



# CERTIFICATE OF ACCREDITATION

**The ANSI National Accreditation Board**

Hereby attests that

**Martin Calibration LLC**  
**dba Great Lakes Calibration Services**  
**1490 W. Bernard Dr., Suite E**  
**Addison, IL 60101**

Fulfills the requirements of

**ISO/IEC 17025:2017**

and national standard

**ANSI/NCSL Z540-1-1994 (R2002)**

In the field of

**CALIBRATION**

This certificate is valid only when accompanied by a current scope of accreditation document.  
The current scope of accreditation can be verified at [www.anab.org](http://www.anab.org).

Jason Stine, Vice President

Expiry Date: 06 July 2027

Certificate Number: ACT-1265.02



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.  
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).

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017**

**AND**

**ANSI/NCSL Z540-1-1994 (R2002)**

**Martin Calibration LLC dba Great Lakes Calibration Services**

1490 W. Bernard Dr., Suite E  
Addison, IL 60101  
Marya Black 909-276-1308

**CALIBRATION**

ISO/IEC 17025 Accreditation Granted: **02 June 2026**

Certificate Number: **ACT-1265.02** Certificate Expiry Date: **06 July 2027**

**Chemical Quantities**

<b>Parameter/Equipment</b>	<b>Range</b>	<b>Expanded Uncertainty of Measurement (+/-)</b>	<b>Reference Standard, Method, and/or Equipment</b>
Conductivity Measuring Devices <sup>1,2</sup>	(1 to 10) $\mu\text{S/cm}$ (50 to 100) $\mu\text{S/cm}$ (500 to 1 000) $\mu\text{S/cm}$ (5 000 to 10 000) $\mu\text{S/cm}$ (10 000 to 100 000) $\mu\text{S/cm}$	0.71 $\mu\text{S/cm}$ 3 $\mu\text{S/cm}$ 23 $\mu\text{S/cm}$ 46 $\mu\text{S/cm}$ 360 $\mu\text{S/cm}$	Comparison to Accredited Buffer Solutions
pH Measuring Devices <sup>1,2</sup>	4 pH 7 pH 10 pH	0.03 pH 0.04 pH 0.04 pH	Comparison to Accredited Buffer Solutions
Refractometers <sup>1,2</sup>	(0 to 10) %Brix 20 %Brix 30 %Brix 60 %Brix	0.081 %Brix 0.081 %Brix 0.094 %Brix 0.094 %Brix	Comparison to Accredited Sucrose Solutions

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Measure <sup>1</sup>	(0 to 100) $\mu$ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	25 $\mu$ A/A + 0.93 nA 25 $\mu$ A/A + 5.9 nA 25 $\mu$ A/A + 59 nA 42 $\mu$ A/A + 0.59 $\mu$ A 0.13 mA/A + 12 $\mu$ A	Comparison to Agilent 3458A/Opt-002 8.5 Digit Multimeter
DC Current – Measure <sup>1</sup>	(1 to 3) A	0.14 % of reading + 0.7 mA	Comparison to HP 34401A 6.5 Digit Multimeter
DC Current – Measure <sup>1</sup>	(3 to 25) A (25 to 50) A	0.42 % of reading + 14 mA 0.29 % of reading + 29 mA	Comparison to HP 34401A 6.5 Digit Multimeter, Current Shunt
DC Current – Generate <sup>1</sup>	(0 to 100) mA	58 $\mu$ A/A + 1.3 $\mu$ A	Comparison to Fluke 7526A Precision Process Calibrator
DC Resistance – Measure <sup>1</sup>	(0 to 10) $\Omega$ (10 to 100) $\Omega$ (0.1 to 1) k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ (0.1 to 1) M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$	18 $\mu\Omega/\Omega$ + 59 n $\Omega$ 15 $\mu\Omega/\Omega$ + 0.59 $\mu\Omega$ 12 $\mu\Omega/\Omega$ + 0.59 m $\Omega$ 12 $\mu\Omega/\Omega$ + 5.9 m $\Omega$ 12 $\mu\Omega/\Omega$ + 59 m $\Omega$ 18 $\mu\Omega/\Omega$ + 2.6 $\Omega$ 59 $\mu\Omega/\Omega$ + 0.26 k $\Omega$ 0.58 % of reading + 2.6 k $\Omega$	Comparison to Agilent 3458A/Opt-002 8.5 Digit Multimeter
Electrical Simulation of RTD Indicators – Measure/Generate <sup>1</sup>	Pt 385, 100 $\Omega$ (-200 to 800) $^{\circ}$ C Pt 385, 200 $\Omega$ (-200 to 630) $^{\circ}$ C Pt 385, 500 $\Omega$ (-200 to 630) $^{\circ}$ C Pt 385, 1 000 $\Omega$ (-200 to 630) $^{\circ}$ C	0.06 $^{\circ}$ C 0.58 $^{\circ}$ C 0.2 $^{\circ}$ C 0.11 $^{\circ}$ C	Comparison to Fluke 7526A Precision Process Calibrator
DC Resistance – Generate <sup>1</sup>	(5 to 400) $\Omega$ (0.4 to 4) k $\Omega$	0.021 $\Omega$ 0.37 $\Omega$	Comparison to Fluke 7526A Precision Process Calibrator



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Measure <sup>1,8</sup>	(0 to 100) mV (100 mV to 1) V (1 to 10) V (10 to 100) V (100 to 1 000) V	6.5 $\mu$ V/V + 0.4 $\mu$ V 5.2 $\mu$ V/V + 0.4 $\mu$ V 5.2 $\mu$ V/V + 0.6 $\mu$ V 7.4 $\mu$ V/V + 35 $\mu$ V 8 $\mu$ V/V + 0.12 mV	Comparison to Agilent 3458A/Opt-002 8.5 Digit Multimeter
Electrical Simulation of Thermocouple Indicating Devices – Measure/Generate <sup>1</sup>	Type E (-250 to -200) °C (-200 to -100) °C (-100 to 1 000) °C Type J (-210 to -100) °C (-100 to 800) °C (800 to 1 200) °C Type K (-250 to -100) °C (-100 to 1 372) °C Type N (-250 to -200) °C (-200 to 100) °C (100 to 1 300) °C Type R (-50 to 100) °C (100 to 1 767) °C Type S (-50 to 100) °C (100 to 1 767) °C Type T (-250 to -100) °C (-100 to 400) °C	0.3 °C 0.12 °C 0.12 °C 0.17 °C 0.11 °C 0.12 °C 0.53 °C 0.2 °C 0.84 °C 0.27 °C 0.14 °C 0.64 °C 0.33 °C 0.59 °C 0.34 °C 0.41 °C 0.13 °C	Comparison to Fluke 7526A Precision Process Calibrator
DC Voltage – Generate <sup>1</sup>	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V	37 $\mu$ V/V + 2.7 $\mu$ V 35 $\mu$ V/V + 21 $\mu$ V 35 $\mu$ V/V + 0.21 mV 41 $\mu$ V/V + 2.5 mV	Comparison to Fluke 7526A Precision Process Calibrator



**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers <sup>1,3,4</sup> (Outside, Inside, Depth, Step)	Up to 4 in (> 4 to 20) in (> 20 to 60) in	30 μin (58 + 25L) μin (158 + 25L) μin	Comparison to Gage Blocks, Master Ring Gages
Height Gages <sup>1,3,4</sup>	Up to 4 in (> 4 to 6) in (> 6 to 24) in	(16 + 25L) μin (18 + 25L) μin (90 + 25L) μin	Comparison to Gage Blocks,
Indicators <sup>1,3,4</sup> (Dial, Digital, LVDT)	Up to 2 in (> 2 to 10) in	(16 + 13L) μin (158 + 25L) μin	Gage Blocks, Indicator Calibrator Stand
Micrometers <sup>1,3,4</sup> (Inside, Outside, Depth)	Up to 60 in	(35 + 26L) μin	Comparison to Gage Blocks
Surface Flatness <sup>1</sup>	Up to 1 in	5.3 μin	Comparison to Optical Flat, Monochromic Light
	Up to 6 in	800 μin	
Optical Comparators <sup>1,3</sup> X-Y Travel <sup>4</sup>	Up to 12 in	(120 + 3.8L) μin	Comparisons to Stage Micrometer
Magnification	Up to 100X	220 μin	Magnification Checker
Angle <sup>4</sup>	(15, 30, 45, 60, 90, 120, 150, 180, 270, 360)°	14°	Stage Micrometer
Microscopes <sup>1</sup> (Eyepiece Reticules, Video Systems)	Up to 1 in	170 μin	ASTM E1951 using Stage Micrometers
	Up to 25 mm	4.1 μm	
Stage Micrometers for Micro Indentation Hardness Testers <sup>3</sup>	(0 to 2) in	24 μin	Comparison to Glass Stage Micrometer
	(0 to 25) mm	3.5 μm	
Vision Systems <sup>1,3</sup> X-axis, Y-axis <sup>4</sup>	Up to 12 in	(120 + 3.8L) μin	Comparisons to Stage Micrometer
Z-axis	Up to 1 in	65 μin	Length Probe
Magnification	(10 to 100) X	0.0035 in	Magnification Checker
Angularity <sup>4</sup>	(15, 30, 45, 90, 135, 180, 270, 360)°	0.19°	Stage Micrometer



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**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Extensometer, COD Gage, Deflectometers <sup>1</sup> Travel	Up to 2 in (> 2 to 25) in	(30 + 13L) μin (130 + 13L) μin	ASTM E 83, ISO 9513 using Calibrator and Encoder
Gage Length	Up to 8 in	0.0013 in	Calipers
Angular – Measure <sup>1,2</sup> Displacement	(0.01 to 36 000)°	0.051° per revolution	Comparisons to Rotary Encoder
Speed	Up to 1 000 rpm	0.024 % of reading + 0.022 rpm	Rotary Encoder, Stopwatch

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Force Measuring Equipment (Tension and Compression)	(0.01 to 50) lbf (50 to 500) lbf	0.006 1 lbf 0.6 lbf	ASTM E-4, ISO 7500-1; ASTM E617 Class 6 Weights
	1 g to 10 kg	0.12 % of reading	ASTM E617 Class 1 Weights
Force Measuring Equipment, Creep Testing Equipment Tension	(20 to 1 000) lbf (1 000 to 10 000) lbf (2 000 to 100 000) lbf	0.15 % of reading 0.15 % of reading 0.17 % of reading	ISO 7500-1, ISO 7500-2 with Class 0.5 Accuracy
Force Measuring Equipment, Creep Testing Equipment Compression	(20 to 1 000) lbf (1 000 to 10 000) lbf (2 000 to 100 000) lbf	0.17 % of reading 0.15 % of reading 0.16 % of reading	ISO 7500-1, ISO 7500-2 with Class 0.5 Accuracy

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Force Measuring Equipment <sup>1</sup> Tension	Up to 1 000 lbf (1 000 to 20 000) lbf (20 000 to 200 000) lbf (200 000 to 700 000) lbf	0.11 % of reading 0.11 % of reading 0.11 % of reading 0.12 % of reading	ASTM E-4 using Class A Load Cells.
Compression	Up to 2 000 lbf (2 000 to 200 000) lbf (200 000 to 1 500 000) lbf	0.09 % of reading 0.12 % of reading 0.12 % of reading	
Dynamic Force <sup>1</sup>	(0.5 to 700 000) lbf	0.75 % of reading	ASTM E-467 and NASM 1312; Dynamometers, Load Cells
Verification of Test Frames <sup>1</sup>			ASTM E2309, ASTM E2658; Linear Gage with Digital Encoder
Crosshead Displacement	(0.01 to 1) in (1 to 25) in (25 to 50) in	230 μm 0.001 in 0.06 in	Linear Gage w/ Stopwatch
Crosshead Speed	(0.1 to 1) in/min (0.1 to 25) in/min	0.001 in/min 0.002 in/min	
Crosshead Parallelism	Up to 1 in	0.001 5 in	Linear Gage
Strain Rate	(0.001 to 1) in/in/min	0.17 % of reading	Extensometer w/ Stopwatch
Load Rate	(20 to 600 000) lb/min	0.44 % of reading	Load Cell w/ Stopwatch
Specimen Alignment	(0 to 50) % bending	1.2 % bending	ASTM E1012, ISO 23788

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Brinell Hardness Testers <sup>1</sup>			Indirect verification per ASTM E10 and ASTM E110 using Hardness Test Blocks.
10/3000/15	(100 to 499) HBW (500 to 650) HBW	2.9 HBW 8.7 HBW	
10/1500/15	(49 to 199) HBW (200 to 345) HBW	0.68 HBW 3 HBW	
10/1000/15	(40 to 134) HBW (135 to 230) HBW	0.58 HBW 2.7 HBW	
10/500/15	(50 to 109) HBW (110 to 140) HBW	0.85 HBW 2.1 HBW	
5/750/15	(96 to 499) HBW (500 to 650) HBW	2.2 HBW 10 HBW	
2.5/187.5/10	(100 to 499) HBW (500 to 650) HBW	7.5 HBW 7.7 HBW	
2.5/62.5/10	(40 to 134) HBW (135 to 230) HBW	3 HBW 8.4 HBW	
Brinell Hardness Testers <sup>1</sup>			Direct verification per ASTM E10 using ASTM E74 Load Cells
Test Force	(62.5, 187.5, 500, 1 000, 1 500, 2 000, 3 000) kgf	0.29 % of reading	
Brinell Scope	(0 to 10) mm	0.02 mm	Stage Micrometer
Test Cycle Time	Up to 15 s	0.054 s	Stopwatch
Knoop Hardness Testers <sup>1</sup>			Indirect verification per ASTM E384, ASTM E92, and ISO 6507-2 using Hardness Test Blocks.
Mean Hardness $\geq$ 1 kgf	(50 to 240) HK (240 to 600) HK > 600 HK	0.76 % of reading 0.47 % of reading 0.21 % of reading	
Mean Hardness $\leq$ 1 kgf	(100 to 250) HK (250 to 650) HK > 650 HK	1.5 % of reading 1.6 % of reading 1.5 % of reading	

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Vickers Hardness Testers <sup>1</sup> Mean Hardness $\geq$ 1 kgf  Mean Hardness $\leq$ 1 kgf	(50 to 250) HV (250 to 600) HV > 600 HV  (50 to 240) HV (240 to 600) HV > 650 HV	0.79 % of reading 0.50 % of reading 0.37 % of reading  0.76 % of reading 0.66 % of reading 0.42 % of reading	Indirect verification per ASTM E384, ASTM E92, and ISO 6507-2 using Hardness Test Blocks.
Micro Hardness Testers <sup>1</sup>  Test Force  Indentation Measuring System  Testing Cycle Time  Indenter Velocity	Up to 1 kg  > 1 kg  Up to 1 mm  Up to 15 s  Up to 200 mm/s	3.6 mg  0.12 % of reading  1.2 $\mu$ m  0.054 s  0.54 $\mu$ m/s	Direct verification per ASTM E92 using ASTM E617 Class 1 Weights  ASTM E74 Load Cells  Stage Micrometer  Stopwatch  Linear Gage, Stopwatch
Leeb Hardness Testers <sup>3</sup>	714 HLD	10 HLD	Indirect verification per ASTM A956 using Hardness Test Block.
Rockwell Hardness Testers <sup>3</sup> (Carbide)	HRA Low Middle High	0.29 HRA 0.15 HRA 0.27 HRA	Indirect verification per ASTM B294 using Hardness Test Blocks.
Rockwell Hardness Testers <sup>1</sup>	HRA Low Middle High HRBW Low Middle High HRC Low Middle High	0.34 HRA 0.23 HRA 0.31 HRA  0.83 HRBW 0.61 HRBW 0.47 HRBW  0.38 HRC 0.46 HRC 0.40 HRC	Indirect verification per ASTM E18 using Hardness Test Blocks.

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Hardness Testers <sup>1</sup>	HREW		Indirect verification per ASTM E18 using Hardness Test Blocks.
	Low	1.1 HREW	
	Middle	0.45 HREW	
	High	0.48 HREW	
	HRFW		
	Low	0.60 HRFW	
	Middle	0.46 HRFW	
	High	0.43 HRFW	
	HRGW		
	Low	0.61 HRGW	
	Middle	0.45 HRGW	
	High	0.45 HRGW	
	HRHW		
	Low	0.79 HRHW	
	Middle	0.43 HRHW	
HRLW			
Low	0.46 HRLW		
Middle	0.47 HRLW		
HRMW			
Low	0.62 HRMW		
High	0.50 HRMW		
HRRW			
Low	0.75 HRRW		
High	0.61 HRRW		
Rockwell Superficial Hardness Testers <sup>1</sup>	HR15N		Indirect verification per ASTM E18 using Hardness Test Blocks.
	Low	0.47 HR15N	
	Middle	0.37 HR15N	
	High	0.29 HR15N	
	HR30N		
	Low	0.49 HR30N	
	Middle	0.71 HR30N	
	High	0.36 HR30N	
	HR45N		
	Low	1.0 HR45N	
	Middle	0.75 HR45N	
	High	0.48 HR45N	
	HR15TW		
	Low	0.61 HR15TW	
	Middle	0.45 HR15TW	
High	0.38 HR15TW		

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Rockwell Superficial Hardness Testers <sup>1</sup>	HR30TW Low Middle High HR45TW Low Middle High HR15YW Low High	0.53 HR30TW 0.46 HR30TW 0.41 HR30TW 0.58 HR45TW 0.55 HR45TW 0.51 HR45TW 0.41 HR15YW 0.42 HR45YW	Indirect verification per ASTM E18 using Hardness Test Blocks.
Rockwell Hardness Testers <sup>1</sup>	Test Force Up to 150 kgf Depth Measuring System Up to 0.25 mm Testing Cycle Time Up to 8 s Machine Hysteresis Up to 2 HR	0.11 % of reading 0.78 μm 0.054 s 0.25 HR	Direct verification per ASTM E18 using ASTM E74 Load Cells Length Gage Stopwatch Blunt Indenter/Flat Anvil
Charpy Impact Testers <sup>1</sup>	(9 to 20) J (65 to 100) J (175 to 250) J	2.3 % of reading 1.1 % of reading 1.0 % of reading	Indirect verification per ASTM E23 and ISO 148-2
Charpy Impact Testers <sup>1,9</sup>	Level Torque Angle Distance between Anvils	- - - -	2° 5.6 % of reading 0.16° 30 μm
Test Weight Verification	(0.001 to 50) lb	0.12 % of reading	ASTM E-139; Balance
Pneumatic Pressure Gages <sup>1,4</sup>	(-14 to 500) psig (>500 to 1000) psig (1000 to 10000) psig (-25 to 25) inH <sub>2</sub> O	0.066 psi 0.01 % of reading + 0.05 psi 1.2 psi 0.0032 inH <sub>2</sub> O	Comparison to Mensor CPG2500 Digital Pressure Indicator

**Mass and Mass Related**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Balances/Scales <sup>1,5</sup> (SI)	(5 to 500) mg (0.5 to 5) g (5 to 200) g (200 to 500) g (500 to 1 000) g (1 to 2) kg (2 to 5) kg (5 to 11) kg	0.025 mg 0.041 mg 0.59 mg 1.4 mg 3.1 mg 5.9 mg 15 mg 56 mg	ASTM E617 Class 1 weights and internal calibration procedure utilized in the calibration of the weighing device.
Balances/Scales <sup>1,5</sup> (Avoirdupois)	(0.001 to 0.1) lb (0.1 to 1) lb (1 to 10) lb (10 to 50) lb (50 to 500) lb (500 to 1 000) lb	0.00008 lb 0.00022 lb 0.00020 lb 0.008 lb 0.08 lb 0.17 lb	NIST Class F weights and internal calibration procedure utilized in the calibration of the weighing device.
Torque Measuring Devices <sup>1</sup>	(0.02 to 5 000) lbf·in  (47 to 2 200) lbf·in	0.11 % of reading  0.35 % of reading	ASTM E2624 using Master Weights  Torque Cell

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Humidity Measuring Devices <sup>1</sup>	(15 to 80) %RH (80 to 97) %RH	1.2 %RH 2 %RH	Comparison to Vaisala Temp/Humidity Probe w/ Indicator, Environmental Chamber
Temperature – Measure <sup>1</sup>	(-196 to 500) °C (500 to 1400) °C	0.081 °C 0.25 % of reading + 0.65 °C	Direct Measurement using Fluke 7526 Precision Process Calibrator, PRT
Temperature – Measure <sup>1</sup>	(500 to 1 400) °C	0.25 % of reading + 0.65 °C	Direct Measurement using Digital Thermometer, Thermocouple Probe

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Generate <sup>1</sup> (Temperature Probes, Thermometers, etc.)	(-196 to -45) °C (-45 to 25) °C (25 to 420) °C (420 to 500) °C	0.21 °C 0.097 °C 0.12 °C 0.21 °C	Comparison to Fluke 7526 Precision Process Calibrator, Fluke 5628 PRT, Baths, Dry Wells, Furnace
Temperature – Generate <sup>1</sup> (Temperature Probes, Thermometers, etc.)	(500 to 1 200) °C	0.25 % of reading + 0.75 °C	Comparison to Fluke 7526 Precision Process Calibrator, Type S Thermocouple Probe Dry Wells, Furnace
Furnace Temperature Uniformity Surveys (TUS) <sup>1</sup>	(-150 to 32) °F (32 to 1000) °F ( 1000 to 2400) °F	2.4 °F 2.6 °F 0.4 % of reading + 2.2 °F	AMS 2750 or CQI-9; Thermocouple Scanner, Type K or Type N Thermocouples
Thermocouples <sup>1</sup>	Type E (-200 to 500) °C (500 to 1 200) °C Type J (-196 to 500) °C (500 to 1 200) °C Type K (-200 to 500) °C (500 to 1 200) °C Type N (-200 to 500) °C (500 to 1 200) °C Type R (-50 to 100) °C (100 to 500) °C (500 to 1 200) °C Type S (-50 to 100) °C (100 to 500) °C (500 to 1 200) °C	0.26 °C 0.25 % of reading + 0.76 °C 0.27 °C 0.25 % of reading + 0.76 °C 0.28 °C 0.25 % of reading + 0.76 °C 0.34 °C 0.25 % of reading + 0.76 °C 0.67 °C 0.34 °C 0.25 % of reading + 0.76 °C 0.63 °C 0.35 °C 0.25 % of reading + 0.76 °C	Calibration per ASTM E2846, ASTM E220

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thermocouples <sup>1</sup>	Type T (-200 to 400) °C	0.28 °C	Calibration per ASTM E2846, ASTM E220

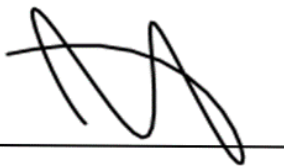
**Time and Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Measure <sup>1</sup>	Up to 300 Hz	0.01 % of reading + 0.1 mHz	Comparison to Keysight 1202A Oscilloscope
Frequency – Measure <sup>1</sup>	Up to 30 MHz	0.012 % of reading + 0.6 mHz	Comparison to Keysight 3458A 8.5 Digit Multimeter
Timing Devices <sup>1</sup>	(0 to 24) hr	54 ms/min 20 s/day	Comparison to Stopwatch
Timing Devices <sup>1</sup>	(0 to 24) hr	40 ms/day	Comparison to Timometer

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ( $k=2$ ), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. The values listed in the Range column are Nominal values. The Actual values will be utilized at the time of calibration along with the inherent Uncertainty value.
3.  $L$  = length in inches; rpm = revolutions per minute.
4.  $0.6R$  will be added to the Measurement Uncertainty (MU) at the time of calibration, where  $R$  is the resolution of the unit under calibration.
5. The CMC for scales and balances is highly dependent upon the resolution of the unit under test. The CMC presented here does not include the resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
6. Unless otherwise specified, the calibration method/procedure utilized by the laboratory was developed and validated internally.
7. Legal Entity for this location is Transcat, Inc.
8. Add 12ppm  $X(V_{in} / 1000)$  2 additional errors for inputs >100 V.
9. Limited Direct Charpy Impact, Standard ASTM E23 requirements, does not include anvil radius and striker radius.



Jason Stine, Vice President