



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

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CALIBRATION

Valid To: March 31, 2027

Certificate Number: 0117.04

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), 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 3 in (> 3 to 10) in	6.6 µin 72 µin	Ring gages
Gage Blocks – Length Only	Up to 1 in (> 1 to 4) in (5 to 20) in	2.8 µin (2.5 + 0.3L) µin (5.3 + 0.5L) 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 + 1.4L) µin (60 + 1.0L) µin	ULM
Calipers ³	(4 to 120) in	(7.8 + 6.0L + 0.60R) µin	Gage blocks, plugs
Center Punches or Gage Markers	Up to 8 in	540 µin	Optical comparator

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Coating Thickness Gages	(0.8 to 60) mils (> 60 to 2000) mils	(0.044 + 0.6R) mils (0.058 + 0.6R) mils	Shims
Micrometers – Outside ³ Disc Micrometers Inside Micrometers	Up to 1 in (> 1 to 6) in (> 6 to 24) in (> 24 to 65) in Up to 1 in Up to 40 in	17 μ in (51 + 9.4L) μ in (77 + 8.6L) μ in 0.0012 in 130 μ in (64 + 1.6L) μ in	Gage blocks ULM
Feeler Gages	(0.001 to 0.5) in	41 μ in	ULM
Height Gages ³	(1 to 24) in (> 24 to 48) in	(7.1 + 1.4L) μ in (28 + 9.2L + 0.60R) μ in	Gage blocks, surface plate
Hex Plugs	Up to 1 in: Corner to Corner Flat to Flat Length	45 μ in 33 μ in 170 μ in	ULM, Pratt & Whitney Supermicrometer™ Optical comparator
Indicators ³ – Dial/Digital	Up to 1 in (> 1 to 6) in	(24 + 0.60R) μ in (27 + 0.60R) μ in	Gage blocks, indicator calibrator
Laser Micrometers ³	Up to 2 in	20 μ in	Class XX pin
Surveillance Masters – Micrometer Set Master Depth/Caliper Micrometer Master	Up to 6 in (> 6 to 12) in Up to 12 in	31 μ in 65 μ in 32 μ in	ULM Gage head, gage blocks and surface plate

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Optical Comparators ³ –			
Linearity	Up to 3 in (> 3 to 12) in	(130 + 0.60R) μ in (210 + 0.60R) μ in	Reticle, angle blocks, & inspection scale
Magnification	(10 to 100)X	(1400 + 0.60R) μ in	
Angularity	(0 to 360) $^{\circ}$	4' 0"	
Pin Gages	Up to 1 in	21 μ in	ULM, Pratt & Whitney Supermicrometer TM
Plugs	Up to 1.5 in (> 1.5 to 3.0) in (> 3.0 to 13) in	13 μ in 18 μ in 40 μ in	Horizontal comparator ULM
Radius Gages	Up to 1 in (> 1 to 2) in	140 μ in 150 μ in	Video measuring machine
Shims	(0.8 to 60) mils (> 60 to 1000) mils	0.035 mils 0.051 mils	Indicator calibrator Electronic gage head ULM
Threaded Plugs –			
Major Diameter	Up to 3.5 in (> 3.5 to 10) in	50 μ in 170 μ in	ULM, Pratt & Whitney Supermicrometer TM
Pitch Diameter	Up to 1.5 in (> 1.5 to 3.5) in (> 3.5 to 10) in	100 μ in 160 μ in 280 μ in	
Thread Wires	Up to 0.26 in	18 μ in	
Plain Rings	0.04 to 1.5 in (> 1.5 to 3.0) in (> 3.0 to 10.0) in	11 μ in 13 μ in 40 μ in	Horizontal comparator

Parameter/Equipment	Range	CMC ^{2,4} ($\pm$)	Comments
Adjustable Thread Rings –			
Minor Diameter	Up to 0.425 in (> 0.425 to 2.8) in (> 2.8 to 10) in	120 μ in 130 μ in 600 μ in	Bore gage Video measuring machine
Pitch Diameter	Up to 3.5 in (> 3.5 to 10) in	220 μ in 310 μ in	Set plug
Tapered Thread Rings –			
Standoff	Up to 6 in	0.000 21 in	Gage blocks, indicator, NPT plug
L1 Length	Up to 6 in	0.000 10 in	gage master
Microscopes (Linearity) ³	(5 to 100) $\times$ Objective	4.0 μ m + 0.6 <i>R</i>	Reticle/stage micrometer
Tapered Thread Plugs –			
Pitch Diameter	Up to 6 in	0.000 10 in	Gage blocks, Pratt & Whitney Supermicrometer™, thread wires, indicator
L1 Length	Up to 6 in	0.000 10 in	
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 μ in 0.0024 mm	Vision system
Angle	(0 to 360)°	0° 1' 0"	

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Surface Plates ³ – Flatness Repeat	Up to 17 in Diagonal (16 to 195) in Diagonal	200 µin 6√Dia 23 µin	Contact CMM Electronic levels. Dia is diagonal in inches Repeat-o-meter
Bench Micrometers, Pratt & Whitney Supermicrometer ^{TM3}	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 + 0.6R	Step blocks

II. Dimensional Testing

Parameter/Equipment	Range	CMC ² (±)	Comments
Thread Inspection ⁵ – Tri-roll Gauging: External Threads Bi-Element: Internal Threads External Threads: Ring Gauges (Go-No-Go)	Up to 1 7/8 in #10 to 1 5/8 in Up to 1 1/2 in	0.0003 in 0.0003 in 0.000 27 in	FED-STD H28/20A (systems 21, 22, & 23); MIL-S-8879, AS 8879, MIL-S-007742 MIL-DTL-1222J; FEDSTD H28/20; ANSI/ASME B1.1M MIL-S-8879, AS 8879; ANSI/ASME B1. 3M

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Thread Inspection ⁵ – (cont) Internal Threads: Thread Plug	#10 to 1 $\frac{5}{8}$ in	0.000 24 in	MIL-S-007742 Pratt & Whitney Supermicrometer TM
Length ⁵	Up to 20 in Up to 20 in Up to 6 in	(18 + 2.7L) μ in 200 μ in 190 μ in	ULM Vision system Optical comparator
Angle ⁵	(0 to 360) $^{\circ}$	0 $^{\circ}$ 0' 6" 0 $^{\circ}$ 4' 0"	Vision system Optical comparator
Radius ⁵	Up to 6 in	220 μ in	Video measuring machine
Surface Finish	Ra (5 to 250) μ in Ry (Rmax)/Rz (20 to 250) μ in	4 μ in 18 μ in	Surface finish tester Surface finish tester

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	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 μ V/V + 100 nV 3.6 μ V/V + 400 nV 3.6 μ V/V + 4.0 μ V 5.6 μ V/V + 40 μ V 5.6 μ V/V + 500 μ V	Fluke 8508A

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	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 μ V/V + 0.8 μ V 9 μ V/V + 2.0 μ V 9 μ V/V + 16 μ V 14 μ V/V + 120 μ V 14 μ V/V + 1.2 mV	Fluke 5522A
DC Current ³ – Measure	Up to 200 μ A 200 μ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	13 μ A/A + 0.40 nA 12 μ A/A + 4.0 nA 14 μ A/A + 40 nA 48 μ A/A + 0.80 μ A 0.019 % + 16 μ A 0.041 % + 0.40 mA	Fluke 8508A
DC Current ³ – Generate	(0 to 330) μ A 330 μ A 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 μ A/A + 0.020 μ A 78 μ A/A + 0.040 μ A 78 μ A/A + 0.20 μ A 78 μ A/A + 1.9 μ A 160 μ A/A + 31 μ A 300 μ A/A + 31 μ A 390 μ A/A + 390 μ A 780 μ A/A + 580 μ A	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 & Fluke 5522A
DC Resistance ³ – Measure	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 k Ω (2 to 20) k Ω (20 to 200) k Ω 200 k Ω to 2 M Ω (2 to 20) M Ω (20 to 200) M Ω 200 M Ω to 2 G Ω	20 $\mu\Omega/\Omega$ + 4.0 $\mu\Omega$ 10 $\mu\Omega/\Omega$ + 14 $\mu\Omega$ 9.0 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 9.0 $\mu\Omega/\Omega$ + 0.50 m Ω 9.0 $\mu\Omega/\Omega$ + 5.0 m Ω 12 $\mu\Omega/\Omega$ + 50 m Ω 91 $\mu\Omega/\Omega$ + 1.0 Ω 33 $\mu\Omega/\Omega$ + 100 Ω 0.027 % + 10 k Ω 0.16 % + 1.0 M Ω	Fluke 8508A
Electrical Simulation of RTDs ³ – Pt 385, 100 Ω	(-200 to 0) $^{\circ}$ C (0 to 100) $^{\circ}$ C (100 to 300) $^{\circ}$ C (300 to 400) $^{\circ}$ C (400 to 630) $^{\circ}$ C (630 to 800) $^{\circ}$ C	0.040 $^{\circ}$ C 0.050 $^{\circ}$ C 0.070 $^{\circ}$ C 0.080 $^{\circ}$ C 0.090 $^{\circ}$ C 0.18 $^{\circ}$ C	Fluke 5522A

Parameter/Equipment	Range	CMC ^{2, 7} ($\pm$)	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 k Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω 330 k Ω to 1.1 M 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 M Ω to 1.1 G Ω	31 $\mu\Omega/\Omega$ + 0.010 Ω 23 $\mu\Omega/\Omega$ + 0.012 Ω 22 $\mu\Omega/\Omega$ + 0.012 Ω 22 $\mu\Omega/\Omega$ + 0.016 Ω 22 $\mu\Omega/\Omega$ + 0.016 Ω 22 $\mu\Omega/\Omega$ + 0.16 Ω 22 $\mu\Omega/\Omega$ + 0.08 Ω 22 $\mu\Omega/\Omega$ + 0.78 Ω 22 $\mu\Omega/\Omega$ + 0.78 Ω 25 $\mu\Omega/\Omega$ + 7.8 Ω 25 $\mu\Omega/\Omega$ + 7.8 Ω 47 $\mu\Omega/\Omega$ + 120 Ω 100 $\mu\Omega/\Omega$ + 200 Ω 200 $\mu\Omega/\Omega$ + 1.9 k Ω 390 $\mu\Omega/\Omega$ + 2.3 k Ω 0.23 % + 77 k Ω 1.1 % + 390 k Ω	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 (±)	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)			
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	Fluke 8508A
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			Fluke 5522A
(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	
(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			Fluke 8508A
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	

Parameter/Range	Frequency	CMC ^{2, 7} ($\pm$)	Comments
AC Current ³ – Measure (cont)			Fluke 8508A
200 μ A 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	
(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 μ A 0.031 % + 2.0 μ A 0.072 % + 2.0 μ A 0.40 % output + 2.0 μ A	
(20 to 200) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.032 % + 20 μ A 0.030 % + 20 μ A 0.063 % + 20 μ A	
200 mA to 2 A	10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.063 % + 200 μ A 0.074 % + 200 μ A 0.30 % output + 200 μ A	
(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			Fluke 5522A
(29 to 330) μ A	(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 μ A 0.12 % output + 0.10 μ A 0.10 % output + 0.10 μ A 0.23 % output + 0.10 μ A 0.62 % output + 0.20 μ A 1.2 % output + 0.30 μ A	
330 μ A 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 μ A 0.10 % output + 0.10 μ A 0.08 % output + 0.10 μ A 0.16 % output + 0.20 μ A 0.39 % output + 0.20 μ A 0.78 % output + 0.50 μ A	
(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 μ A 0.070 % output + 1.6 μ A 0.030 % output + 1.6 μ A 0.060 % output + 1.6 μ A 0.16 % output + 2.3 μ A 0.31 % output + 3.0 μ A	

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

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2, 4, 6} ($\pm$)	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)	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	0.0012 g + 0.6R 0.014 g + 0.6R 0.001 lbf + 0.6R 0.0085 lbf + 0.6R 0.10 lbf + 0.6R 0.12 % 0.25 % 0.10 %	Dead weight Load cells, ASTM E4, ISO 7500
Speed Displacement	(1 to 12) in-min Up to 25 in	0.001 in/min 0.014 in	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} ($\pm$)	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 HBW 10/1000/15 HBW 10/1500/15 HBW 10/3000/15	 (100 to 200) HBW (200 to 300) HBW (300 to 400) HBW (200 to 400) HBW (500 to 600) HBW	 2.5 HBW 3.7 HBW 2.9 HBW 3.1 HBW 3.1 HBW	 ASTM E10 ISO EN 6506-2
Indirect Verification of Microindentation Hardness Testers ³ – Vickers Knoop	 (100 to 240) HV (240 to 600) HV > 600 HV (100 to 250) HK (250 to 650) HK > 650 HK	 4.3 HV 7.4 HV 16 HV 6.4 HK 12 HK 19 HK	 ASTM E92 ISO EN 6507-2 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 psig (> 30 to 1000) psig (> 1000 to 10 000) psig	 0.016 % + 0.60R 0.010 % + 0.60R 0.06 % + 0.60R	 Fluke PPC4 module RPM4 module

Parameter/Equipment	Range	CMC ^{2, 4, 6, 8} ($\pm$)	Comments
Pressure – Measure (cont)			
Hydraulic	Up to 40 000 psig	0.070 % + 0.60R	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 <i>T</i>) lbf·in + 0.60R (0.008 + 0.0001 <i>T</i>) lbf·ft + 0.60R (0.016 + 0.0001 <i>T</i>) lbf·ft + 0.60R	Torque arms, wheels class F weights
Torque Wrenches	Up to 100 lbf·in (> 100 to 2400) lbf·in (10 to 200) lbf·ft (> 200 to 2000) lbf·ft	0.75 % 1.1 % 0.94 % 1.3 %	Torque, indicator, transducers

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 8} ($\pm$)	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 $\epsilon = 0.95$, $\lambda = (8 \text{ to } 14) \mu\text{m}$
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} ($\pm$)	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 + 0.6R	AMS 2750 Fluke 726, 754 with T/C
Temperature ³ – Measure Temperature Uniformity Surveys (TUS), Ovens, Furnaces Temperature Uniformity Surveys (TUS), Ovens, Furnaces	(0 to 1093) °C (> 1093 to 1327) °C (0 to 1093) °C (> 1093 to 1327) °C	2.1 °C + 0.6R 2.7 °C + 0.6R 2.1 °C + 0.6R 2.7 °C + 0.6R	AMS2750 General manufacturing procedures Type K TC Fluke 726, 754 DATA PAQ logger

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 6, 8} ($\pm$)	Comments
Stopwatches ³	15 s to 24 hr	0.062 s/day	Timometer
Frequency ³ – Measuring Equipment	0.01 Hz to 2 MHz	2.0 μ Hz/Hz + 5.0 μ Hz	Fluke 5522A
Optical Tachometers	Up to 100 RPM (> 100 to 200 000) RPM	0.001 RPM + 0.6R 0.005 % + 0.6R	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, LLC

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 25th day of April 2025.

A blue ink signature of Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 117.04
Valid to March 31, 2027

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