



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION

Valid To: September 30, 2024

Certificate Number: 1500.04

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 10}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Angle Blocks	Up to 1° (> 1 to 20)° (> 20 to 60)°	13" 10" 11" - 0.027L	Gauge blocks, precision height gauge
Calipers ^{3, 8}	Up to 80 in	300 μin	Gauge blocks
Diameter – External ³	Up to 1 in	45 μin	Digital micrometer
External	Up to 24 in	(70 + 3.5D) μin	Precision height gauge
Internal	Up to 24 in	(70 + 3.5D) μin	Precision height gauge
Flatness – Anvils and Spindles ^{3, 8}	Up to 0.001 in	10 μin	Optical flat
Gauge Blocks	Up to 1 in (1 to 4) in	(2.6 + 0.7L) μin (0.94 + 2.3L) μin	Gauge block comparator, master gauge blocks

Parameter/Equipment	Range	CMC ^{2, 4, 6} (\pm)	Comments
Height Gauges ^{3, 8}	Up to 40 in	300 μ in	Gauge blocks
Indicators ^{3, 8}	Up to 2 in	96 μ in	Indicator calibrator
Indicator Calibrators	Up to 2 in	79 μ in	Gauge blocks, precision height gauge
Length Standards	Up to 12 in (12 to 24) in (20 to 80) in	(73 + 0.64L) μ in (61 + 1.6L) μ in (-160 + 11L) μ in	Gauge blocks, precision height gauge, Laser interferometer
Precision Levels Sensitivity ⁸	Up to 0.0005 in/ft	17 %	Parallel bars, gauge blocks
Linear Dimension and Angle – X-Axis Y-Axis Angle	8 in 4 in (0 to 360) $^{\circ}$	200 μ in 250 μ in 0.07 $^{\circ}$	Optical comparator
Micrometers ^{3, 8} – Depth, ID, OD	Up to 6 in (6 to 24) in	(31 + 1.2L) μ in (8 + 4.6L) μ in	Gauge blocks
Optical Comparators ^{3, 8} X-Axis Y-Axis Angle	8 in 4 in (0 to 360) $^{\circ}$	81 μ in 100 μ in 0.052 $^{\circ}$	Gauge blocks Angle blocks
Protractors ⁸	(0 to 45) $^{\circ}$ (45 to 90) $^{\circ}$	0.0005 $^{\circ}$ + 0.0006 % 0.0012 $^{\circ}$	Sine bar, gauge blocks, master square, surface plate

Parameter/Equipment	Range	CMC ^{2,4} (\pm)	Comments
Sine Bars – Parallelism Length Angle (20 in Bar Length)	(5 to 20) in (5 to 20) in Up to 45°	110 μ in (70 + 3.5L) μ in 19"	Surface plate, precision height gauge Surface plate, precision height gauge, gauge blocks
Squares ⁸	Up to 24 in	26 μ in/in	Master square, gauge blocks
Step Gauges ⁸	Up to 1 in (1 to 6) in	68 μ in (64 + 2L) μ in	Gauge blocks, precision height gauge
Surface Plates ³ – Flatness Repeatability	Up to 12 ft x 12 ft Up to 12 ft x 12 ft	(24 + 0.6L) μ in 24 μ in	Laser interferometer Repeat-o-meter
Tape Measures ⁸	Up to 40 in (> 40 to 120) in (> 120 to 280) in (> 280 to 440) in	(2200 + 13L) μ in (1600 + 28L) μ in (2900 + 16L) μ in (3900 + 12L) μ in	Tape measure calibrator
Rulers ⁸	Up to 40 in (> 40 to 72) in	(2200 + 13L) μ in (1600 + 28L) μ in	Tape measure calibrator
Thickness Gauges ³	Up to 1 in	(150 + 1400L) μ in	Gauge blocks
Straight Edges – Parallelism Straightness	Up to 72 in Up to 72 in	(60 + 12L) μ in (50 + 8.5L) μ in	Surface plate, precision height gauge

II. Mechanical

Parameter/Equipment	Range	CMC ^{2, 4, 6, 7} (±)	Comments
Durometers (Types A, B, C, D, DO, O, OO) – Indenter Extension and Shape Diameter Radius Angle Extension Indenter Display Hardness ⁵ A, B, C, D, DO, O, OO	 Up to 0.105 in Up to 0.125 in (25 to 40) ^o Up to 0.105 in Up to 100 durometer units Up to 100 durometer units	 470 μin 230 μin 0.059 ^o 260 μin 0.58 durometer units 0.78 durometer units 0.33 durometer units	ASTM D2240 Optical comparator Gauge blocks Force gauge
Force – Measure and Measuring Equipment ^{3, 8}	(0 to 500) lbs	0.03 %	Dead weight
Hydraulic Pressure/Vacuum – Measure and Measuring Equipment ³	(-14.2 to 0) psig (0 to 6) psig (6 to 15 000) psig	0.036 psi 0.006 psi 0.10 %	Digital pressure gauges and pumps
Pneumatic Pressure Measure and Measuring Equipment ³	(-15 to 250) psig (> 250 to 750) psig (> 750 to 3000) psig	0.036 % 0.015 + (0.0001 · psi) 0.06 + (0.0001 · psi)	Pressure controller and modules
Load Cells Compression	Up to 1000 lbf (> 1000 to 25 000) lbf (> 25 000 to 60 000) lbf	0.33 + (0.0011 · lbf) 0.10 + (0.000 88 · lbf) 2.3 + (0.0007 · lbf)	Load cells
Scales and Balances ^{3, 5}	Up to 2 Kg (0 to 19) lbs (19 to 700) lbs	3.5 M mg 0.001 % 0.0015 %	Precision weights Field weights
Aircraft Scales	Up to 25 000 lb (> 25 000 to 60 000) lb	3 lb + 0.000 44 · lbf 7.2 lb + 0.0006 · lbf	Load cells

Parameter/Equipment	Range	CMC ^{2, 5, 6} (\pm)	Comments
Torque Transducers ⁸	(0 to 1) lb·ft (1 to 8) lb·ft (8 to 250) lb·ft (250 to 1500) lb·ft	0.06 % 0.2 % 0.2 % 0.02 %	Torque calibration arm; ASTM 6 Class weights
Torque Wrenches and Drivers	(0.053 to 0.52) lb·ft (0.42 to 3.33) lb·ft (0.84 to 8.33) lb·ft (4.2 to 41) lb·ft (25 to 250) lb·ft (50 to 1000) lb·ft	0.7 % 0.6 % 0.4 % 0.4 % 0.6 % 0.2 %	Torque system and transducers

III. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 4, 7} (\pm)	Comments
IR Thermometer	(35 to 500) °C	0.25 °C + 0.0019 <i>T</i>	Fluke 4181 Blackbody
Temperature – Measuring Equipment	0 °C (-60 to 98) °C	0.0050 °C 1.2 °C + 0.0032 <i>T</i>	ASTM E56 ice point Calibration bath, RTD, and Druck DPI620

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I. Electrical DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 11} (±)	Comments
DC Voltage ³ – Measure	(0 to 120) mV (0.12 to 1.2) V (1.2 to 12) V (12 to 120) V (120 to 1000) V	11 μV/V + 0.35 μV 9.6 μV/V + 0.34 μV 9.6 μV/V + 0.57 μV 12 μV/V + 35 μV (12 + (14V/1000) ²) μV/V + 120 μV	Agilent 3458A V = voltage
	(0 to 10) kV (10 to 140) kV	0.034 % + 0.034 V 0.091 % + 0.8 V	Vitretek 4700 w/ HVL-150 probe
DC Voltage ³ – Generate	(0 to 329.9999) mV (0.33 to 3.299 999) V (3.3 to 32.999 99) V (33 to 329.9999) V (330 to 1000.000) V	16 μV/V + 0.78 μV 8.6 μV/V + 1.6 μV 9.4 μV/V + 16 μV 14 μV/V + 120 μV 14 μV/V + 1200 μV	Fluke 552X series calibrator
DC Current ³ – Measure	(12 to 120) μA (0.12 to 1.2) mA (1.2 to 12) mA (12 to 120) mA (0.12 to 1.05) A	24 μA/A + 0.93 nA 24 μA/A + 5.8 nA 24 μA/A + 58 nA 41 μA/A + 0.58 μA 0.013 % + 12 μA	Agilent 3458A
Resistance ³ – Measure	(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	18 μΩ/Ω + 58 μΩ 15 μΩ/Ω + 0.58 mΩ 13 μΩ/Ω + 0.57 mΩ 13 μΩ/Ω + 5.7 mΩ 13 μΩ/Ω + 56 mΩ 18 μΩ/Ω + 2.3 Ω 58 μΩ/Ω + 120 Ω 0.058 % + 1200 Ω 0.58 % + 12 kΩ	Agilent 3458A

Parameter/Equipment	Range	CMC ^{2, 11} (±)	Comments
DC Current ³ – Generate	(0 to 329.999) μ A (0.330 to 3.299 99) mA (3.3 to 32.9999) mA (33 to 329.999) mA (0.33 to 1.099 99) A (1.1 to 2.999 99) A (3 to 10.9999) A (11 to 20.5) A	0.012 % + 0.016 μ A 78 μ A/A + 0.039 μ A 78 μ A/A + 0.20 μ A 78 μ A/A + 2.0 μ A 0.016 % + 32 μ A 0.03 % + 32 μ A 0.039 % + 390 μ A 0.078 % + 580 μ A	Fluke 552X series calibrator
Clamp-On Meters	(20 to 149.999) A (150 to 549.999) A (550 to 1025) A	0.58 % + 0.17 A 0.58 % + 0.58 A 0.59 % + 0.58 A	Fluke 552X series w/ Fluke 5500A/coil
Resistance ³ – Generate	(0 to 10.9999) Ω (11 to 32.9999) Ω (33 to 109.9999) Ω (110 to 329.9999) Ω (330 to 1.099 999) k Ω (1.1 to 3.299 999) k Ω (3.3 to 10.999 99) k Ω (11 to 32.999 99) k Ω (33 to 109.9999) k Ω (110 to 329.9999) k Ω 330 k Ω to 1.099 999 M Ω (1.1 to 3.299 999) M Ω (3.3 to 10.999 99) M Ω (11 to 32.999 99) M Ω (33 to 109.9999) M Ω (110 to 329.9999) M Ω (330 to 1100) M Ω	32 $\mu\Omega/\Omega$ + 0.78 m Ω 24 $\mu\Omega/\Omega$ + 1.2 m Ω 22 $\mu\Omega/\Omega$ + 1.1 m Ω 22 $\mu\Omega/\Omega$ + 1.6 m Ω 22 $\mu\Omega/\Omega$ + 1.6 m Ω 22 $\mu\Omega/\Omega$ + 16 m Ω 22 $\mu\Omega/\Omega$ + 16 m Ω 22 $\mu\Omega/\Omega$ + 0.16 Ω 22 $\mu\Omega/\Omega$ + 0.16 Ω 25 $\mu\Omega/\Omega$ + 1.6 Ω 25 $\mu\Omega/\Omega$ + 1.6 Ω 47 $\mu\Omega/\Omega$ + 24 Ω 0.011 % + 36 Ω 0.02 % + 2.0 k Ω 0.039 % + 2.4 k Ω 0.24 % + 78 k Ω 1.2 % + 390 k Ω	Fluke 552X series calibrator

Parameter/Range	Frequency	CMC ^{2, 11} (±)	Comments
AC Voltage ³ – Measure (1 to 10) 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	0.035 % + 3.5 μ V 0.024 % + 1.3 μ V 0.035 % + 1.3 μ V 0.12 % + 1.3 μ V 0.58 % + 1.3 μ V 4.7 % + 2.4 μ V	Agilent 3458A

Parameter/Range	Frequency	CMC ^{2, 11} (\pm)	Comments
AC Voltage ³ – Measure (cont)			
(10 to 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	0.0081 % + 4.7 μ V 0.0081 % + 2.4 μ V 0.017 % + 2.4 μ V 0.035 % + 2.4 μ V 0.093 % + 2.4 μ V 0.35 % + 12 μ V 1.2 % + 12 μ V 1.8 % + 12 μ V	Agilent 3458A
(0.1 to 1.0) 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	0.0081 % + 47 μ V 0.0081 % + 24 μ V 0.017 % + 24 μ V 0.035 % + 24 μ V 0.093 % + 24 μ V 0.35 % + 120 μ V 1.2 % + 120 μ V 1.8 % + 120 μ V	
(1.0 to 10.0) 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	0.0081 % + 0.47 mV 0.0081 % + 0.24 mV 0.017 % + 0.24 mV 0.035 % + 0.24 mV 0.093 % + 0.24 mV 0.35 % + 1.2 mV 1.2 % + 1.2 mV 1.8 % + 1.2 mV	
(10.0 to 100.0) 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	0.024 % + 4.7 mV 0.024 % + 2.4 mV 0.024 % + 2.4 mV 0.041 % + 2.4 mV 0.14 % + 2.4 mV 0.47 % + 12 mV 1.8 % + 12 mV	
(100.0 to 700) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.047 % + 47 mV 0.047 % + 24 mV 0.07 % + 24 mV 0.14 % + 24 mV 0.35 % + 24 mV	
(0.1 to 10) kV (10 to 100) kV	60 Hz 60 Hz	0.14 % + 0.11 V 0.57 % + 1.1 V	Vitrek 4700 w/ HVL probe

Parameter/Range	Frequency	CMC ^{2, 11} (\pm)	Comments
AC Voltage ³ – Generate			
(1 to 32.999) 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 % + 4.7 μ V 0.012 % + 4.7 μ V 0.016 % + 4.7 μ V 0.078 % + 4.7 μ V 0.28 % + 9.4 μ V 0.63 % + 39 μ V	Fluke 552X series calibrator
(33 to 329.999) 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	0.024 % + 6.3 μ V 0.012 % + 6.3 μ V 0.013 % + 6.3 μ V 0.028 % + 6.3 μ V 0.063 % + 25 μ V 0.16 % + 55 μ V	
(0.33 to 3.299 99) 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	0.024 % + 39 μ V 0.012 % + 47 μ V 0.015 % + 47 μ V 0.024 % + 39 μ V 0.055 % + 97 μ V 0.19 % + 470 μ V	
(3.3 to 32.9999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.024 % + 510 μ V 0.012 % + 470 μ V 0.019 % + 470 μ V 0.028 % + 470 μ V 0.07 % + 1300 μ V	
(33 to 329.999) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.015 % + 1600 μ V 0.016 % + 4700 μ V 0.02 % + 4700 μ V 0.024 % + 4700 μ V 0.16 % + 39 000 μ V	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.024 % + 7800 μ V 0.02 % + 7800 μ V 0.024 % + 7800 μ V	

Parameter/Range	Frequency	CMC ^{2, 11} (\pm)	Comments
AC Current ³ – Measure			
(5 to 100) μ A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz	0.47 % + 0.035 μ A 0.18 % + 0.035 μ A 0.07 % + 0.035 μ A 0.07 % + 0.035 μ A	Agilent 3458A
(0.05 to 1) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz	0.47 % + 0.24 μ A 0.18 % + 0.24 μ A 0.07 % + 0.24 μ A 0.035 % + 0.24 μ A	
(0.5 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz	0.47 % + 2.4 μ A 0.18 % + 2.4 μ A 0.07 % + 2.4 μ A 0.035 % + 2.4 μ A	
(5 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz	0.47 % + 24 μ A 0.18 % + 24 μ A 0.07 % + 24 μ A 0.035 % + 24 μ A	
(0.05 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz	0.47 % + 240 μ A 0.19 % + 240 μ A 0.093 % + 240 μ A 0.12 % + 240 μ A	

Parameter/Range	Frequency	CMC ^{2, 11} (\pm)	Comments
AC Current ³ – Generate			
(29 to 329.99) 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 % + 0.078 μ A 0.12 % + 0.078 μ A 0.097 % + 0.078 μ A 0.24 % + 0.12 μ A 0.63 % + 0.16 μ A 1.3 % + 0.32 μ A	Fluke 552X series calibrator
(0.33 to 3.2999) 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 % + 0.12 μ A 0.097 % + 0.12 μ A 0.078 % + 0.12 μ A 0.16 % + 0.16 μ A 0.39 % + 0.24 μ A 0.78 % + 0.47 μ A	
(3.3 to 32.999) 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 % + 1.6 μ A 0.07 % + 1.6 μ A 0.032 % + 1.6 μ A 0.063 % + 1.6 μ A 0.16 % + 2.4 μ A 0.32 % + 3.2 μ A	
(33 to 329.99) 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 % + 16 μ A 0.070 % + 16 μ A 0.032 % + 16 μ A 0.078 % + 39 μ A 0.16 % + 78 μ A 0.32 % + 160 μ A	
(0.33 to 1.099 99) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 78 μ A 0.039 % + 78 μ A 0.47 % + 780 μ A 2.0 % + 3900 μ A	
(1.1 to 2.999 99) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 78 μ A 0.047 % + 78 μ A 0.47 % + 780 μ A 2.0 % + 3900 μ A	

Parameter/Range	Frequency	CMC ^{2, 11} (\pm)	Comments
AC Current ³ – Generate (cont)			
(3 to 10.9999) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.047 % + 1600 μ A 0.078 % + 1600 μ A 2.4 % + 1600 μ A	Fluke 552X series calibrator
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.094 % + 3900 μ A 0.12 % + 3900 μ A 2.4 % + 3900 μ A	
Clamp-On Meters:			
(Toroidal Type)			
(20 to 54.999) A (55 to 149.999) A (150 to 1025) A	(45 to 65) Hz	0.31 % + 0.054 A 0.34 % + 0.042 A 0.34 % + 0.13 A	Fluke 552X series w/ Fluke 5500A/coil
(20 to 54.999) A (55 to 149.999) A (150 to 400) A	(65 to 440) Hz	0.93 % + 0.054 A 0.94 % + 0.046 A 1.2 % + 0.22 A	
(Non-Toroidal Type)			
(20 to 149.999) A (150 to 549.999) A (550 to 1025) A	(45 to 65) Hz	0.65 % + 0.30 A 0.66 % + 1.1 A 0.65 % + 1.1 A	
(20 to 149.999) A (150 to 400) A	(65 to 440) Hz	1.2 % + 0.30 A 1.4 % + 1.1 A	
Capacitance ³ – Generate			
(0.22 to 0.399 99) nF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.999) nF (11 to 32.9999) nF (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 to 1.099 99) mF (1.1 to 3.2999) mF (3.3 to 10.9999) mF	10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (0 to 50) Hz (0 to 20) Hz (0 to 6) Hz (0 to 2) Hz	0.39 % + 0.0078 nF 0.39 % + 0.0078 nF 0.39 % + 0.0078 nF 0.20 % + 0.0078 nF 0.20 % + 0.078 nF 0.20 % + 0.078 nF 0.20 % + 0.24 nF 0.20 % + 0.78 nF 0.20 % + 2.4 nF 0.20 % + 7.8 nF 0.32 % + 24 nF 0.35 % + 78 nF 0.35 % + 240 nF 0.35 % + 0.78 μ F 0.35 % + 2.4 μ F 0.35 % + 7.8 μ F	Fluke 552X series calibrator

Parameter/Range	Frequency	CMC ^{2, 11} (±)	Comments
Capacitance ³ – Generate (cont)			
(11 to 32.9999) mF (33 to 110) mF	(0 to 0.6) Hz (0 to 0.2) Hz	0.59 % + 24 μF 0.86 % + 78 μF	Fluke 552X series calibrator

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouples and Thermocouple Indicating Devices ³ –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C	0.35 °C 0.27 °C 0.24 °C 0.26 °C	Fluke 552X series calibrator
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 0.13 °C 0.11 °C 0.13 °C 0.17 °C	
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 0.13 °C 0.11 °C 0.14 °C 0.18 °C	
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 0.13 °C 0.21 °C 0.32 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.32 °C 0.18 °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	0.45 °C 0.28 °C 0.26 °C 0.32 °C	

Parameter/Equipment	Range	CMC ^{2, 6, 11} (\pm)	Comments
Electrical Simulation of Thermocouples and Thermocouple Indicating Devices ³ – (cont)			
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.37 °C 0.28 °C 0.29 °C 0.36 °C	Fluke 552X series calibrator
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.49 °C 0.19 °C 0.13 °C 0.11 °C	
Electrical Simulation of RTD Indicators and Indicating Systems ³ –			
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	0.039 °C 0.039 °C 0.055 °C 0.07 °C 0.078 °C 0.094 °C 0.18 °C	Fluke 552X series calibrator
Oscilloscopes ³ –			
Amplitude – DC Signal 50 Ω Load 1 M Ω Load	1 mV to 6.6 V 1 mV to 130 V	0.20 % + 32 μ V 0.039 % + 32 μ V	Fluke 552XA/SC1100
Amplitude – Square Wave 50 Ω Load 1 M Ω Load	1 mV to 6.6 V _{pp} 10 Hz to 100 kHz 1 mV to 130 V _{pp} 10 Hz to 100 kHz	0.20 % + 32 μ V 0.078 % + 32 μ V	
Bandwidth Flatness	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	1.2 % + 78 μ V 1.6 % + 78 μ V 3.2 % + 78 μ V 3.9 % + 78 μ V	
Time Marker	50 ms to 5 s 2 ns to 20 ms	(20 + (t 1000)) μ s/s 1.9 μ s/s	t = time in seconds

Parameter/Equipment	Range	CMC ^{2, 6, 11} (\pm)	Comments
Oscilloscopes ³ – (cont)			
Resistance – Measure	(40 to 60) Ω (0.5 to 1.5) M Ω	0.079 % 0.078 %	Fluke 552XA/SC1100
Insulation Testers			
Up to 35 kV	50 k Ω 100 k Ω 200 k Ω 250 k Ω 500 k Ω 1 M Ω 2.5 M Ω 5 M Ω 10 M Ω 30 M Ω 40 M Ω 50 M Ω 100 M Ω 200 M Ω 400 M Ω 1 G Ω 1.9 G Ω 9 G Ω	0.032 k Ω 0.064 k Ω 0.13 k Ω 0.16 k Ω 0.32 k Ω 0.00064 M Ω 0.0016 M Ω 0.0032 M Ω 0.0064 M Ω 0.019 M Ω 0.026 M Ω 0.032 M Ω 0.064 M Ω 0.13 M Ω 0.32 M Ω 0.00071 G Ω 0.0013 G Ω 0.023 G Ω	Standard resistors

¹ This laboratory offers commercial calibration services and field calibration service, where noted.

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. D is the numerical value of the nominal diameter of the device (Diameter, External and Internal); or the long diagonal (Surface Plates - Flatness) measured in inches. M is the numerical value of the nominal weight measured in Kg (Mass, Scales). T is the numerical value of the nominal torque in foot pounds. T is the numerical value of nominal temperature measured in degrees Celsius.

⁵ The contributions from the “best existing device” are not included in the CMC claim.

⁶ In the statement of CMC, percentages are to be read as percent of reading, unless otherwise noted.

⁷ 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.

⁸ The contributions attributed to the repeatability of the “best existing device” are not included in the CMC claim.

⁹ The contributions attributed to the emissivity of the infrared calibrator are not included in the CMC claim.

¹⁰ This scope meets A2LA’s *P112 Flexible Scope Policy*.

¹¹ 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.



Accredited Laboratory

A2LA has accredited

JEM PRECISION LTD.

Edmonton, Alberta, CANADA

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 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 30th day of December 2022.

A blue ink signature of Trace McInturff, written over a horizontal line.

Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1500.04
Valid to September 30, 2024

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