



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

APPLIED TECHNICAL SERVICES, LLC.
2450 Laurel Ave
Sanford, FL 32771
James Halsey Phone: 770 423 1400
jhalsey@atslab.com

CALIBRATION

Valid To: April 30, 2025

Certificate Number: 1888.07

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations and dimensional inspections^{1, 7}:

I. Chemical

Parameter/Equipment	Range	CMC ^{2, 8} ($\pm$)	Comments
pH Measuring Equipment ³	4.01 pH 7.0 pH 10.0 pH	0.026 pH 0.035 pH 0.033 pH	pH buffer solutions
Conductivity ³ – Liquid	(> 10 to 100) μ S (> 100 to 1413) μ S (> 1413 to 10 000) μ S (> 10 000 to 100 000) μ S	0.83 % rdg + 0.047 μ S 0.42 % rdg + 0.46 μ S 0.48 % rdg – 0.45 μ S 0.34 % rdg + 14 μ S	Conductivity solutions

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Calipers ³	(0 to 1) in (1 to 25) in (25 to 80) in	220 μ in (210 + 1.7L) μ in (160 + 4.0L) μ in	Gage blocks

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Micrometers ³	(0 to 1) in (1 to 25) in (25 to 80) in	220 μ in (210 + 1.7L) μ in (160 + 4.0L) μ in	Gage blocks
Height Gages ³	Up to 80 in	(120 + 8L) μ in	Gage blocks
Bore Micrometers ³	Up to 4 in	(70 + 20L) μ in	Ring gages
Length Indicators ³ (Dial, Digital, Test, and Bore)	Up to 4 in	(25 + 6L) μ in	Gage blocks
Rigid Rulers ³	Up to 80 in	0.010 in	Gage blocks
Tape Measures ³	Up to 100 ft	0.014 in per 6 ft	Gage blocks
Cylindricals – OD Pins, Plugs, Master Disc Outside Diameter ³	Up to 10 in	30 μ in	Model C P&W Supermicrometer TM
Thread Plug Gages ³ – Pitch Diameter Major Diameter	(4 to 80) TPI Up to 10 in	100 μ in 30 μ in	Model C P&W Supermicrometer TM with Thread Wires P&W Supermicrometer TM
Micrometer Standards ³	Up to 10 in	(33 + 8L) μ in	P&W Supermicrometer TM
Feeler Gages ³	Up to 1 in	70 μ in	P&W Supermicrometer TM

Parameter/Equipment	Range	CMC ^{2, 4} ($\pm$)	Comments
Surface Plate ³ –			
Flatness	12 in $\times$ 12 in to 12 ft $\times$ 12 ft	(20 + 2 <i>DL</i>) μ in	Electronic level system <i>DL</i> =diagonal distance
Repeat Reading	12 in $\times$ 12 in to 12 ft $\times$ 12 ft	34 μ in	Repeat-o-meter
Optical Comparator & Vision Machines ³ –			
X-Y Linearity	Up to 12 in	250 μ in + 0.58 <i>R</i>	Glass master
Angle	(15, 30, 45, 60, 75, 90, 180) $^{\circ}$	0.013 $^{\circ}$	Angle blocks
Crimp Tools ³	Go/No Go Crimp Height	600 μ in 0.001 in	Pin gages Crimp micrometer
Protractors ³	0 $^{\circ}$, 30 $^{\circ}$, 45 $^{\circ}$, 60 $^{\circ}$, 90 $^{\circ}$	0.033 $^{\circ}$ + 0.58 <i>R</i>	Angle blocks

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 5, 6} ($\pm$)	Comments
DC Voltage – Generate ³	Up 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 + 1.0 μ V 8.5 μ V/V + 2.0 μ V 9.7 μ V/V + 20 μ V 14 μ V/V + 150 μ V 14 μ V/V + 1.5 mV	Fluke multi-function calibrator

Parameter/Equipment	Range	CMC ^{2, 5, 6} ($\pm$)	Comments
DC Voltage – Measure ³	(0 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V (1 to 9) kV (9 to 70) kV	14 μ V/V + 0.35 μ V 10 μ V/V + 0.35 μ V 9.3 μ V/V + 0.58 μ V 13 μ V/V + 35 μ V 12 μ V/V + 120 μ V 0.042 % 0.47 %	Agilent precision DMM Vitrek 4700 Vitrek 4700 w/HVL-35
DC Current – Generate ³ Clamp-On Only	Up 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 (3.0 to 11) A (11 to 20.5) A (20.5 to 150) A (150 to 1025) A	0.012 % + 0.020 μ A 0.0079 % + 0.050 μ A 0.0082 % + 0.25 μ A 0.0082 % + 2.5 μ A 0.015 % + 40 μ A 0.03 % + 40 μ A 0.039 % + 500 μ A 0.085 % + 750 μ A 0.52 % + 0.14 A 0.54 % + 0.5 A	Fluke multi-function calibrator Fluke 5500A/coil
DC Current – Measure ³	(10 to 100) μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 3) A 3 A to 2 kA (2 to 10) kA	38 μ A/A + 0.80 nA 27 μ A/A + 5.0 nA 27 μ A/A + 50 nA 39 μ A/A + 0.50 nA 0.011 % + 10 μ A 0.12 % + 0.60 mA 0.25 % 1.0 %	Agilent precision DMM Agilent 34401A current shunts

Parameter/Equipment	Range	CMC ^{2, 5, 6} ($\pm$)	Comments
Resistance – Generate ³	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω 110 W to 1.1 k Ω (1.1 to 11) k Ω (11 to 110) k Ω 110 k 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 to 1100) M Ω 10 M Ω 100 M Ω 100 G Ω 1 T Ω	35 $\mu\Omega/\Omega + 1.0$ m Ω 24 $\mu\Omega/\Omega + 1.5$ m Ω 23 $\mu\Omega/\Omega + 2.0$ m Ω 23 $\mu\Omega/\Omega + 2.0$ m Ω 25 $\mu\Omega/\Omega + 20$ m Ω 23 $\mu\Omega/\Omega + 0.20$ Ω 27 $\mu\Omega/\Omega + 2.0$ Ω 48 $\mu\Omega/\Omega + 30$ Ω 0.010 % + 50 Ω 0.02 % + 2.5 k Ω 0.04 % + 3.0 k Ω 0.23 % + 100 k Ω 1.2 % + 500 k Ω 0.051 M Ω 0.13 M Ω 0.45 G Ω 0.01 T Ω	Fluke multi-function calibrator Decade box Decade box Standard resistors
Fixed Points ³	1.0 m Ω 10.0 m Ω 100.0 m Ω 1 Ω	0.1 $\mu\Omega$ 1.2 $\mu\Omega$ 11 $\mu\Omega$ 51 $\mu\Omega$	L&N resistor L&N resistor L&N resistor L&N resistor
Resistance – Measure ³	(0 to 10) Ω (10 to 100) Ω (100 to 1000) Ω (1 to 10) k Ω (10 to 100) k Ω 100 k Ω to 1 M Ω (1 to 10) M Ω (10 to 100) M Ω 100 M Ω to 1 G Ω	17 $\mu\Omega/\Omega + 50$ $\mu\Omega$ 14 $\mu\Omega/\Omega + 0.50$ m Ω 10 $\mu\Omega/\Omega + 0.5$ m Ω 13 $\mu\Omega/\Omega + 5$ m Ω 13 $\mu\Omega/\Omega + 50$ m Ω 18 $\mu\Omega/\Omega + 2$ Ω 54 $\mu\Omega/\Omega + 100$ Ω 0.05 % + 1.0 k Ω 0.54 % + 10 k Ω	Agilent precision DMM
Capacitance – Generate ³	(0.19 to 3.3) nF (3.3 to 330) nF 330 nF to 3.3 μ F (3.3 to 33) μ F (33 to 330) μ F 330 μ F to 3.3 mF (3.3 to 33) mF (33 to 110) mF	0.42 % + 0.01 nF 0.21 % + 0.30 nF 0.20 % + 3.0 nF 0.42 % + 30 nF 0.36 % + 300 nF 0.36 % + 3.0 μ F 0.58 % + 30 μ F 0.85 % + 100 μ F	Fluke multi-function calibrator

Parameter/Equipment	Range	CMC ^{2, 5, 6} ($\pm$)	Comments
Capacitance – Generate Fixed Points ³	0.001 μ F 0.01 μ F 0.1 μ F	0.048 nF 0.022 nF 0.075 nF	GR 1409 series
Inductance – Generate ³ @ 1 kHz	1 mH 10.0 mH 100 mH	0.12 % 0.10 % 0.08 %	GR 1482 series GR 1482 series
Electrical Calibration of Thermocouple Indicators ³ –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1800) °C	0.35 °C 0.28 °C 0.24 °C 0.27 °C	Fluke multi-function calibrator
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.24 °C 0.22 °C 0.25 °C 0.40 °C 0.66 °C	
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.40 °C 0.15 °C 0.13 °C 0.14 °C 0.18 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.22 °C 0.15 °C 0.13 °C 0.15 °C 0.19 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.27 °C 0.16 °C 0.14 °C 0.21 °C 0.32 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouple Indicators ³ – (cont)			
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 0.19 °C 0.17 °C 0.16 °C 0.22 °C	Fluke multi-function calibrator
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.45 °C 0.28 °C 0.27 °C 0.32 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.37 °C 0.29 °C 0.30 °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 0.20 °C 0.14 °C 0.13 °C	
Electrical Calibration of RTD Indicators ³ –			
Pt 385, 100 W	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 630) °C (630 to 800) °C	0.039 °C 0.057 °C 0.072 °C 0.095 °C 0.18 °C	
Pt 3926, 100 W	(-200 to 0) °C (0 to 300) °C (300 to 630) °C	0.039 °C 0.072 °C 0.095 °C	
Pt 3916, 100 W	(-200 to -190) °C (-190 to 0) °C (0 to 260) °C	0.23 °C 0.049 °C 0.055 °C	
Pt 385, 200 W	(260 to 600) °C (600 to 630) °C	0.078 °C 0.18 °C	
Pt 385, 500 W	(-200 to 260) °C (260 to 630) °C	0.041 °C 0.12 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTD Indicators ³ (cont.) –			
Pt 385, 1000 W	(-200 to 260) °C (260 to 400) °C (400 to 630) °C	0.049 °C 0.071 °C 0.088 °C	Fluke multi- function calibrator
Ni 120, 120 W	(-200 to 260) °C (260 to 600) °C (600 to 630) °C	0.041 °C 0.055 °C 0.18 °C	
Cu 427, 10 W	(-80 to 100) °C (100 to 260) °C (-100 to 260) °C	0.063 °C 0.11 °C 0.23 °C	

Parameter/Range	Frequency	CMC ^{2,6} (±)	Comments
AC Voltage – Generate ³			
(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	0.064 % + 4.7 µV 0.018 % + 4.7 µV 0.022 % + 4.7 µV 0.082 % + 4.7 µV 0.28 % + 9.3 µV 0.63 % + 39 µV	Fluke multi- function calibrator
(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 % + 6.2 µV 0.012 % + 6.2 µV 0.013 % + 6.2 µV 0.028 % + 6.2 µV 0.064 % + 25 µV 0.048 % + 54 µV	

Parameter/Range	Frequency	CMC ^{2, 6} ($\pm$)	Comments
AC Voltage – Generate ³ (cont)			
(0.33 to 3.3) 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 % + 39 μ V 0.012 % + 47 μ V 0.015 % + 47 μ V 0.024 % + 39 μ V 0.054 % + 97 μ V 0.19 % + 0.47 μ V	Fluke multi-function calibrator
(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	0.024 % + 500 μ V 0.012 % + 470 μ V 0.015 % + 470 μ V 0.024 % + 470 μ V 0.070 % + 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 0.018 % + 4.7 mV 0.025 % + 4.7 mV 0.16 % + 39 mV	
(330 to 1020) V	45 Hz to 10 kHz	0.024 % + 7.8 mV	
AC Voltage – Measure ³			
(1 to 10) mV	(10 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.036 % rdg + 0.030 % rng 0.086 % rdg + 0.011 % rng 0.085 % rdg + 0.011 % rng 0.014 % rdg + 0.011 % rng 0.51 % rdg + 0.011 % rng 4.0 % rdg + 0.020 % rng	Agilent precision DMM
(10 to 100) mV, 100 mV to 1 V, (1 to 10) V	(10 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	0.021 % rdg + 0.0040 % rng 0.021 % rdg + 0.0020 % rng 0.024 % rdg + 0.0020 % rng 0.037 % rdg + 0.0020 % rng 0.083 % rdg + 0.0020 % rng 0.031 % rdg + 0.010 % rng 1.0 % rdg + 0.010 % rng 1.5 % rdg + 0.010 % rng	

Parameter/Range	Frequency	CMC ^{2, 5, 6} ($\pm$)	Comments
AC Voltage – Measure ³ (cont)			
(10 to 100) V	(10 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	0.021 % rdg + 0.0040 % rng 0.021 % rdg + 0.0020 % rng 0.021 % rdg + 0.0020 % rng 0.035 % rdg + 0.0020 % rng 0.12 % rdg + 0.0020 % rng 0.40 % rdg + 0.010 % rng 1.5 % rdg + 0.010 % rng	Agilent precision DMM
(100 to 750) V	(10 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.042 % rdg + 0.0040 % rng 0.042 % rdg + 0.0020 % rng 0.061 % rdg + 0.0020 % rng 0.12 % rdg + 0.0020 % rng 0.30 % rdg + 0.0020 % rng	
750 V to 9 kV	(50 to 60) Hz	0.45 %	Vitrek 4700
(9 to 70) kV	(50 to 60) Hz	1.5 %	Vitrek 4700 with HVL-70
AC Current – Generate ³			
(29 to 330) μ A	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % rdg + 0.08 μ A 0.12 % rdg + 0.08 μ A 0.10 % rdg + 0.08 μ A 0.23 % rdg + 0.12 μ A 0.64 % rdg + 0.16 μ A 1.2 % rdg + 0.31 μ A	Fluke multi- function calibrator
330 μ A to 3.3 mA	10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 30) kHz	0.16 % rdg + 0.12 μ A 0.097 % rdg + 0.12 μ A 0.079 % rdg + 0.12 μ A 0.39 % rdg + 0.23 μ A 0.79 % rdg + 0.47 μ A	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % rdg + 1.6 μ A 0.070 % rdg + 1.6 μ A 0.033 % rdg + 1.6 μ A 0.08 % rdg + 2.0 μ A 0.064 % rdg + 1.6 μ A 0.33 % rdg + 3.1 μ A	

Parameter/Range	Frequency	CMC ^{2, 5, 6} ($\pm$)	Comments
AC Current – Generate ³ (cont)			
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % rdg + 16 μ A 0.070% rdg + 16 μ A 0.033 % rdg + 16 μ A 0.079 % rdg + 39 μ A 0.16 % rdg + 78 μ A 0.30 % rdg + 160 μ A	Fluke multi-function calibrator
330 mA to 1.1 A	(10 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.15 % rdg + 78 μ A 0.041 % rdg + 78 μ A 0.46 % rdg + 0.78 μ A 1.9 % rdg + 3.9 mA	
(1.1 to 3) A	(10 to 45) Hz (0.45 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.14 % rdg + 78 μ A 0.053 % rdg + 78 μ A 0.47 % rdg + 0.78 mA 1.9 % rdg + 3.9 mA	
(3 to 11) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.045 % rdg + 1.6 mA 0.081 % rdg + 1.6 mA 2.4 % rdg + 1.6 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (0.1 to 5) kHz	0.10 % rdg + 3.9 mA 0.12 % rdg + 3.9 mA 2.5 % rdg + 500 mA	
Clamp-On Only – (20.5 to 1025) A			
Toroidal	(45 to 65) Hz (65 to 440) Hz	0.35 % rdg 0.82 % rdg	Fluke multi-function calibrator with Fluke 50- turn coil
Non-Toroidal	(45 to 65) Hz (65 to 440) Hz	0.60 % rdg 1.0 % rdg	
AC Current – Measure ³			
(5 to 100) μ A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 5 kHz	0.46 % rdg + 0.030 % rng 0.18 % rdg + 0.030 % rng 0.071 % rdg + 0.030 % rng	Agilent precision DMM

Parameter/Range	Frequency	CMC ^{2, 5, 6} ($\pm$)	Comments
AC Current – Measure ³ (cont)			
(1, 10, 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.46 % rdg + 0.020 % rng 0.17 % rdg + 0.020 % rng 0.07 % rdg + 0.020 % rng 0.036 % rdg + 0.020 % rng 0.40 % rdg + 0.040 % rng 0.42 % rdg + 0.040 % rng 0.56 % rdg + 0.16 % rng	Agilent precision DMM
1 A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.46 % rdg + 0.020 % rng 0.19 % rdg + 0.020 % rng 0.095 % rdg + 0.020 % rng 0.12 % rdg + 0.020 % rng 0.35 % rdg + 0.020 % rng 0.35 % rdg + 0.020 % rng	
3 A	(3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz	1.1 % rdg + 1.8 mA 0.44 % rdg + 1.8 mA 0.20 % rdg + 1.8 mA	HP DMM
3 A to 1 kA	45 Hz to 5 kHz	0.80 % rdg	Clamp-on meter
Oscilloscopes ³ –			
DC, 1 mW to 50 W	(0 to +/- 6.6) V	0.26 % + 40 μ V	Fluke multi-function calibrator with scope option
Square Wave 1 mW to 50 W	(0 to +/- 130) V	0.068 % + 40 μ V	
Level Sine Wave Amplitude (50 kHz Reference)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	0.26 % + 40 μ V 0.25 % + 40 μ V 0.26 % + 40 μ V 0.26 % + 40 μ V	
Flatness (50 kHz Reference)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	0.26 % + 40 μ V 0.25 % + 40 μ V 0.26 % + 40 μ V 0.26 % + 40 μ V	

Parameter/Range	Frequency	CMC ^{2, 6} ($\pm$)	Comments
Oscilloscopes ³ – (cont) Time Marker	1 ns to 20 ms 50 ms to 5 s	3 μ s/s (30 + 1000 <i>t</i>) μ s/s	Fluke multi-function calibrator with scope option
Rise Time	250 ps	120 ps	<i>t</i> = time in seconds

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2, 4, 5} ($\pm$)	Comments
Universal Testing Machines, Compression Testing Machines and Tension Testing Machines ³	(0.2 to 600) lbf Up to 600 000 lbf	0.04 % + 0.58 <i>R</i> 0.4 % + 0.58 <i>R</i>	Deadweights, ASTM E4 Load cells; the range for testing machines in tension is only to 60 000 lbf. ASTM E4
Calibration of Force Gages, Load Cells, Dynamometers and Cable Tensiometers ³	Up to 600 lbf (0 to 500) lbf (0 to 2000) lbf (0 to 5000) lbf (0 to 25 000) lbf	0.02 % 0.32 lbf 1.1 lbf 3.0 lbf 9.0 lbf	Comparison to Class F weights, compression & tension Master load cells – tension & compression
Pressure Gages and Transducers – Hydraulic ³ Pneumatic ³	(75 to 15 000) psig (10 to 16) psi/psia (-13.5 to 30) psi/psia (30 to 300) psi/psia (300 to 1000) psi/psia (1000 to 2000) psi/psia (2000 to 6000) psi/psia	0.12 % 0.012 % 0.011 psi 0.035 psi 0.14 psi 0.24 psi 0.64 psi	Ametek T150 deadweight tester Pressure controller

Parameter/Equipment	Range	CMC ^{2, 4, 5, 8} ($\pm$)	Comments
Torque ³ – Wrenches	20 ozf·in to 1000 lbf·ft	1.0 %	CDI torque standard
Analyzers	(10 to 24 000) lbf·in	0.1 %	Weights, torque wheels, and arms
Guns, Drivers, Screwdrivers	(0.2 to 250) N·m	0.40 %	Crane torque transduces
RPM ³ – Measure	(6 to 8300) RPM (8300 to 24 999) RPM	0.02 % + 0.1 RPM 0.02 % + 1.0 RPM	Laser tachometer
Scales & Balances ³	(1 to 20) mg (20 to 500) mg 500 mg to 5 g (5 to 20) g 20g to 20 kg 0.25 oz to 1 lb (1 to 10) lb (10 to 1000) lb	30 μ g 30 μ g 50 μ g 0.001 % 0.0005 % 0.05 % 0.002 % 0.012 %	Comparison to precision weights Comparison to standard weights
Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Tester ³	HRA: Low Medium High HRBW: Low Medium High HRC: Low Medium High HRE: Low Medium High	0.22 HRA 0.30 HRA 0.19 HRA 0.47 HRBW 0.46 HRBW 0.34 HRBW 0.33 HRC 0.37 HRC 0.25 HRC 0.17 HRE 0.13 HRE 0.14 HRE	Indirect verification per ASTM E18

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Tester ³ (cont)	HR15N: Low Medium High HR15TW: Low Medium High HR30N: Low Medium High HR30TW: Low Medium High HR45N: Low Medium High HR45TW: Low Medium High	0.32 HR15N 0.12 HR15N 0.17 HR15N 0.49 HR15TW 0.25 HR15TW 0.43 HR15TW 0.26 HR30N 0.27 HR30N 0.17 HR30N 0.49 HR30TW 0.46 HR30TW 0.46 HR30TW 0.24 HR45N 0.31 HR45N 0.20 HR45N 0.35 HR45TW 0.49 HR45TW 0.35 HR45TW	Indirect verification per ASTM E18
Indirect Verification of Microindentation Hardness Testers (Knoop and Vickers) ³	(100 to 250) HK (250 to 650) HK > 650 HK (100 to 900) HV	9.2 HK 9.3 HK 24 HK 7.6 HV	Indirect verification method per ASTM E92
Indirect Verification of Brinell Hardness Testers at Test Conditions ³ – 10/3000/15 10/1500/15 10/500/15	(100 to 199) HBW (200 to 399) HBW (400 to 600) HBW	1.7 HBW 3.3 HBW 5.2 HBW	Indirect verification method per ASTM E10

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 4, 8} ($\pm$)	Comments
Temperature Measuring Equipment ³ – Liquid in Glass Thermometers, Dial, RTDs, and Thermocouples	(-30 to 200) °C (200 to 660) °C	0.056 °C 0.14 °C	Master PRT display with probe, temperature bath Block calibrations with master PRT display with probe
Temperature – Measure ³	(-80 to 420) °C	0.056 °C	Master PRT display with probe
Relative Humidity – Measure ³	(10 to 90) % RH (90 to 95) % RH	1.2 % RH 2.3 % RH	Vaisala HMP 70 series
Relative Humidity – Generate ³	(10 to 90) % RH (90 to 95) % RH	1.2 % RH 2.3 % RH	Vaisala HMP with chamber
Ovens, Chambers, Freezers, Furnaces ³	(-196 to 400) °C (> 400 to 550) °C (550 to 800) °C (800 to 1000) °C (1000 to 1200) °C	0.14 °C 1.6 °C 3.8 °C 4.7 °C 5.6 °C	Fluke PRT with readout Fluke process calibrator with TC

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2, 8} ($\pm$)	Comments
Frequency – Measure ³	1 μ Hz to 20 MHz 20 MHz to 26.5 GHz	0.002 μ Hz/Hz 0.002 μ Hz/Hz	HP frequency counter

Parameter/Equipment	Range	CMC ^{2, 8} ($\pm$)	Comments
Frequency – Measuring Equipment ³	1 μ Hz to 20 MHz	0.002 μ Hz/Hz	HP function generator
	100 kHz to 3 GHz	0.002 μ Hz/Hz	HP signal generator
Tachometer – Optical ³	(0 to 60 000) RPM	0.001 RPM	Agilent signal generator
Stopwatches and Timers ³	(0.1 to 86 400) s	0.03 s/day	Helmut timometer

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 length of the unit under test in inches; and R is the resolution of the device under test.

⁵ In the statement of CMC, the first percentage given is the percentage of the reading, unless otherwise noted; the second percentage or fraction given is a percentage or fraction of the range.

⁶ 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.

⁷ This scope meets A2LA's *P112 Flexible Scope Policy*.

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.



Accredited Laboratory

A2LA has accredited

APPLIED TECHNICAL SERVICES, LLC.

Sanford, FL

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 3rd day of April 2023.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1888.07
Valid to April 30, 2025

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