.97 % + 3 µA 0.26 % + 3 µA 0.26 % + 3 µA 0.33 % + 3 µA 0.73 % + 3 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	0.36 % + 30 µA 0.26 % + 30 µA 0.26 % + 30 µA 0.33 % + 30 µA 0.73 % + 30 µA	
(0.33 to 2.2) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.28 % + 300 µA 0.2 % + 300 µA 0.9 % + 300 µA	
(2.2 to 11) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.25 % + 2 mA 0.26 % + 2 mA 0.45 % + 2 mA	
(11 to 110) A	(45 to 440) Hz	0.29 % of output + 0.5 A	
(110 to 550) A	(45 to 65) Hz	0.3 % of output + 0.5 A	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Current – Measure ³			
(0 to 200) µA	(1 to 10 000) Hz (10 to 30) kHz (30 to 100) kHz	0.056 % + 0.02 µA 0.068 % + 0.02 µA 0.47 % + 0.02 µA	Fluke 8508A
(0 to 2) mA	(1 to 10) Hz (10 to 10 000) Hz (10 to 30) kHz (30 to 100) kHz	0.037 % + 0.2 µA 0.047 % + 0.2 µA 0.1 % + 0.2 µA 0.47 % + 0.2 µA	
(0 to 20) mA	(1 to 10) Hz (10 to 10 000) Hz (10 to 30) kHz (30 to 100) kHz	0.04 % + 2 µA 0.033 % + 2 µA 0.08 % + 2 µA 0.47 % + 2 µA	
(0 to 200) mA	(1 to 10) Hz (10 to 10 000) Hz (10 to 30) kHz	0.04 % + 20 µA 0.055 % + 20 µA 0.08 % + 20 µA	
(0 to 2) A	(10 to 2000) Hz (2 to 10) kHz (10 to 30) kHz	0.07 % + 0.2 mA 0.092 % + 0.2 mA 0.37 % + 0.2 mA	
(0 to 20) A	(10 to 2000) Hz (2 to 10) kHz	0.1 % + 2 mA 0.29 % + 2 mA	

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
Resistance – Generate ³	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ (0.33 to 1.1) MΩ (1.1 to 33) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ	0.019 % + 0.008 Ω 0.014 % + 0.015 Ω 0.011 % + 0.015 Ω 0.011 % + 0.015 Ω 0.011 % + 0.06 Ω 0.011 % + 0.06 Ω 0.011 % + 0.6 Ω 0.011 % + 0.6 Ω 0.014 % + 6 Ω 0.014 % + 6 Ω 0.028 % + 55 Ω 0.021 % + 55 Ω 0.07 % + 0.55 kΩ 0.15 % + 0.55 kΩ 0.59 % + 5.5 kΩ 1.2 % + 17 kΩ	Fluke 5500A
Resistance – Measure ³	(0 to 2) Ω (2 to 20) Ω (20 to 200) Ω (200 to 2000) Ω (2 to 20) kΩ (20 to 200) kΩ (200 to 2000) kΩ (2 to 20) MΩ (20 to 200) MΩ (200 to 2000) MΩ	0.0022 % + 4 μΩ 0.0014 % + 8 μΩ 0.0013 % + 50 μΩ 0.0012 % + 0.5 mΩ 0.001 % + 5 mΩ 0.0012 % + 50 mΩ 0.0014 % + 1 Ω 0.0024 % + 100 Ω 0.015 % + 10 kΩ 0.2 % + 1 MΩ	Fluke 8508A
Capacitance – Generate ³	(0.33 to 0.5) nF (0.5 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF (0.3 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	0.59 % + 10 pF 0.6 % + 10 pF 0.6 % + 10 pF 0.6 % + 10 pF 0.32 % + 100 pF 0.33 % + 100 pF 0.303 % + 300 pF 0.31 % + 1 nF 0.42 % + 3 nF 0.41 % + 10 nF 0.48 % + 30 nF 0.59 % + 100 nF 0.85 % + 300 nF 1.2 % + 300 nF	Fluke 5500A

Parameter/Equipment	Range	CMC ^{2, 5, 6} (±)	Comments
Capacitance – Measure ³	Up to 100 pF 100 pF to 1 nF (1 to 10) nF (10 to 100) nF 100 nF to 100 mF	0.068 % 0.063 % 0.07 % 0.069 % 0.065 %	Precision LCR meter
Inductance – Measure ³	Up to 100 µH 100 µH to 1 mH (1 to 10) mH (10 to 100) mH 100 mH to 100 H	0.066 % 0.047 % 0.049 % 0.048 % 0.045 %	Precision LCR meter
Electrical Calibration of Thermocouple Indicators ³ – Generate & Measure			
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.39 °C 0.21 °C 0.19 °C 0.31 °C 0.48 °C	Fluke 5500A
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 0.19 °C 0.17 °C 0.2 °C 0.27 °C	
Electrical Calibration of RTD Indicators ³ – Generate			
Pt 385, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.06 °C 0.06 °C 0.08 °C 0.10 °C 0.12 °C 0.14 °C 0.27 °C	Fluke 5500A

Parameter/Equipment	Range	CMC ^{2, 5, 6} (±)	Comments
Oscilloscopes ³ –			
DC Voltage Function Specification			Fluke 5500Aopt300
50 Ω	Up to 2.2 V	100 μV + 0.31 %	
1 MΩ	Up to 33 V	100 μV + 0.3 %	
AC Square Wave Function			
50 Ω	1.8 mV to 2.2 V _{p-p}	100 μV + 0.32 %	
1 MΩ	4.5 mV to 95 V _{p-p} (95 to 105) V _{p-p}	100 μV + 0.3 % 100 μV + 0.59 %	
Edge – Rise Time	< 400 ps	<490 ps	
Leveled Sine Wave Flatness			
5 mV to 5.5 V	50 kHz to 100 MHz (100 to 300) MHz	100 μV + 1.8 % 100 μV + 3.3 %	
Time Marker	(2 to 10) ns 20 ns to 1 μs (2 to 50) μs 100 μs to 5 s	0.0002 % 0.00022 % 0.00022 % 0.0002 %	

V. Mechanical

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Brinell Hardness Testers ³ – HBW 10/3000/10	(200 to 650) HBW	6 HBW	Indirect verification per ASTM E10 HBW hardness blocks
Direct Verification of Brinell Hardness Testers ³ – Verification of the Test Force Verification of the Device for Measuring Indentation Diameters	≤ 3000 kgf 10 mm	31 kgf 47 μm	Direct verification per ASTM E10 Verification of the test force is by load cell Stage micrometer
Direct Verification of Durometers – Type A, B, C, D Indenter Geometry – Length Diameter Angle Radius Indenter Display Spring Calibration – Force	 Up to 0.2 in Up to 0.5 in (30 to 35) ° Up to 0.25 in (0 to 100) duro units (0 to 4100) g	 260 μin 260 μin 0.044° 260 μin 32 μin 4 g	ASTM D2240 Optical comparator Gage blocks Weight scale
Force – Tension & Compression Tension Only	 (0.5 to 45) lbf (45 to 300) lbf (0 to 10 000) lbf (5 to 50 000) lbf	 0.075 lbf 0.03 lbf 0.50 lbf 4.4 lbf	 Dead weight comparison Hydraulic loading, load cell comparison

Parameter/Equipment	Range	CMC ² (±)	Comments
Ultrasonic Thickness Gages ³ – Ferrous Only	Up to 0.5 in	710 µin	Gage blocks
Mass ³	1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 2000 g 1 lb 2 lb 5 lb 10 lb 20 lb 50 lb	0.61 mg 0.62 mg 0.66 mg 0.71 mg 0.99 mg 2.1 mg 4.1 mg 8.1 mg 60 mg 59 mg 0.0029 lb 0.0029 lb 0.0029 lb 0.0035 lb 0.0043 lb 0.007 lb	NIST Handbook 145 with Class F weights, digital scale
Scales and Balances	1 g to 2 kg Up to 600 lb	0.13 mg + 0.001 % 0.003 lb + 0.009 %	Class F weights
Pressure / Vacuum Gages and Transducers ³	Up to -25 inHg Up to 30 psi (30 to 400) psi (400 to 20 000) psi (20 000 to 30 000) psi (30 000 to 60 000) psi	0.007 inHg 0.032 % + 0.00053 psi 0.021 % + 0.0022 psi 0.01 % + 0.14 psi 6.4 psi 37 psi	Pressure transducers / deadweight tester
Indirect Verification of Rockwell Hardness Testers ³ – Mean Hardness Value	HRC: (20 to 39) HRC (40 to 59) HRC (60 to 70) HRC	0.71 HRC 0.89 HRC 0.71 HRC	Indirect verification per ASTM E18



Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Torque ³ – Torque Analyzers, Transducers	(5 to 30) in·lbf (30 to 400) in·lbf (80 to 1000) in·lbf (20 to 250) ft·lbf (100 to 1000) ft·lbf (200 to 2000) ft·lbf	0.0085 in·lbf + 0.24 % 0.056 in·lbf + 0.02 % 0.08 % 0.18 % 0.1 % 0.1 %	Torque arms w/ dead weight
Wrenches, Screwdrivers	(0.5 to 50) in·lbf (4 to 2000) ft·lbf	0.3 in·lbf 0.7 %	Torque transducers

VI. Thermodynamics

Parameter/Equipment	Range	CMC ² (±)	Comments
Relative Humidity	(20 to 90) % RH	1.5 % RH	Thermohygrometer
Temperature – Measure	(-15 to 0) °C (0 to 100) °C (100 to 200) °C (200 to 400) °C	0.03 °C 0.03 °C 0.05 °C 0.06 °C	SRPRT w/Precision DMM
IR Temperature – Measure	(100 to 400) °F	1.7 °F	Precision IR thermometer
Temperature ³ – Measuring Equipment	(0 to 400) °C	0.15 °C	Dry well
Temperature – IR Systems	(100 to 750) °F	3.9 °F	Blackbody calibrator

VII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 6} (±)	Comments
Optical Tachometers ³	Up to 200 000 rpm	0.0036 % + 0.001 rpm	Comparison to counter and lamp
Frequency ³ – Measure	0.1 Hz to 225 MHz	0.0018 %	Universal counter
Frequency ³ – Measuring Equipment	10 MHz	10 µHz	Universal counter 10MHz Output
	0.01 Hz to 10 kHz 10 kHz to 2 MHz	0.0074 % + 0.01 mHz 0.0074 % + 15 mHz	5500A
Stop Watches	60 s to 24 hr	17 ms + 0.0025 ms/s	Comparison to counter using the totalize method

¹ This laboratory offers commercial calibration, dimensional testing, and field calibration service.

² Calibration 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.

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 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.

⁴ In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches; t represents time.

⁵ The 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. CMC are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

⁶ In the statement of CMC the values listed with percent (%) are percent of reading or generated value unless otherwise noted.

⁷ This test is not equivalent to that of a calibration.

⁸ This laboratory meets *R205 – Specific Requirements: Calibration Laboratory Accreditation Program* for the types of dimensional tests listed and is considered equivalent to that of a calibration certificate.

⁹ Adjustable thread rings are set to applicable specifications using calibrated master set plug gages.

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Accredited Laboratory

A2LA has accredited

CAL-TEC, INC.

Broussard, LA

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/NCSLI 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 22nd day of May 2017.

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

President and CEO
For the Accreditation Council
Certificate Number 3781.01
Valid to May 31, 2019

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