



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

F. D. HURKA COMPANY
 4731 Stockholm Court
 Charlotte, NC 28273
 Charles Jenkins Phone: 704 552 0008

CALIBRATION

Valid To: December 31, 2022

Certificate Number: 1527.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1,6}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Optical Comparator ³ –			
Magnification	5×, 10×, 20× 31.25 in 50× 100×	0.7× 0.13 in 0.27× 0.54×	Glass master & ruler
X-Y Linearity	Up to 12 in	180 μin	Glass master
Rotation	360°	5'	
Squareness	6 in	160 μin	Precision square
Automatic Vision Systems ³ –			
X-Y-Z Coordinates	X, Y: Up to 12 in X, Y: Up to 40 in Z: Up to 6 in	(120 + 2.2L) μin (110 + 5L) μin 140 μin	Glass master Step gage Gage block
Squareness	6 in	150 μin	Precision square

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Articulating Arm CMM ³ – Hemispherical Linearity Ball Bar	40 in Up to 24 in	0.0006 in 0.0011 in	Step gage 4 positional checks
Manual Vision System or Field of View Vision System ³ – X-Y-Z Coordinates Squareness	X, Y: Up to 12 in X, Y: (1 to 40) in Z: Up to 12 in 6 in	(150 + 1.5L) μin (130 + 4.7L) μin 140 μin 200 μin	Glass master Check master Gage block Precision square
CMM ³ – X-Y-Z Coordinates Repeatability Squareness (XY, XZ, YZ) Ball Bar	Up to 40 in Up to 40 in Up to 24 in Up to 24 in	(100 + 5L) μin 100 μin 120 μin 400 μin	Step gage Precision square 4 positional checks
Rotational CMM ³ – Rotational Axis Radial Axis Z-Axis Ball Bar Rotational Repeatability	Up to 24 in Up to 9 in Up to 9 in 8 in 360°	230 μin 150 μin 110 μin 270 μin 0.0017°	Step gage 4 positional checks 360° rotation
Universal Length Measuring Machine ³ – Linearity Parallelism	Up to 300 mm Up to 300 mm	(0.03 + 2.5L/1000) μm 1.4 μm	Gage blocks, force gage Sphere

Parameter/Equipment	Range	CMC ^{2,4,7} (\pm)	Comments
Laser Micrometer ³	Up to 1 in	16 μ in	Comparison to master pin gages
Height Gage ³	Up to 40 in	(130 + 3.7L) μ in	Step gage, gage blocks, indicator
Thread Wires	Up to 0.5 in	12 μ in	Universal length measuring machine
Surface Plate ³ – Flatness	(8 \times 12) in to (24 \times 48) in	45 μ in	Planekator
	(24 \times 48) in to (6 \times 12) ft	46 μ in	Autocollimator
Repeat Reading	(8 \times 12) in to (6 \times 12) ft	43 μ in	Repeat-o-meter
Threads ³ – Thread Rings (Functional Diameter)	Up to 12 in	300 μ in	Truncated/HILO set plugs
Thread Rings (Pitch Diameter)	Up to 12 in	150 μ in	Universal length measuring machine, two-ball method
Thread Plugs, Set Plugs (Pitch Diameter)	Up to 13 in	(60 + 5L) μ in	Universal length measuring machine, thread wires
Cylindrical Measure ³ – OD Gages ID Gages	Up to 20 in (0.039 to 0.3) in (>0.3 to 15) in	(8.7 + 2.7L) μ in 29 μ in (13 + 3.8L) μ in	Universal length measuring machine, gage blocks, cylindrical masters, laser gage
Custom Designed Gages	Up to 20 in	(7 + 3.7L) μ in	
Micrometer Length Standards ³	Up to 20 in (>20 to 40) in	(36 + 2.6L) μ in (150 + 3.9L) μ in	Universal length machine Precision height gage

Parameter/Equipment	Range	CMC ^{2,4} (\pm)	Comments
Micrometers ³ – Length Parallelism	Up to 24 in Up to 1 in	$(64 + 1.5L) \mu\text{in}$ 61 μin	Gage blocks Gage balls
Gage Blocks	Up to 1 in (1 to 4) in (>4 to 20) in	$(3.3 + 0.8L) \mu\text{in}$ $(2.5 + 2.3L) \mu\text{in}$ $(5.9 + 2.3L) \mu\text{in}$	Electronic comparator, gage blocks
Calipers ³	Up to 12 in (18 to 40) in	800 μin $(800 + 1.2L) \mu\text{in}$	Gage blocks Check master
Indicators ³	Up to 12 in	$(23 + 1.1L) \mu\text{in}$	Universal length measuring machine, gage block & stand, indicator calibrator
Step Gage	Up to 40 in	$(95 + 4L) \mu\text{in}$	Electronic comparator, master step gage
Glass Scales	Up to 12 in	$(8 + 2.9L) \mu\text{in}$	Universal length measuring machine with microscope
Squares ³	Up to 12 in	70 μin	Squaremaster & master square
Bore Gages ³	Up to 6 in	200 μin	Gage blocks, ring gage
CMM Spheres, Spheres-Balls ³	Up to 5 in	20 μin	Universal length measuring machine
Surface Finish Masters ³ (Ra)	Up to 115 μin	3.5 Ra	Surface finish tester
Surface Finish Testers ³ (Ra)	Up to 115 μin	2.5 Ra	Master surface finish standard

Parameter/Equipment	Range	CMC ² (±)	Comments
Line Scales ³ – Steel Rulers	Up to 24 in Up to 48 in	0.000 20 in 0.0018 in	Vision system comparison to master ruler
Tape Measures ³	6 in Up to 25 ft Up to 100 ft	0.0048 in 0.0068 in + 0.000 12 in/ft 0.016 in + 0.000 23 in/ft	Lixer gage comparison to master tape measure

II. Dimensional Testing/Calibration

Parameter/Equipment	Range	CMC ^{2, 4, 7} (±)	Comments
Length, 1D – Measure ⁵	Up to 40 in Up to 50 mm Up to 300 mm Up to 12 in Up to 6 in Up to 1 in Up to 4 in	280 μin 59 μin 90 μin 950 μin 130 μin 110 μin 13 μin	Height gage, universal length measuring machine Calipers Micrometer Indicators Gage blocks
Length, 2D – Measure ⁵	(12 × 6) in (10 × 6 × 6) in (25 × 25 × 10) in (6 × 6 × 6) in	260 μin 150 μin 150 μin 220 μin	Optical comparator Micro-Vu vertex Micro-Vu excel Micro-Vu sol
Length, 3D – Measure ⁵	(39 × 47 × 24) in (10 × 6 × 6) in (25 × 25 × 10) in (6 × 6 × 6) in	190 μin 150 μin 150 μin 220 μin	CMM Micro-Vu vertex Micro-Vu excel Micro-Vu sol
Angular Measurements – Measure ⁵	Up to 360°	(0.0034 - 0.000 12L) angular °	CMM/vision or optical system

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,8} (±)	Comments
DC Voltage – Generate ³	(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) V	2.8 μV/V + 1.0 μV 2.4 μV/V + 1.5 μV 3.0 μV/V + 15 μV 3.4 μV/V + 100 μV 4.5 μV/V + 0.30 mV	Meter calibrator
	(0 to 100) mV (0.1 to 1) V (1 to 15) V	59 μV/V + 5.0 μV 58 μV/V + 50 μV 40 μV/V + 500 μV	Process calibrator
DC Voltage – Measure ³	(0 to 1) mV (1 to 10) mV (10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V	130 μV/V + 1.0 nV 15 μV/V + 10 nV 14 μV/V + 0.6 μV 6.6 μV/V + 4.0 μV 5.6 μV/V + 20 μV 6.3 μV/V + 500 μV	7.5 digit nanovolt meter
	(10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	3.8 μV/V + 0.1 μV 1.1 μV/V + 0.1 μV 0.79 μV/V + 0.1 μV 0.85 μV/V + 10 μV 1.1 μV/V + 10 μV	8.5 digit multimeter
	(1000 to 10 000) V (10 000 to 35 000) V (35 000 to 70 000) V	75 μV/V 0.36 mV/V 1.5 mV/V	High voltage meter w/ probes
	(0 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	16 μV/V + 0.5 μV 8.2 μV/V + 1.0 μV 8.5 μV/V + 10 μV 8.4 μV/V + 100 μV 8.8 μV/V + 1.0 mV	6.5 digit multimeter
	(0 to 100) mV 100 mV to 3 V (3 to 30) V (30 to 300) V	61 μV + 5 μV 20 μV + 50 μV 20 μV + 0.5 mV 0.20 mV + 50 mV	Process calibrator

Parameter/Equipment	Range	CMC ^{2, 8} (±)	Comments
DC Current – Generate ³	(0 to 329.999) µA (0.33 to 3.299 99) mA (3.3 to 32.9999) mA (33 to 329.999) mA (0.33 to 2.999 99) A (3.0 to 10) A (> 10 to 20.5) A	20 µA/A + 0.023 µA 14 µA/A + 0.02 µA 15 µA/A + 0.3 µA 29 µA/A + 3 µA 51 µA/A + 58 µA 80 µA/A + 0.5 mA 0.15 mA/A + 0.2 mA	Meter calibrator
	(10 to 500) A (>500 to 1000) A	3.8 mA/A + 5 mA 7.5 mA/A + 10 mA	Meter calibrator w/ X25/X50 current coil
	(0 to 22) mA	0.27 mA/A + 3 µA	Process calibrator
DC Current – Measure ³	(1 to 100) nA (0.10 to 1) µA (1 to 10) µA (10 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	8.2 µA/A + 5 pA 11 µA/A + 5 pA 12 µA/A + 10 pA 8.4 µA/A + 0.1 nA 6.0 µA/A + 5 nA 5.9 µA/A + 10 nA 14 µA/A + 0.1 µA 3.8 µA/A + 2 µA	8.5 digit multimeter
	(10 to 100) µA (100 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 3) A (3 to 10) A	35 µA/A + 3 nA 42 µA/A + 5 nA 32 µA/A + 200 nA 62 µA/A + 0.5 µA 0.61 mA/A + 2.0 µA 0.33 mA/A + 10 µA 0.15 mA/A + 60 µA	6.5 digit multimeter
	(10 to 100) A (100 to 300) A (300 to 1000) A	0.069 % 0.063 % 0.058 %	Empro stunts w/ 6.5 digit multimeter
	(0 to 30) mA (30 to 100) mA	0.20 mA/A + 5 µA 0.59 mA/A + 20 µA	Process calibrator
AC Power – Generate ³ PF=1	(0.01 to 336) W (336 to 3060) W (3.06 to 20.9) kW	0.05 % 0.05 % 0.1 %	Meter calibrator

Parameter/Range	Frequency	CMC ^{2, 8} (\pm)	Comments
AC Voltage – Generate ³			
(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	0.019 % + 6.0 μ V 0.018 % + 6.0 μ V 0.011 % + 6.0 μ V 0.020 % + 6.0 μ V 0.017 % + 12 μ V 0.017 % + 50 μ V	Meter 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	0.0067 % + 8.0 μ V 0.0025 % + 8.0 μ V 0.0028 % + 8.0 μ V 0.0036 % + 8.0 μ V 0.0056 % + 32 μ V 0.0022 % + 70 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	0.0058 % + 50 μ V 0.0021 % + 60 μ V 0.0022 % + 60 μ V 0.0032 % + 50 μ V 0.0040 % + 130 μ V 0.028 % + 600 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	0.0065 % + 650 μ V 0.0024 % + 600 μ V 0.0030 % + 600 μ V 0.0036 % + 600 μ V 0.0052 % + 1.6 mV	
(33 to 329.999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.0045 % + 2.0 mV 0.0053 % + 6.0 mV 0.0037 % + 6.0 mV 0.0082 % + 6.0 mV 0.0049 % + 50 mV	
(330 to 1000) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.0053 % + 10 mV 0.0046 % + 10 mV 0.0049 % + 10 mV	

Parameter/Range	Frequency	CMC ^{2, 8} (\pm)	Comments
AC Voltage – Measure ³			
(1 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	75 μ V/V + 4.3 μ V 71 μ V/V + 2.2 μ V 0.014 % + 2.2 μ V 0.03 % + 2.1 μ V 0.08 % + 2.1 μ V 0.3 % + 11 μ V 1 % + 11 μ V 1.5 % + 10 μ V	8.5 digit multimeter
100 mV to 1 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	75 μ V/V + 43 μ V 71 μ V/V + 22 μ V 0.014 % + 22 μ V 0.03 % + 21 μ V 0.08 % + 21 μ V 0.3 % + 110 μ V 1 % + 110 μ V 1.5 % + 100 μ V	
(1 to 10) 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	75 μ V/V + 0.43 mV 71 μ V/V + 0.22 mV 0.014 % + 0.22 mV 0.03 % + 0.21 mV 0.08 % + 0.21 mV 0.3 % + 1 mV 1 % + 1 mV 1.5 % + 1 mV	
(10 to 100) 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 40) Hz	0.021 % + 4 mV 0.02 % + 22 mV 0.02 % + 22 mV 0.035 % + 21 mV 0.12 % + 21 mV 0.4 % + 110 mV 1.5 % + 110 mV 0.04 % + 43 mV	
(100 to 750) V	40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.04 % + 21 mV 0.06 % + 22 mV 0.12 % + 21 mV 0.3 % + 21 mV	
(0 to 3) V	(40 to 500) Hz	0.2 % + 2 mV	Process calibrator
(3 to 30) V	(40 to 500) Hz	0.2 % + 20 mV	
(30 to 300) V	(40 to 500) Hz	0.2 % + 200 mV	

Parameter/Range	Frequency	CMC ^{2, 8} (\pm)	Comments
AC Voltage – Measure High Frequency			
(1 to 10) mV	(2 to 4) MHz (4 to 8) MHz	54 mV/V + 11 μ V 160 mV/V + 8.2 μ V	8.5 digit multimeter
(10 to 100) mV	(2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	30 mV/V + 130 μ V 30 mV/V + 220 μ V 120 mV/V + 160 μ V	
(0.1 to 1) V	(2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	30 mV/V + 1.3 mV 30 mV/V + 2.2 mV 120 mV/V + 1.6 mV	
(1 to 10) V	(2 to 4) MHz (4 to 8) MHz (8 to 10) MHz	31 mV/V + 6.2 mV 31 mV/V + 7.9 mV 120 mV/V + 8.5 mV	
AC High Voltage – Measure ³			
(0.7 to 10) kV (10 to 30) kV (30 to 50) kV	(0.01 to 600) Hz	0.29 mV/V 0.48 mV/V 0.48 mV/V	High voltage meter w/probes

Parameter/Range	Frequency	CMC ^{2,8} (±)	Comments
AC Current – Generate ³			
(29 to 329.99) µA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.017 % + 0.10 µA 0.011 % + 0.10 µA 0.011 % + 0.10 µA 0.011 % + 0.20 µA 0.017 % + 0.20 µA 0.011 % + 0.40 µA	Meter calibrator
(.33 to 3.2999) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.011 % + 0.20 µA 0.010 % + 0.20 µA 0.010 % + 0.20 µA 0.010 % + 0.20 µA 0.012 % + 0.30 µA 0.027 % + 0.60 µA	
(3.3 to 32.9999) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.016 % + 2.0 µA 0.012 % + 2.0 µA 0.012 % + 2.0 µA 0.012 % + 2.0 µA 0.013 % + 3.0 µA 0.020 % + 4.0 µA	
(33 to 329.99) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.016 % + 20 µA 0.011 % + 20 µA 0.012 % + 20 µA 0.011 % + 50 µA 0.013 % + 100 µA 0.022 % + 200 µA	
(.33 to 1.099 99) A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.030 % + 100 µA 0.028 % + 100 µA 0.038 % + 1.0 mA 0.079 % + 5.0 mA	
(1.1 A to 2.999 99) A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.017 % + 100 µA 0.014 % + 100 µA 0.030 % + 1.0 mA 0.065 % + 5.0 mA	
(3 to 10.9999) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.013 % + 2.0 mA 0.013 % + 2.0 mA 0.056 % + 2.0 mA	
(11 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.0084 % + 5.0 mA 0.018 % + 5.0 mA 0.054 % + 5.0 mA	
(20.5 to 500) A	(45 to 440) Hz	0.081 % IV + 0.13 A	Meter calibrator w/ X25/X50 current coil
(>500 to 1000) A	(45 to 440) Hz	0.10 % IV + 0.25 A	

Parameter/Range	Frequency	CMC ^{2,4,8} (±)	Comments
AC Current – Measure ³			
(0 to 100) μA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz	0.4 % + 0.03 μA 0.15 % + 0.03 μA 0.06 % + 0.03 μA 0.06 % + 0.03 μA	8.5 digit multimeter
(0.1 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 100) kHz	0.4 % + 0.02 μA 0.15 % + 0.02 μA 0.06 % + 0.02 μA 0.03 % + 0.02 μA 0.06 % + 0.02 μA 0.55 % + 0.15 μA	
(0.1 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 100) kHz	0.4 % + 0.2 mA 0.16 % + 0.2 mA 0.08 % + 0.2 mA 0.1 % + 0.2 mA 0.3 % + 0.2 mA 1 % + 0.4 mA	
(1 to 600) A	(45 to 440) Hz	0.28 % + 0.58R	Current clamp/probe with 6.5 digital multimeter

Parameter/Equipment	Range	CMC ^{2,8} (±)	Comments
Resistance – Generate ³ (Variable)	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 1.1) kΩ (1.1 to 11) kΩ (11 to 110) kΩ 110 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 to 1100) MΩ	84 μΩ/Ω + 1 mΩ 40 μΩ/Ω + 1.5 mΩ 14 μΩ/Ω + 1.4 mΩ 6.4 μΩ/Ω + 2 mΩ 5.8 μΩ/Ω + 20 mΩ 6.0 μΩ/Ω + 0.2 Ω 5.6 μΩ/Ω + 2 Ω 18 μΩ/Ω + 30 Ω 18 μΩ/Ω + 50 Ω 0.17 mΩ/Ω + 2.5 kΩ 0.18 mΩ/Ω + 3 kΩ 0.58 mΩ/Ω + 100 kΩ 1.1 mΩ/Ω + 500 kΩ	Meter calibrator
	(0 to 10) Ω (10 to 100) Ω (100 to 1000) Ω (1 to 10) kΩ	0.59 mΩ/Ω + 10 mΩ 0.58 mΩ/Ω + 20 mΩ 0.58 mΩ/Ω + 200 mΩ 6.2 mΩ/Ω + 3 Ω	Process calibrator

Parameter/Equipment	Range	CMC ^{2,4,8} (\pm)	Comments
Resistance – Generate ³ (Fixed Points)	0.0001 Ω 0.0005 Ω 0.01 Ω /Step 0.1 Ω /Step 1 Ω /Step 10 Ω /Step 100 Ω /Step 1 k Ω /Step 10 k Ω /Step 100 k Ω /Step 1 M Ω /Step 10 M Ω /Step 100 M Ω /Step 1 G Ω /Step	11 $\mu\Omega$ 11 $\mu\Omega$ 0.61 m Ω / Ω + 0.58R 69 $\mu\Omega$ / Ω + 0.58R 11 $\mu\Omega$ / Ω + 0.58R 20 $\mu\Omega$ / Ω + 0.58R 4.1 $\mu\Omega$ / Ω + 0.58R 3.9 $\mu\Omega$ / Ω + 0.58R 2.9 $\mu\Omega$ / Ω + 0.58R 6.5 $\mu\Omega$ / Ω + 0.58R 25 $\mu\Omega$ / Ω + 0.58R 0.34 m Ω / Ω + 0.58R 9.9 m Ω / Ω + 0.58R 11 m Ω / Ω + 0.58R	Current shunt Decade resistance boxes
Low Resistance – Measure ³	(0 to 1) m Ω (1 to 100) m Ω (0.1 to 1) Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω	46 m Ω / Ω + 0.2 $\mu\Omega$ 0.62 m Ω / Ω + 0.2 $\mu\Omega$ 83 $\mu\Omega$ / Ω + 0.2 $\mu\Omega$ 66 $\mu\Omega$ / Ω + 1.0 $\mu\Omega$ 7.1 $\mu\Omega$ / Ω + 10 $\mu\Omega$ 13 $\mu\Omega$ / Ω + 0.1 m Ω 12 $\mu\Omega$ / Ω + 1.0 m Ω 12 $\mu\Omega$ / Ω + 20 m Ω 12 $\mu\Omega$ / Ω + 20 m Ω	7.5 digit micro-ohm meter
Resistance – Measure ³	(1 to 10.9999) Ω (11 to 109.9999) Ω (0.11 to 1.099 999) k Ω (1.1 to 10.999 99) k Ω (11 to 109.9999) k Ω (0.11 to 1.099 999) M Ω (1.1 to 10.999 99) M Ω (11 to 109.9999) M Ω (0.11 to 1100) G Ω	5.4 $\mu\Omega$ / Ω + 10 $\mu\Omega$ 3.9 $\mu\Omega$ / Ω + 100 $\mu\Omega$ 3.8 $\mu\Omega$ / Ω + 100 $\mu\Omega$ 3.6 $\mu\Omega$ / Ω + 1.0 m Ω 2.6 $\mu\Omega$ / Ω + 10 m Ω 3.1 $\mu\Omega$ / Ω + 1.0 Ω 15 $\mu\Omega$ / Ω + 20 Ω 22 $\mu\Omega$ / Ω + 200 Ω 0.86 m Ω / Ω + 2 k Ω	8.5 digit multimeter
Resistance – Measure ³	(0 to 10) Ω (10 to 100) Ω (0.10 to 1) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω (1 to 10) M Ω (10 to 100) M Ω	0.20 m Ω / Ω + 50 $\mu\Omega$ 30 $\mu\Omega$ / Ω + 100 $\mu\Omega$ 12 $\mu\Omega$ / Ω + 1.0 m Ω 12 $\mu\Omega$ / Ω + 10 m Ω 12 $\mu\Omega$ / Ω + 100 m Ω 17 $\mu\Omega$ / Ω + 2.0 Ω 53 $\mu\Omega$ / Ω + 40 Ω 1.3 m Ω / Ω + 200 k Ω	6.5 digit multimeter

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouples and Thermocouple Indicating Systems ³ –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1820) °C	0.45 °C 0.35 °C 0.31 °C	Meter calibrator
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.51 °C 0.18 °C 0.16 °C 0.18 °C 0.22 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.30 °C 0.18 °C 0.16 °C 0.19 °C 0.25 °C	
Type K	(-200 to -100) °C (-200 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.34 °C 0.20 °C 0.18 °C 0.27 °C 0.41 °C	
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.38 °C 0.27 °C 0.19 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.41 °C 0.24 °C 0.21 °C 0.20 °C 0.28 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.58 °C 0.36 °C 0.34 °C 0.40 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.48 °C 0.37 °C 0.38 °C 0.47 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.64 °C 0.26 °C 0.18 °C 0.16 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTDs ³ –			
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 630) °C (630 to 800) °C	0.065 °C 0.081 °C 0.10 °C 0.13 °C 0.23 °C	Meter calibrator
Pt 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 630) °C	0.065 °C 0.081 °C 0.10 °C 0.13 °C	
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 600) °C (600 to 630) °C	0.25 °C 0.058 °C 0.073 °C 0.081 °C 0.11 °C 0.24 °C	
Pt 385, 200 Ω	(-200 to 100) °C (100 to 260) °C (260 to 600) °C (600 to 630) °C	0.058 °C 0.065 °C 0.15 °C 0.17 °C	
Pt 385, 500 Ω	(-200 to -80) °C (-80 to 100) °C (100 to 260) °C (260 to 600) °C (600 to 630) °C	0.058 °C 0.065 °C 0.073 °C 0.10 °C 0.12 °C	
Pt 385, 1000 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 600) °C (600 to 630) °C	0.052 °C 0.031 °C 0.058 °C 0.071 °C 0.081 °C 0.24 °C	
PtNi 385, 120 Ω	(-80 to 100) °C (100 to 260) °C	0.090 °C 0.15 °C	
Cu 427 10 Ω	(-100 to 260) °C	0.31 °C	
Current Coils	Up to 25 Turns (> 25 to 50) Turns	0.079 % of Turns 0.099 % of Turns	

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
AC/DC Insulation Tester – High Pot Tester & Meggers			
AC Voltage – 10 kV	(0.01 to 600) Hz	0.17 mV/V	High voltage voltmeter & 8.5 digit multimeter
DC Voltage	Up to 10 000 V	60 µV/V	
AC Current	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz	0.4 % + 0.02 µA 0.15 % + 0.02 µA 0.06 % + 0.02 µA	8.5 digit multimeter
DC Current	(10 to 100) mA	7.8 µA/A + 0.1 µA	
Resistance	10 MΩ/Step 100 MΩ/Step 1 GΩ/Step	0.33 mΩ/Ω + 0.58R 9.8 mΩ/Ω + 0.58R 9.9 mΩ/Ω + 0.58R	High power resistance decade box

IV. Magnetic Quantities

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Magnetic Flux Density – Measuring Equipment, Fixed Points ³	-2.0 G 2.0 G -10 G 10 G	0.19 G 0.19 G 0.30 G 0.30 G	Reference magnets

V. Mechanical

Parameter/Equipment	Range	CMC ^{2,4,7} (±)	Comments
Torque – Measure ³	(10 to 100) in·ozf (5 to 1000) in·lbf (25 to 250) ft·lbf (251 to 600) ft·lbf	0.006R 0.006R 0.008R 0.008R	Torque calibrator

Parameter/Equipment	Range	CMC ^{2,4,7} (\pm)	Comments
Vacuum – Measuring Equipment ³	(-30 to 0) in Hg	0.11 in Hg + 0.58R	Master vacuum gage
	(-25 to 0) in Hg	0.11 in Hg + 0.58R	Process calibrator w/ reference pressure module
Pressure – Measuring Equipment ³	(0 to 10) inH2O (0 to 100) psi (0 to 300) psi	0.022 inH2O + 0.58R 0.023 psi + 0.58R 0.036 psi + 0.58R	Process calibrator w/ reference pressure module
	(0 to 1000) psi (1000 to 10 000) psi	0.077 psi + 0.58R 0.38 psi + 0.58R	Master pressure gage
Weight Scales ³	(0 to 5) mg (5 to 50) mg (50 to 100) mg (100 to 200) mg (200 to 500) mg (0.5 to 2) g (2 to 5) g (5 to 10) g (10 to 20) g (20 to 50) g (50 to 100) g (100 to 1000) g (1 to 2) kg (2 to 5) kg (5 to 20) kg (20 to 68) kg	1.2 μ g + 0.58R 1.8 μ g + 0.58R 3.3 μ g + 0.58R 2.7 μ g + 0.58R 1.6 μ g + 0.58R 3.3 μ g + 0.58R 5.0 μ g + 0.58R 15 μ g + 0.58R 22 μ g + 0.58R 34 μ g + 0.58R 0.21 mg + 0.58R 3.5 mg + 0.58R 6.6 mg + 0.58R 17 mg + 0.58R 33 mg + 0.58R 35 mg + 0.58R	Standard weights
Mass ³	(1 to 1000) mg (1 to 2) g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg	41 μ g 41 μ g 42 μ g 48 μ g 61 μ g 24 μ g 30 μ g 1.1 mg 3.6 mg 5.1 mg 11 mg 22 mg 83 mg 0.13 g	Mechanical comparison to standard weights

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Rockwell Hardness Testers ³	HRC: Low Medium High	1 HRC 1 HRC 1 HRC	Indirect verification method per ASTM E18 with test blocks
Indirect Verification of Superficial Hardness Testers ³	HRBW: Low Medium High HR15TW: Low Medium High HR15N: Low Medium High HR30TW: Low Medium High HR30N: Low Medium High	1 HRBW 1 HRBW 1 HRBW 1 HR15TW 1 HR15TW 1 HR15TW 1 HR15N 1 HR15N 1 HR15N 1 HR30TW 1 HR30TW 1 HR30TW 1 HR30N 1 HR30N 1 HR30N	Indirect verification method per ASTM E18 with test blocks
Indirect Verification of Superficial Hardness Testers ³ (cont)	HR45TW: Low Medium High HR45N: Low Medium High	1 HR45TW 1 HR45TW 1 HR45TW 1 HR45N 1 HR45N 1 HR45N	Indirect verification method per ASTM E18 with test blocks
Indirect Verification of Brinell Hardness Testers ³	HBW 10/3000: Low Medium High	7 HBW 10/3000 7 HBW 10/3000 7 HBW 10/3000	Indirect verification method per ASTM E10 with test blocks

VI. Thermodynamics

Parameter/Equipment	Range	CMC ^{2, 4, 7} (\pm)	Comments
Temperature – Measuring Equipment ³			
Dial & Liquid in Glass Thermometers	(-35 to 165) °C	0.13 °C + 0.58R	Special RTD probe w/ display & wet bath
RTDs Thermocouples	(-35 to 660) °C (-195 to 370) °C	0.13 °C + 0.58R 0.40 °C + 0.58R	Standard probe w/ display & wet bath/oven
Temperature – Measure ³	(-195 to 660) °C (-195 to 370) °C	0.13 °C + 0.58R 0.40 °C + 0.58R	Special RTD probe w/ display Type T thermocouple probe w/ display
Temperature/Humidity Recorders ³			
Temperature	(-35 to 165) °C	0.13 °C + 0.58R	Special RTD probe/display
Humidity – Fixed Values	(11, 35, 76, 95) % RH	(0.59 + 0.0043H) % RH	Master hygrometer w/ saturated salts
Relative Humidity – Measure ³	(11 to 95) % RH	(0.59 + 0.0043H) % RH	Master hygrometer
Relative Humidity – Measuring Equipment, Fixed Points ³	11 % RH 35 % RH 76 % RH 95 % RH	(0.59 + 0.0043H) % RH	Master hygrometer w/saturated salts
Ovens, Chambers, Freezers, Furnaces ³	(-195 to 660) °C (-195 to 1200) °C	0.13 °C + 0.58R 0.40 °C + 0.58R	Process calibrator w/ RTD & TC probes

VII. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,4,7} (\pm)	Comments
Frequency – Generation/Measuring Equipment ³	0.1 Hz to 5 GHz	14 nHz/Hz	Function generator w/ 10-digit counter
Frequency – Measure ³	0.1 Hz to 5 GHz	14 nHz/Hz	10 Digit counter
Tachometer – Optical ³	Up to 200 000 RPM	0.000 044 RPM/RPM	Function generator w/ LED
Stop Watches/Time Measurement ³	Up to 24 hrs	0.52 s/day	Direct comparison
	(0.1 to 86 400) s	35 ms/day + 0.58R	Totalize method

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

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 either inches or millimeters (where appropriate), H is percent relative humidity, and R is the resolution of the unit under test.

⁵ This laboratory meets R205 – *Specific Requirements: Calibration Laboratory Accreditation Program* for the types of dimensional tests listed above and is considered equivalent to that of a calibration.

⁶ This scope meets A2LA’s *P112 Flexible Scope Policy*.

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 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

F.D. Hurka Company

Charlotte, NC

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 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 29th day of October 2020.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1527.01
Valid to December 31, 2022
Revised March 10, 2021

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