



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005  
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: September 30, 2020

Certificate Number: 0513.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1, 11</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2, 4, 8</sup> ( $\pm$ )	Comments
Calipers <sup>3</sup>	Up to 72 in	$(2L) \mu\text{in} + 0.6R$	Gage blocks
Coating Thickness Gages <sup>3</sup>	Up to 0.2 in	140 $\mu\text{in}$	Master shims
Cylindrical Pins – Outside Diameter	Up to 1 in	26 $\mu\text{in}$	Laser micrometer
Cylindrical Plugs – Outside Diameter	Up to 4 in	$(9 + 1.7L) \mu\text{in}$	SIP 550 ULM
Cylindrical Ring Gages	(0.25 to 12) in	$(15 + 1.5L) \mu\text{in}$	SIP 550 ULM

Parameter/Equipment	Range	CMC <sup>2, 4, 8</sup> ( $\pm$ )	Comments
CMM <sup>3</sup> – Linearity Repeatability Squareness Volumetric	Up to 1600 in	(6.4 + 0.7L) $\mu$ in 150 $\mu$ in 180 $\mu$ in 190 $\mu$ in	Laser interferometer, master sphere, granite square, ball bar
End Standards & Long Gage Blocks	Up to 20 in	(10 + 1.5L) $\mu$ in	SIP 550 ULM
Extensometer <sup>3</sup>	Up to 2 in	68 $\mu$ in	Micrometer head, gage blocks, extensometer calibrator
Flatness <sup>3</sup>	Up to 2 in	5 $\mu$ in	Optical flats and monochromatic light
Gage Blocks	Up to 1 in ( $>1$ to 4) in	4 $\mu$ in (4 + 1.5L) $\mu$ in	Mechanical comparison
Height Gage <sup>3</sup>	Up to 40 in	(0.6R + 8.3L) $\mu$ in	Gage blocks
Hole Tester Gages and Micrometers <sup>3</sup>	Up to 2 in	0.000 069 in + 0.000 017 in/in	Ring gages
Bore Gages Indicators <sup>3</sup>	Up to 2 in	(0.6R + 2L) $\mu$ in	Gage block
Indicators <sup>3</sup>	Up to 4 in	(0.000 095 + 0.000 006L) in	Gage blocks
Level – Bubble <sup>3</sup>	Up to 24” in Length	(50L) $\mu$ in + 0.25R	Surface plate, sine bar and gage blocks

Parameter/Equipment	Range <sup>6</sup>	CMC <sup>2,4,8</sup> ( $\pm$ )	Comments
Linear Measurement Machines <sup>3</sup> – Linearity	Up to 1600 in Up to 100 in	(6.4 + 0.7L) $\mu$ in (2L) $\mu$ in + 0.6R	Laser interferometer Gage blocks
Micrometers <sup>3</sup>	Up to 20 in	(2.7L) $\mu$ in + 0.6R	Gage blocks
Optical Comparator <sup>3</sup> – Axis Linearity Axis Squareness Magnification Angle	Up to 12 in Up to 12 in (10, 20, 31.25, 62.5, 75,100) X 0° to 60°	(120 + 1.2L) $\mu$ in 130 $\mu$ in 120 $\mu$ in 0.017°	Glass master scales, angle blocks
Protractors – Digital <sup>3</sup>	(0 to 90) degrees	0.0057 degrees + 0.6R	Sine plate, gage blocks, granite surface plate
Rulers & Tape Measures <sup>3</sup>	Up to 72 in	0.6R	Gage blocks
Spheres	Up to 4 in	(13 + 3D) $\mu$ in	SIP 550 ULM
Surface Plate <sup>3</sup> Flatness Repeatability	Up to 590 in -----	10D $\mu$ in 13 $\mu$ in	Laser interferometer, D is the length of the diagonal in feet Repeat-o-meter
Thread Wires	Up to 1 in	12 $\mu$ in	SIP 550 ULM with master plug
Threaded Plug Gages – Pitch Diameter Major Diameter	Up to 4 in Up to 4 in	(70 + 3L) $\mu$ in (9 + 1.7L) $\mu$ in	SIP 550 ULM, three- wire method

Parameter/Equipment	Range	CMC <sup>2, 4, 8</sup> ( $\pm$ )	Comments
Adjustable Thread Ring Gages <sup>3, 10</sup>	Up to 1.5 in	W (Set Plug Tolerance)	Master plugs gages
Glass Scales	Up to 12 in	27 $\mu$ m	Laser interferometer w/ vision system

## II. Dimensional Testing<sup>1</sup>

Parameter/Equipment	Range	CMC <sup>2, 4, 8</sup> ( $\pm$ )	Comments
Angle Measurements <sup>7</sup>	0° to 180°	0.005°	DCC CMM
Caliper Measurements <sup>3, 7</sup> – Claw & Fixed Gages	Up to 24 in	300 $\mu$ m	Digital caliper
Micrometer Measurements <sup>3, 7</sup> – Feeler, Slot & Fixed Gages	Up to 1 in	30 $\mu$ m	Digital micrometer
1D Measurement <sup>7</sup>	Up to 24"	(21 + 1.6L) $\mu$ m	Transfer stand w/electronic indicator comparison to gage blocks
2D Measurement <sup>7</sup>	Up to 12 in Dia. up to 2 in Length up to 12 in Up to 25 mm ( $>$ 25 to 100) mm	(180 + 0.5L) $\mu$ m (79 + 11D) $\mu$ m (200 + 11L) $\mu$ m 2.2 $\mu$ m 5.1 $\mu$ m	Vision system Jenoptik Opticline Keyence IM system

Parameter/Equipment	Range	CMC <sup>2,4,8</sup> (±)	Comments
3D Measurement <sup>7</sup>	Up to 1100 mm	(0.0066 + 0.000 016L) mm	DCC CMM1
	Up to 2000 mm	(0.0067 + 0.000 018L) mm	DCC CMM2

### III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,8,9</sup> (±)	Comments
DC Voltage – Generate	(0 to 330) mV (0 to 3.3) V (0 to 33) V (0 to 330) V (100 to 1000) V	0.002 % + 1 μV 0.0014 % + 2 μV 0.0008 % + 20 μV 0.0022 % + 150 μV 0.0021 % + 1500 μV	Fluke 5520A
DC Voltage – Measure <sup>3</sup>	(0 to 100) mV (0 to 1) V (0 to 10) V (0 to 100) V (0 to 1000) V	0.007 % + 3.5 μV 0.005 % + 7 μV 0.004 % + 50 μV 0.006 % + 600 μV 0.006 % + 10 mV	Agilent 34401A
DC Current – Measure <sup>3</sup>	(0 to 10) mA (0 to 100) mA (0 to 1) A (0 to 3) A	0.06 % + 2.0 μA 0.06 % + 5.0 μA 0.12 % + 100 μA 0.15 % + 600 μA	Agilent 34401A
DC Current – Generate	(0 to 330) μA (0 to 3.3) mA (0 to 33) mA (0 to 330) mA (0 to 1.1) A (1.1 to 3) A (0 to 11) A (11 to 20.5) A	0.017 % + 0.02 μA 0.012 % + 0.05 μA 0.012 % + 0.25 μA 0.012 % + 2.5 μA 0.026 % + 40 μA 0.044 % + 40 μA 0.057 % + 500 μA 0.12 % + 750 μA	Fluke 5520A

Parameter/Equipment	Range	CMC <sup>2,8,9</sup> (±)	Comments
DC Current – Generate (cont)  Clamp-on Coil Only	  (0.2 to 0.33) A (0.33 to 3.0) A (3.0 to 20.5) A	  0.0028 A 0.023 A 0.11 A	  Fluke 5520A / 5500A coil
Resistance – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ (0.33 to 1.1) MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (119 to 330) MΩ (0.33 to 1.1) GΩ	0.009 % + 0.001 Ω 0.005 % + 0.0015 Ω 0.004 % + 0.0014 Ω 0.003 % + 0.002 Ω 0.003 % + 0.002 Ω 0.014 % + 0.02 Ω 0.003 % + 0.02 Ω 0.003 % + 0.2 Ω 0.003 % + 0.2 Ω 0.004 % + 2 Ω 0.004 % + 2 Ω 0.012 % + 30 Ω 0.016 % + 50 Ω 0.029 % + 2.5 kΩ 0.35 % + 3 kΩ 0.78 % + 0.1 MΩ 1.8 % + 0.5 MΩ	Fluke 5520A
Resistance – Measure <sup>3</sup>	(0 to 100) Ω (0 to 1) kΩ (0 to 10) kΩ (0 to 100) kΩ (0 to 1) MΩ (0 to 10) MΩ (0 to 100) MΩ	0.014 % + 4.0 mΩ 0.012 % + 10 mΩ 0.012 % + 0.10 Ω 0.012 % + 1.0 Ω 0.018 % + 10 Ω 0.051 % + 100 Ω 1.1 % + 10 kΩ	Agilent 34401A

Parameter/Range	Frequency	CMC <sup>2,8,9</sup> (±)	Comments
Capacitance – Generate  (0.19 to 3.3) nF (3.3 to 330) nF (0.33 to 1.1) μF (1.1 to 11) μF (11 to 33) μF (33 to 110) μF	  10 Hz to 3 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 120) Hz (10 to 120) Hz (10 to 80) Hz	  0.58 % + 0.01 nF 0.29 % + 0.3 nF 0.29 % + 1 nF 0.29 % + 10 nF 0.46 % + 30 nF 0.52 % + 100 nF	  Fluke 5520A

Parameter/Range	Frequency	CMC <sup>2, 5, 8, 9</sup> ( $\pm$ )	Comments	
Capacitance – Generate (cont)				
(110 to 330) $\mu$ F	(0 to 50) Hz	0.52 % + 300 nF	Fluke 5520A	
(0.33 to 1.1) mF	(0 to 20) Hz	0.46 % + 1 $\mu$ F		
(1.1 to 3.3) mF	(0 to 6) Hz	0.46 % + 3 $\mu$ F		
(3.3 to 11) mF	(0 to 2) Hz	0.46 % + 10 $\mu$ F		
(11 to 33) mF	(0 to 0.6) Hz	0.76 % + 30 $\mu$ F		
(33 to 110) mF	(0 to 0.2) Hz	1.1 % + 100 $\mu$ F		
Oscilloscopes –				
Square Wave Signal (1 kHz Input) 50 $\Omega$	(0 to 6.6) V 10 Hz to 10 kHz or DC Level	0.29 % + 40 $\mu$ V	Fluke 5520A/SC1100	
1 M $\Omega$	(0 to 130) V 10 Hz to 1 kHz DC Level	0.12 % + 40 $\mu$ V		
Leveled Sine Wave Amplitude 5 mV to 5.5 V	50 kHz (Reference) 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	3.1 % + 300 $\mu$ V 4.7 % + 300 $\mu$ V 4.6 % + 300 $\mu$ V 6.9 % + 300 $\mu$ V		
4 mV to 3.5 V	(600 to 1100) MHz	8.1 % + 300 $\mu$ V		
Flatness 5 mV to 5.5 V	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	1.8 % + 100 $\mu$ V 2.3 % + 100 $\mu$ V 4.6 % + 100 $\mu$ V		
4 mV to 3.5 V	(600 to 1100) MHz	5.8 % + 100 $\mu$ V		
Time Marker	5 s to 50 ms 20 ms to 1 ns	(25 + 1000 <i>t</i> ) Parts in 10 <sup>6</sup> 2.5 Parts in 10 <sup>6</sup>		<i>t</i> is the time in seconds.
Rise Time	$\geq$ 300 ps	120 ps		

Parameter/Range	Frequency	CMC <sup>2,8,9</sup> (±)	Comments
AC Voltage – Generate			
(1 to 33) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.09 % + 6 μV 0.017 % + 6 μV 0.022 % + 6 μV 0.12 % + 6 μV 0.40 % + 12 μV 0.92 % + 50 μV	Fluke 5520A
(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	0.03 % + 8 μV 0.02 % + 8 μV 0.02 % + 8 μV 0.04 % + 8 μV 0.09 % + 32 μV 0.23 % + 70 μV	
(0.33 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	0.03 % + 50 μV 0.02 % + 60 μV 0.02 % + 60 μV 0.04 % + 50 μV 0.08 % + 130 μV 0.28 % + 600 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	0.04 % + 650 μV 0.02 % + 600 μV 0.03 % + 600 μV 0.04 % + 600 μV 0.1 % + 1600 μV	
(33 to 330) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.02 % + 2000 μV 0.02 % + 6000 μV 0.03 % + 6000 μV 0.04 % + 6000 μV 0.23 % + 50 mV	
(330 to 1020) V	45 Hz to 10 kHz	0.03 % + 10 mV	
AC Voltage – Measure <sup>3</sup>			
(0 to 100) mV	10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.08 % + 40 μV 0.15 % + 50 μV 0.71 % + 80 μV 4.6 % + 500 μV	Agilent 34401A



Parameter/Range	Frequency	CMC <sup>2,8,9</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup> (cont)			
(0 to 1) V	10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.08 % + 300 μV 0.15 % + 500 μV 0.71 % + 800 μV 4.6 % + 5 mV	Agilent 34401A
(0 to 10) V	10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.08 % + 3.0 mV 0.15 % + 5.0 mV 0.71 % + 8.0 mV 4.7 % + 50 mV	
(0 to 100) V	10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.08 % + 30 mV 0.15 % + 50 mV 0.79 % + 80 mV	
(0 to 300) V	45 Hz to 10 kHz	0.08 % + 230 mV	
AC Current – Generate			
(29 to 330) μA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.23 % + 0.1 μA 0.17 % + 0.1 μA 0.14 % + 0.1 μA 0.35 % + 0.15 μA 0.92 % + 0.2 μA 1.9 % + 0.4 μA	Fluke 5520A
(0.33 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	0.23 % + 0.15 μA 0.14 % + 0.15 μA 0.2 % + 0.15 μA 0.26 % + 0.2 μA 0.58 % + 0.3 μA 1.2 % + 0.6 μA	
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.21 % + 2 μA 0.1 % + 2 μA 0.05 % + 2 μA 0.09 % + 2 μA 0.23 % + 3 μA 0.46 % + 4 μA	

Parameter/Range	Frequency	CMC <sup>2,8,9</sup> (±)	Comments
AC Current – 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	0.2 % + 20 µA 0.1 % + 20 µA 0.05 % + 20 µA 0.12 % + 50 µA 0.23 % + 100 µA 0.46 % + 200 µA	Fluke 5520A
(0.33 to 1.1) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.21 % + 100 µA 0.06 % + 100 µA 0.69 % + 1 mA 2.9 % + 5 mA	
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.21 % + 100 µA 0.07 % + 100 µA 0.69 % + 1 mA 2.9 % + 5 mA	
(3 to 11) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.08 % + 2 mA 0.12 % + 2 mA 3.5 % + 2 mA	
(11 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.14 % + 5 mA 0.18 % + 5 mA 3.5 % + 2 mA	Fluke 5520A / 5500A coil
Clamp-on Coil Only			
(0.2 to 0.33) A (0.33 to 3.0) A (3.0 to 20.5) A	(45 to 65) Hz	0.0039 A 0.033 A 0.15 A	
(0.2 to 0.33) A (0.33 to 3.0) A (3.0 to 20.5) A	(65 to 440) Hz	0.0056 A 0.051 A 0.26 A	
AC Current – Measure <sup>3</sup>			
(0 to 1) A (0 to 3) A	50 Hz to 5 kHz 50 Hz to 5 kHz	1.6 % + 400 µA 0.68 % + 1.8 mA	Agilent 34401A

Parameter/Equipment	Range	CMC <sup>2,8</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicating Systems –			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.52 °C 0.21 °C 0.19 °C 0.21 °C 0.25 °C	Fluke 5520A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.34 °C 0.21 °C 0.19 °C 0.22 °C 0.30 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.40 °C 0.23 °C 0.20 °C 0.29 °C 0.42 °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 0.22 °C 0.19 °C 0.18 °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 0.38 °C 0.36 °C 0.43 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.52 °C 0.38 °C 0.39 °C 0.48 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.64 °C 0.27 °C 0.20 °C 0.19 °C	

Parameter/Equipment	Range	CMC <sup>2, 8</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicators <sup>3</sup>  Type E Type J Type K Type N Type N Type T	(-250 to 1000) °C (-210 to 1200) °C (-200 to 1372) °C (-190 to -45) °C (-45 to 1275) °C (-250 to 400) °C	0.7 °C 0.5 °C 0.6 °C 0.71 °C 0.40 °C 0.9 °C	Process calibrator
Electrical Calibration of RTD Indicators <sup>3</sup> –  Pt 385, 100 Ω Pt 385, 1 kΩ Pt 3916, 100 Ω Pt 3926, 100 Ω	(-200 to 800) °C (-190 to 630) °C (-200 to 630) °C (-200 to 630) °C	0.1 °C 0.1 °C 0.1 °C 0.1 °C	Process calibrator, PRT indicators
Electrical Calibration of RTD Indicating Systems –  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	0.08 °C 0.08 °C 0.09 °C 0.11 °C 0.12 °C 0.14 °C 0.27 °C	Fluke 5520A
Electrical Calibration of Relative Humidity Indicators <sup>3</sup>	(0 to 100) % RH	0.26 % RH	Fluke 725

IV. Mechanical

Parameter/Equipment	Range	CMC <sup>2, 5, 8</sup> (±)	Comments
Force Tension & Compression <sup>3</sup> – Measure	Up to 300 lbf Up to 1000 lbf (1001 to 10 000) lbf (10 001 to 25 000) lbf 25 001 to 100 000) lbf	0.05 % 0.07 % 0.075 % 0.066 % 0.076 %	Class F weights ASTM E4 with load cells
Indirect Verification of Brinell Hardness Testers <sup>3</sup>  HBW 10/3000/15	(100 to 200) HBW (300 to 400) HBW (500 to 600) HBW	2.7 HBW 6.2 HBW 14 HBW	Indirect verification per ASTM E10 using standardized test blocks
Indirect Verification Rockwell and Rockwell Superficial Hardness Testers <sup>3</sup>	HRBW: Low Medium High  HRC: Low Medium High  HR15N: Low Medium High  HR30N: Low Medium High  HR15TW: Low Medium High  HR30TW: Low Medium High	0.87 HRBW 0.83 HRBW 0.72 HRBW  0.69 HRC 0.53 HRC 0.54 HRC  0.52 HR15N 0.56 HR15N 0.58 HR15N  0.50 HR30N 0.56 HR30N 0.44 HR30N  0.63 HR15TW 0.63 HR15TW 0.62 HR15TW  0.79 HR30TW 0.60 HR30TW 0.60 HR30TW	Indirect verification per ASTM E18

Parameter/Equipment	Range <sup>6</sup>	CMC <sup>2, 4, 5, 8</sup> ( $\pm$ )	Comments
Pressure Gauges & Transducers	Up to 10 000 psi	0.12 %	Crystal pressure gage
Scales & Balances <sup>3</sup>	Up to 18 000 g	0.0011 % + 0.5R	Reference weights
	Up to 4000 lbs	0.0044 % + 0.5R	
RPM Measure <sup>3</sup>	(6 to 90 000) RPM	0.5 %	Contact & reflective pickup tachometer
Torque Wrenches <sup>3</sup>	(Up to 50) in.lbf (30 to 400) in.lbf (80 to 1000) in.lbf (20 to 250) ft.lbf (60 to 600) ft lbf	0.52 % 0.21 % 0.32 % 0.31 % 0.26% + 0.5R	CDI torque tester
Torque Transducers	Up to 250 ft·lbf	0.044 %	CDI torque arms and weights
Weight Measurement	Up to 12 000g (26 lbs)	0.51 g (0.0011 lbs)	Digital Balance

#### V. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2, 8</sup> ( $\pm$ )	Comments
Temperature – Measuring Equipment <sup>3</sup> (RTD, Thermocouples, Thermometers, Thermistors)	(-30 to 600) °C	0.071°C	PRT comparison
Infrared Temperature Devices <sup>3</sup>	50 °C to 400 °C	(0.94 + 0.000 485x) °C	Hart dry cell. <i>x</i> is the temperature in degrees centigrade

Parameter/Equipment	Range	CMC <sup>2, 8, 9</sup> ( $\pm$ )	Comments
Temperature – Environmental Chambers <sup>3</sup>	(32 to 400) °F	0.75 °F	RTD, PRT comparison
Relative Humidity <sup>3</sup> – Measure	(10 to 95) % RH (10 to 95) % RH	1.4 % RH 1.1 % RH	Vaisala HMP235 Rontronics Sensor

<sup>1</sup> This laboratory offers dimensional testing, commercial calibration and field calibration services.

<sup>2</sup> 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.

<sup>3</sup> Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. 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.

<sup>4</sup> In the statement of CMC;  $L$  is the numerical value of the nominal length of the device measured in inches;  $D$  is the diameter of the device in inches;  $R$  is the resolution of the device.

<sup>5</sup> In the statement of CMC, the value is defined as the percentage of reading.

<sup>6</sup> Where ranges are not specified, the CMC stated is for the cardinal points only.

<sup>7</sup> This test is not equivalent to that of a calibration.

<sup>8</sup> The contributions from the “best existing device” are not included in the CMC claim.

<sup>9</sup> 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 are expressed as either a specific value that covers the full range or as a fraction or percentage of the reading plus a fixed floor specification.

<sup>10</sup> Adjustable Thread rings are set applicable to specifications using calibrated master set plug gages.

<sup>11</sup> This scope meets A2LA’s P112 Flexible Scope Policy.



## *Accredited Laboratory*

A2LA has accredited

**METROCAL INC.**

*Kentwood, MI*

for technical competence in the field of

**Calibration**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *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 6<sup>th</sup> day of May 2019.

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

Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 513.01  
Valid to September 30, 2020

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