SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: March 31, 2025 Certificate Number: 0117.04

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1, 9]:

I. Dimensional

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Bore Mics	Up to 2.8 in (2.8 to 10) in	64 µin 72 µin	Ring gages
Gage Blocks	Up to 3 in 4 in (5 to 20) in	4.5 µin 5.5 µin (5.3 + 0.5*L*) µin	Mechanical comparison with reference blocks
Angle Blocks	(0 to 360)°	0° 0’ 6 ”	Vision system
Length Standards	(1 to 72) in (> 72 to 120) in	(34 + 1.4*L*) µin (60 + 1.0*L*) µin	ULM
Calipers[3]	(4 to 120) in	(7.8 + 6.0*L* + 0.60*R*) µin	Gage blocks, plugs
Center Punches or Gage Markers	Up to 8 in	540 µin	Optical comparator
Coating Thickness Gages	(0.8 to 60) mils (> 60 to 2000) mils	(0.044 + 0.6*R*) mils (0.058 + 0.6*R*) mils	Shims

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Micrometers –			
Outside[3]	Up to 1 in (> 1 to 6) in (> 6 to 24) in (> 24 to 65) in	17 µin (51 + 9.4*L*) µin (77 + 8.6*L*) µin 0.0012 in	Gage blocks
Disc Micrometers	Up to 1 in	130 µin	
Inside Micrometers	Up to 40 in	(64 + 1.6*L*) µin	ULM
Feeler Gages	(0.001 to 0.5) in	41 µin	ULM
Height Gages[3]	(1 to 24) in (> 24 to 48) in	(36 + 1.4*L*) µin (28 + 9.2*L* + 0.60*R*) µin	Gage blocks, surface plate
Hex Plugs	Up to 1 in: Corner to Corner Flat to Flat Length	 45 µin 33 µin 170 µin	 ULM, Pratt & Whitney Supermicrometer™ Optical comparator
Indicators[3] – Dial/Digital	Up to 1 in (> 1 to 6) in	(24 + 0.60*R*) µin (27 + 0.60*R*) µin	Gage blocks, indicator calibrator
Laser Micrometers[3]	Up to 2 in	20 µin	Class XX pin
Surveillance Masters –			
Micrometer Set Master	Up to 6 in (> 6 to 12) in	31 µin 65 µin	ULM
Depth/Caliper Micrometer Master	Up to 12 in	32 µin	Gage head, gage blocks and surface plate
Optical Comparators[3]–			
Linearity	Up to 3 in (> 3 to 12) in	(130 + 0.60*R*) µin (210 + 0.60*R*) µin	Reticle, angle blocks, and inspection scale

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Optical Comparators[3]– (cont)			
Magnification	(10 to 100)X	(1400 + 0.60*R*) µin	Reticle, angle blocks, and inspection scale
Angularity	(0 to 360)°	4’ 0”	
Pin Gages	Up to 1 in	21 µin	ULM, Pratt & Whitney Supermicrometer™
Plugs	Up to 1.5 in (> 1.5 to 3.0) in (> 3.0 to 13) in	13 µin 18 µin 40 µin	Horizontal comparator ULM
Radius Gages	Up to 1 in (> 1 to 2) in	140 µin 150 µin	Video measuring machine
Shims	(0.8 to 60) mils (> 60 to 1000) mils	0.035 mils 51 mils	Indicator calibrator Electronic gage head ULM
Threaded Plugs –			
Major Diameter	Up to 3.5 in (> 3.5 to 10) in	40 µin 170 µin	ULM, Pratt & Whitney Supermicrometer™
Pitch Diameter	Up to 1.5 in (> 1.5 to 3.5) in (> 3.5 to 10) in	100 µin 160 µin 280 µin	
Thread Wires	Up to 0.26 in	18 µin	ULM
Plain Rings	0.04 to 1.5 in (> 1.5 to 3.0) in (> 3.0 to 10.0) in	17 µin 24 µin 40 µin	Horizontal comparator

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Adjustable Thread Rings –			
Minor Diameter	Up to 0.425 in (> 0.425 to 2.8) in (> 2.8 to 10) in	120 µin 130 µin 600 µin	Bore gage Video measuring machine
Pitch Diameter	Up to 3.5 in (> 3.5 to 10) in	220 µin 310 µin	Set plug
Tapered Thread Rings –			
Standoff L1 Length	Up to 6 in Up to 6 in	0.000 21 in 0.000 10 in	Gage blocks, indicator, NPT plug gage master
Microscopes (Linearity)[3]	(5 to 100)X Objective	4.0 µm + 0.6*R*	Reticle/stage micrometer
Tapered Thread Plugs –			
Pitch Diameter L1 Length	Up to 6 in Up to 6 in	0.000 10 in 0.000 10 in	Gage blocks, Pratt & Whitney Supermicrometer™, thread wires, indicator
Tri Roll Elements & Bi Element Segments	(4 to 80) TPI	0.0002 in	Overlays, optical comparator
Reticles[3] –			
Linearity	Up to 12 in (0 to 304.8) mm	94 µin 0.0024 mm	Vision system
Angle	(0 to 360)°	0° 1’ 0 ”	

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Surface Plates[3] –			
Flatness	Up to 17 in Diagonal	200 µin	Contact CMM Electronic levels
	(16 to 195) in Diagonal	6√Dia	Dia is diagonal in inches
Repeat		23 µin	Repeat-o-meter
Bench Micrometers, Pratt & Whitney Supermicrometer™[3]	Up to 2 in	20 µin	Gage blocks, force gage, optical parallels
Rules[3]	Up to 18 in (>18 to 78) in	0.000 50 in 0.0032 in	Gage blocks, vision system
Ultrasonic Thickness Gages	(0.001 to 2) in	850 µin + 0.6*R*	Gage blocks

II. Dimensional Testing

Parameter/Equipment	Range	CMC[2] (±)	Comments
Thread Inspection[5] –			
Tri-roll Gauging: External Threads	Up to 1⅞ in	0.0003 in	FED-STD H28/20A (systems 21, 22, & 23); MIL-S-8879, AS 8879, MIL-S-007742
Bi-Element: Internal Threads	#10 to 1⅝ in	0.0003 in	MIL-DTL-1222J; FEDSTD H28/20; ANSI/ASME B1.1M
External Threads: Ring Gauges (Go-No-Go)	Up to 1½ in	0.000 27 in	MIL-S-8879, AS 8879; ANSI/ASME B1. 3M

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Thread Inspection[5] – (cont) Internal Threads: Thread Plug	#10 to 1⅝ in	0.000 24 in	MIL-S-007742 Pratt & Whitney Supermicrometer™
Length[5]	Up to 20 in Up to 20 in Up to 6 in	(18 + 2.7*L*) µin 200 µin 190 µin	ULM Vision system Optical comparator
Angle[5]	(0 to 360)°	0° 0’ 6 ” 0° 4’ 0 ”	Vision system Optical comparator
Radius[5]	Up to 6 in	220 µin	Video measuring machine
Surface Finish	Ra (5 to 250) µin Ry (Rmax)/Rz (20 to 250) µin	4 µin 18 µin	Surface finish tester Surface finish tester

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
DC Voltage[3] – Measure	Up to 200 mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V	5.0 µV/V + 100 nV 3.6 µV/V + 400 nV 3.6 µV/V + 4.0 µV 5.6 µV/V + 40 µV 5.6 µV/V + 500 µV	Fluke 8508A

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
DC Voltage[3] – Generate	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1000) V	16 µV/V + 0.8 µV 9 µV/V + 2.0 µV 9 µV/V + 16 µV 14 µV/V + 120 µV 14 µV/V + 1.2 mV	Fluke 5522A
DC Current[3] – Measure	Up to 200 µA 200 µA to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	13 µA/A + 0.40 nA 12 µA/A + 4.0 nA 14 µA/A + 40 nA 48 µA/A + 0.80 µA 0.019 % + 16 µA 0.041 % + 0.40 mA	Fluke 8508A
DC Current[3] – Generate	(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	120 µA/A + 0.020 µA 78 µA/A + 0.040 µA 78 µA/A + 0.20 µA 78 µA/A + 1.9 µA 160 µA/A + 31 µA 300 µA/A +31 µA 390 µA/A + 390 µA 780 µA/A + 580 µA	Fluke 5522A
Clamp-On Only	(20 to 50) A (> 50 to 1025) A	12 % output + 0.14 A 5.0 % output + 0.50 A	Fluke 5500A/coil and Fluke 5522A
DC Resistance[3] – Measure	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ to 2 GΩ	20 µΩ/Ω + 4.0 µΩ 10 µΩ/Ω + 14 µΩ 9.0 µΩ/Ω + 50 µΩ 9.0 µΩ/Ω + 0.50 mΩ 9.0 µΩ/Ω + 5.0 mΩ 12 µΩ/Ω + 50 mΩ 91 µΩ/Ω + 1.0 Ω 33 µΩ/Ω + 100 Ω 0.027 % + 10 kΩ 0.16 % + 1.0 MΩ	Fluke 8508A
Electrical Simulation of RTDs[3] –			
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.040 °C 0.050 °C 0.070 °C 0.080 °C 0.090 °C 0.18 °C	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Electrical Simulation of RTDs[3] – (cont)			
Pt 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.040 °C 0.050 °C 0.070 °C 0.080 °C 0.090 °C	Fluke 5522A
Pt 3916, 100 Ω	(-200 to -190) °C (-190 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	0.19 °C 0.030 °C 0.040 °C 0.050 °C 0.050 °C 0.060 °C 0.070 °C 0.080 °C 0.18 °C	
DC Resistance[3] – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω 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 330 kΩ to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ 330 MΩ to 1.1 GΩ	31 μΩ/Ω + 0.010 Ω 23 μΩ/Ω + 0.012 Ω 22 μΩ/Ω + 0.012 Ω 22 μΩ/Ω + 0.016 Ω 22 μΩ/Ω + 0.016 Ω 22 μΩ/Ω + 0.16 Ω 22 μΩ/Ω + 0.08 Ω 22 μΩ/Ω + 0.78 Ω 22 μΩ/Ω + 0.78 Ω 25 μΩ/Ω + 7.8 Ω 25 μΩ/Ω + 7.8 Ω 47 μΩ/Ω + 120 Ω 100 μΩ/Ω + 200 Ω 200 μΩ/Ω+ 1.9 kΩ 390 μΩ/Ω + 2.3 kΩ 0.23 % + 77 kΩ 1.1 % + 390 kΩ	Fluke 5522A
Electrical Simulation of Thermocouples[3] –			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.39 °C 0.12 °C 0.11 °C 0.12 °C 0.16 °C	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Electrical Simulation of Thermocouples[3] – (cont)			
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.21 °C 0.12 °C 0.11 °C 0.13 °C 0.18 °C	Fluke 5522A
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.26 °C 0.14 °C 0.12 °C 0.20 °C 0.31 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (1000 to 1372) °C	0.31 °C 0.17 °C 0.15 °C 0.14 °C 0.21 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.44 °C 0.27 °C 0.26 °C 0.31 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.36 °C 0.28 °C 0.29 °C 0.36 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.49 °C 0.19 °C 0.12 °C 0.11 °C	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Voltage[3] – Measure			
Up to 200 mV	1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz	0.018 % + 14 µV 0.015 % + 4.0 µV 0.013 % + 4.0 µV 0.013 % + 2.0 µV	Fluke 8508A

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Voltage[3] – Measure (cont)			Fluke 8508A
Up to 200 mV	(2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.014 % + 4.0 µV 0.034 % + 8.0 µV 0.077 % + 20 µV	
200 mV to 2 V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.016 % + 120 µV 0.013 % + 20 µV 97 µV/V + 20 µV 83 µV/V + 20 µV 0.011 % + 20 µV 0.022 % + 40 µV 0.057 % + 200 µV 0.32 % + 2.0 mV 1.1 % + 20 mV	
(2 to 20) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.015 % + 1.2 mV 0.012 % + 200 µV 91 µV/V + 200 µV 76 µV/V + 200 µV 0.011 % + 200 µV 0.022 % + 400 µV 0.057 % + 2.0 mV 0.30 % + 20 mV 1.0 % + 200 mV	
(20 to 200) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.015 % + 12 mV 0.012 % + 2.0 mV 90 µV/V + 2.0 mV 75 µV/V + 2.0 mV 0.011 % + 2.0 mV 0.023 % + 4.0 mV 0.057 % + 20 mV 0.31 % + 200 mV 1.0 % + 2.0 V	
(200 to 1000) V	(1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.016 % + 70 mV 0.012 % + 20 mV 0.013 % + 20 mV 0.023 % + 40 mV 0.059 % + 200 mV	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Voltage[3] – Generate			
(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	0.062 % + 5.0 µV 0.012 % + 5.0 µv 0.016 % + 5.0 µv 0.078 % + 5.0 µv 0.27 % + 9.0 µV 0.62 % + 39 µV	Fluke 5522A
(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 % + 6.0 µV 0.011 % + 6.0 µV 0.012 % + 6.0 µV 0.027 % + 6.0 µV 0.062 % + 25 µV 0.16 % + 54 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 % + 39 µV 0.012 % + 47 µV 0.015 % + 47 µV 0.030 % + 39 µV 0.054 % + 97 µV 0.18 % + 470 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	0.023 % + 510 µV 0.012 % + 470 µV 0.019 % + 470 µV 0.027 % + 470 µV 0.07 % + 1.2 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.015 % + 1.6 mV 0.016 % + 4.7 mV 0.019 % + 4.7 mV 0.023 % + 4.7 mV 0.16 % + 39 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.023 % + 7.8 mV 0.019 % + 7.8 mV 0.023 % + 7.8 mV	
AC Current[3] – Measure			
Up to 200 µA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.058 % + 20 nA 0.058 % + 20 nA 0.074 % + 20 nA 0.40 % output + 20 nA	Fluke 8508A

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Current[3] – Measure (cont)			
200 µA to 2 mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.046 % + 200 nA 0.031 % + 200 nA 0.072 % + 200 nA 0.40 % output + 200 nA	Fluke 8508A
(2 to 20) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.035 % + 2.0 µA 0.031 % + 2.0 µA 0.072 % + 2.0 µA 0.40 % output + 2.0 µA	
(20 to 200) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.032 % + 20 µA 0.030 % + 20 µA 0.063 % + 20 µA	
200 mA to 2 A	10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.063 % + 200 µA 0.074 % + 200 µA 0.30 % output + 200 µA	
(2 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	0.083 + 2.0 mA 0.25 % output + 2.0 mA	
AC Current[3] – Generate			
(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 % output + 0.10 µA 0.12 % output + 0.10 µA 0.10 % output + 0.10 µA 0.23 % output + 0.10 µA 0.62 % output + 0.20 µA 1.2 % output + 0.30 µA	Fluke 5522A
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 % output + 0.12 µA 0.10 % output + 0.10 µA 0.08 % output + 0.10 µA 0.16 % output + 0.20 µA 0.39 % output + 0.20 µA 0.78 % output + 0.50 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 (10 to 30) kHz	0.14 % output + 2.0 µA 0.070 % output + 1.6 µA 0.030 % output + 1.6 µA 0.060 % output + 1.6 µA 0.16 % output + 2.3 µA 0.31 % output + 3.0 µA	

Parameter/Range	Frequency	CMC[2, 7] (±)	Comments
AC Current[3] – Generate (cont)			
(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 % output + 16 µA 0.070 % output + 16 µA 0.030 % output + 16 µA 0.080 % output + 39 µA 0.16 % output + 78 µA 0.31 % output + 160 µA	Fluke 5522A
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 % output + 78 µA 0.050 % output + 78 µA 0.47 % output + 780 µA 1.9 % output + 3.9 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 % output + 78 µA 0.05 % output + 78 µA 0.47 % output + 0.8 mA 1.9 % output + 3.8 mA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.050 % output + 1.6 mA 0.08 % output + 1.6 mA 2.3 % output + 1.6 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.09 % output + 3.8 mA 0.12 % output + 3.8 mA 2.3 % output + 5.0 mA	
(20.5 to 55) A	(45 to 65) Hz (65 to 440) Hz	3.3 % output + 0.25 A 9.2 % output + 0.25 A	Fluke 5500A coil and Fluke 5522A
(55 to 150) A	(45 to 65) Hz (65 to 440) Hz	9.7 % output + 0.25 A 8.5 % output + 0.25 A	
(150 to 550) A	(45 to 440) Hz	4.3 % output + 1.0 A	
(550 to 1025) A	(45 to 440) Hz	7.8 % output + 1.0 A	

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Capacitance[3] – Generate	(0.19 to 0.3999) nF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 32.9999) nF	0.4 % + 0.01 nF 0.4 % + 0.01 nF 0.39 % + 0.01 nF 0.19 % + 0.01 nF 0.19 % + 0.1 nF	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 7] (±)	Comments
Capacitance[3] – Generate (cont)	(33 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 99) µF (1.1 to 3.299 99) µF (3.3 to 10.9999) µF (11 to 32.9999) µF (33 to 109.999) µF (110 to 329.999) µF 0.33 µF to 1.099 99 mF (1.1 to 3.2999) mF (3.3 to 10.9999) mF (11 to 32.9999) mF (33 to 110) mF	0.19 % + 0.1 nF 0.19 % + 0.2 nF 0.19 % + 1 nF 0.19 % + 2 nF 0.19 % + 8 nF 0.31 % + 23 nF 0.35 % + 78 nF 0.35 % + 230 nF 0.35 % + 1 µF 0.35 % + 2 µF 0.35 % + 8 µF 0.58 % + 23 µF 0.85 % + 78 µF	Fluke 5522A
Oscilloscopes: Leveled Sine Wave – Generate, 50 kHz Reference			
5 mV to 5.5 $V_{(pk\text{-}pk)}$	50 kHz 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	1.6 % + 230 µV 2.7 % + 230 µV 3.1 % + 230 µV 4.7 % + 230 µV 5.4 % + 230 µV	Fluke 5522A/SC1100
Flatness (Relative to 50 kHz Ref)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	1.2 % + 78 µV 1.6 % + 78 µV 3.1 % + 78 µV 3.9 % + 78 µV	
Vertical Gain – DC			
Into 50 Ω	(0 to 6.6) V	0.19 % + 31 µV	
Into 1 MΩ	(0 to 130) V	0.04 % + 31 µV	
AC			
Into 50 Ω	1 mV to 6.6 $V_{(pk\text{-}pk)}$	0.19 % + 31 µV	
Into 1 MΩ	1 mV to 130 $V_{(pk\text{-}pk)}$	0.08 % + 31 µV	
Time Markers – Into 50 Ω	5 s to 50 ms 20 ms to 2 ns	19 + t·780 µs/s 2 µs/s	t = time in seconds

IV. Mechanical

Parameter/Equipment	Range	CMC[2, 4, 6] (±)	Comments
Balances & Scales[3]	Up to 1 mg (> 1 to 500) mg > 500 mg to 5 g (> 5 to 20) g (> 20 to 50) g (> 50 to 100) g (> 100 to 200) g (> 200 to 500) g > 500 g to 2.5 kg (> 10 to 25) lb (> 25 to 50) lb (> 50 to 1000) lb	0.0012 mg 0.0022 mg 0.012 mg 0.021 mg 0.033 mg 0.039 mg 0.061 mg 0.093 mg 19 mg 0.000 51 lb 0.000 71 lb 0.024 lb	Class 1 weights Class F weights
Deadweight Testers	Up to 20 000 psi	0.04 %	Fluke RPM4
Force[3] – Gages & Cells (Compression & Tension) Speed Displacement	Up to 150 g (> 150 to 2000) g Up to 10 lbs (>10 to 100) lbf (>100 to 500) lbf (500 to 25 000) lbf (>25 000 to 100 000) lbf (>100 000 to 200 000) lbf (1 to 12) in-min Up to 25 in	0.0012 g + 0.6*R* 0.014 g + 0.6*R* 0.001 lbf + 0.6*R* 0.0085 lbf+ 0.6*R* 0.10 lbf + 0.6*R* 0.12 % 0.25 % 0.10 % 0.001 in/min 0.014 in	Dead weight Load cells, ASTM E4, ISO 7500 GB2 indicator/encoder, stopwatch
Mass	1 mg (> 1 to 500) mg (1 to 5) g (> 5 to 20) g (> 20 to 50) g (> 50 to 100) g (> 100 to 200) g (> 200 to 500) g > 500 g to 6.2 kg (> 6.2 to 11.3398) kg (> 11.3398 to 22.6796) kg	0.0022 mg 0.0032 mg 0.011 mg 0.019 mg 0.031 mg 0.038 mg 0.060 mg 0.093 mg 14 mg 210 mg 300 mg	Class 1 weights Class F weights

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3]	HRA: (20 to 65) HRA (70 to 78) HRA (80 to 84) HRA HRBW: (40 to 59) HRBW (60 to 79) HRBW (80 to 100) HRBW HRC: (20 to 30) HRC (35 to 55) HRC (60 to 65) HRC HREW: (74 to 79) HREW (84 to 90) HREW (93 to 100) HREW HRFW: (60 to 75) HRF (80 to 90) HRF (94 to 100) HRF HR15N: (70 to 77) HR15N (78 to 88) HR15N (90 to 92) HR15N HR15TW: (74 to 80) HR15TW (81 to 86) HR15TW (87 to 93) HR15TW HR30N: (42 to 50) HR30N (55 to 73) HR30N (77 to 82) HR30N HR30TW: (43 to 56) HR30TW (57 to 69) HR30TW (70 to 83) HR30TW HR45N: (20 to 31) HR45N (37 to 61) HR45N (66 to 72) HR45N	 0.28 HRA 0.20 HRA 0.17 HRA 0.42 HRBW 0.32 HRBW 0.42 HRBW 0.39 HRC 0.34 HRC 0.32 HRC 0.38 HREW 0.20 HREW 0.51 HREW 0.47 HRF 0.46 HRF 0.48 HRF 0.40 HR15N 0.42 HR15N 0.52 HR15N 0.28 HR15TW 0.27 HR15TW 0.44 HR15TW 0.24 HR30N 0.25 HR30N 0.22 HR30N 0.57 HR30TW 0.27 HR30TW 0.23 HR30TW 0.26 HR45N 0.28 HR45N 0.27 HR45N	ASTM E18; ISO EN 6508-2

Parameter/Equipment	Range	CMC[2, 4, 6, 8] (±)	Comments
Indirect Verification of Rockwell Hardness Testers[3] (cont.)	HR45TW: (13 to 32) HR45TW (33 to 52) HR45TW (53 to 73) HR45TW	 0.73 HR45TW 0.45 HR45TW 0.39 HR45TW	ASTM E18; ISO EN 6508-2
Indirect Verification of Brinell Hardness Testers[3] at Test Conditions –			
HBW 10/500/15	(100 to 200) HBW	2.5 HBW	ASTM E10 ISO EN 6506-2
HBW 10/1000/15	(200 to 300) HBW	3.7 HBW	
HBW 10/1500/15	(300 to 400) HBW	2.9 HBW	
HBW 10/3000/15	(200 to 400) HBW (500 to 600) HBW	3.1 HBW 3.1 HBW	
Indirect Verification of Microindentation Hardness Testers[3] –			
Vickers	(100 to 240) HV (240 to 600) HV > 600 HV	4.3 HV 7.4 HV 16 HV	ASTM E92 ISO EN 6507-2
Knoop	(100 to 250) HK (250 to 650) HK > 650 HK	6.4 HK 12 HK 19 HK	ISO EN 4545-2
Indirect Verification of Leeb Hardness Testers[3], Fixed Point	780 HLD	10 HLD	ASTM A956
Pressure – Measure			
Pneumatic	(Up to 30) psi (> 30 to 1000) psi (> 1000 to 10 000) psi	0.016 % + 0.60*R* 0.04 % + 0.60*R* 0.06 % + 0.60*R*	Fluke PPC4 module RPM4 module

Parameter/Equipment	Range	CMC[2, 4, 6, 8] (±)	Comments
Pressure – Measure (cont) Hydraulic	Up to 40 000 psi	0.070 % + 0.60*R*	RPM4 module
Torque Multipliers	Up to 6500 lbf·ft	0.35 %	Torque transducers
Torque Transducers	(5 to 100) lbf·in (10 to 200) lbf·ft (> 200 to 2000) lbf·ft	(0.011 + 0.0001*T*) lbf·in + 0.60*R* (0.008 + 0.0001*T*) lbf·ft + 0.60*R* (0.016 + 0.0001*T*) lbf·ft + 0.60*R*	Torque arms, wheels class F weights
Torque Wrenches	(0 to 100) lbf·in (> 100 to 2400) lbf·in (10 to 200) lbf·ft (> 200 to 2000) lbf·ft	0.75 % + 0.60*R* 1.1 % + 0.60*R* 0.94 % + 0.60*R* 1.3 % + 0.60*R*	Torque, indicator, transducers

V. Thermodynamics

Parameter/Equipment	Range	CMC[2, 8] (±)	Comments
Humidity – Measuring Equipment	(10 to 20) % RH (> 20 to 90) % RH @ 20°C	1.0 % RH 0.7 % RH	Thunder Scientific 2500
Temperature – Measure, Infrared	(-15 to 120) °C (> 120 to 200) °C (> 200 to 500) °C	0.74 °C 0.89 °C 2.0 °C	Black body
Temperature[3] – Measuring Equipment	(-197 to -40) °C (> -40 to 0) °C (> 0 to 300) °C (> 300 to 400) °C (> 400 to 500) °C (> 500 to 660) °C	0.39 °C 0.12 °C 0.18 °C 0.35 °C 0.70 °C 0.74 °C	PRT, baths & blackstack

Parameter/Equipment	Range	CMC[2, 4, 8] (±)	Comments
Temperature – Measure	(-197 to 300) °C (300 to 500) °C (500 to 660) °C	0.01 °C 0.02 °C 0.03 °C	PRT and blackstack
Temperature[3] – Measure System Accuracy Test (SAT), Controllers, Ovens, Furnaces, Freezer	(-196 to 1204) °C	1.3 °C + 0.6*R*	AMS 2750 Fluke 726, 754 with T/C
Temperature[3] – Measure Temperature Uniformity Surveys (TUS), Ovens, Furnaces	(0 to 1093) °C (>1093 to 1327) °C	2.1 °C + 0.6*R* 2.7 °C + 0.6*R*	AMS2750
Temperature Uniformity Surveys (TUS), Ovens, Furnaces	(0 to 1093) °C (>1093 to 1327) °C	2.1 °C + 0.6*R* 2.7 °C + 0.6*R*	General manufacturing procedures Type K TC Fluke 726, 754 DATA PAQ logger

VI. Time and Frequency

Parameter/Equipment	Range	CMC[2, 4, 6, 8] (±)	Comments
Stopwatches[3]	15 s to 24 hr	0.20 s	NIST website
Frequency[3] – Measuring Equipment	0.01 Hz to 2 MHz	2.0 µHz/Hz + 5.0 µHz	Fluke 5522A
Optical Tachometers	Up to 100 RPM (> 100 to 200 000) RPM	0.001 RPM + 0.6*R* 0.005 % + 0.6*R*	Fluke 5522 and stroboscope

[1] This laboratory offers commercial calibration service 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. 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; *R* is the numerical value of the resolution of the device in the indicated units. In the Statement of CMC, *T* is the numerical value of the nominal torque of the device measured in lbf·ft or lbf·in.

[5] This test is not equivalent to that of a calibration.

[6] In the statement of CMC, a percent refers to a percentage of reading unless otherwise noted.

[7] 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's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

[8] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

[9] This scope meets A2LA's *P112 Flexible Scope Policy*.

Accredited Laboratory

A2LA has accredited

LABORATORY TESTING, INC.

Hatfield, PA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *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 April 2017).

Presented this 1st day of March 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 117.04
Valid to March 31, 2025

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

March 1, 2023

Jonathan Faia
Laboratory Testing, Inc.
2331 Topaz Drive
Hatfield, PA 19440-1936

Dear Mr. Faia,

Congratulations! Your organization has been approved for accreditation by the American Association for Laboratory Accreditation (A2LA) in the mechanical and chemical testing and calibration fields for the tests and calibrations identified on your Scopes of Accreditation. Your Certificates and Scopes of Accreditation will also be added to the searchable database of accredited organizations on our website, www.A2LA.org. Please note, it may take up to one business day for the newly issued certificate and scope to appear on our online directory.

Your organization is now accredited to ISO/IEC 17025: 2017 through March 31, 2025, by virtue of the on-site assessment of your organization which took place February 6-9, 2023, and an evaluation of all activity related to the assessment by the A2LA Accreditation Council. One year prior to your accreditation anniversary date, you must pay an annual review fee and submit updated information on your organization. In addition, A2LA must be notified in writing within 30 days at any time that significant changes occur in your organization's location – i.e. ownership, management, authorized representative, primary contact, or major facilities.

As an organization accredited by A2LA, you can enjoy the benefits of using your accreditation for promotional and advertising purposes. The A2LA requirements for referring to your A2LA Accredited status may be found in document R105 – Requirements When Making Reference to A2LA Accredited Status located on your CAB portal along with various versions of the 'A2LA Accredited' symbol. As noted in this document, the ILAC MRA mark may only be used in economies where it is registered. A2LA has also made the promotion of your A2LA Accreditation easy by providing you with helpful tips and advice in our 'G125 - A2LA Promotion of Accreditation Information' also located on your CAB Portal. Please be sure to read both documents to ensure you are maximizing the benefits of promoting your A2LA Accreditation. When promoting or providing proof of your accreditation, please use your Scopes of Accreditation, as this document details the specific tests and calibrations which are accredited. The Certificates are to be used for display purposes only.

We would like to take this opportunity to say that we appreciate your participation in the leading national accreditation program and we welcome your questions and feedback at any time. We are pleased that you have chosen to continue as an A2LA accredited organization.

Sincerely,

Trace McInturff
Vice President, Accreditation Services

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