



National Voluntary Laboratory Accreditation Program



CALIBRATION LABORATORIES

NVLAP LAB CODE 200867-0

Scope Revised: 2012-09-05

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Transcat – Dayton 2056 South Alex Road West Carrollton, OH 45449 Mr. Jim Beckner Phone: 937-866-1033 Fax: 937-866-1049 E-mail: jbeckner@transcat.com URL: www.transcat.com	Parameter(s) of Accreditation Dimensional Electromagnetics – DC/Low Frequency Time and Frequency Mechanical Thermodynamic This laboratory is compliant to ANSI/NCSL Z540-1-1994; Part 1. (NVLAP Code: 20/A01)
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
DIMENSIONAL			
NVLAP Code: 20/D01 ANGULAR Angles	0 ° to 75 ° 90 °	7.6 as 2.7 as	Angle Blocks w/Sine Plate Master Square Comparison
NVLAP Code: 20/D03 GAGE BLOCKS Steel Blocks	0.01 in to 0.05 in 0.05 in to 1 in 1 in to 4 in 4 in to 10 in 10 in to 12 in 12 in to 20 in 0.05 in to 1 in	L is length in inches. 3.1 μ in + 0.7 L μ in 1.9 μ in + 0.7 L μ in 1.9 μ in + 1.3 L μ in 0.6 μ in + 1.6 L μ in 0.5 μ in + 1.9 L μ in 0.7 μ in + 1.7 L μ in 2.3 μ in + 0.7 L μ in	Comparison to Gage Blocks
Chrome Blocks			
NVLAP Code: 20/D05 LENGTH and DIAMETER; STEP GAGES Micrometers and Calipers Field calibrations available ^{Note 4}	0.05 in to 8 in 8 in to 24 in 24 in to 40 in	L is length in inches. 8 μ in + 14 L μ in 20 μ in + 14 L μ in 30 μ in + 14 L μ in	Comparison to Gage Blocks
Anvil Flatness Field calibrations available ^{Note 4}	0 in to 1 in	6.4 μ in	Optical Flats

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Length Measurement – Single Axis	0.001 in to 20 in	L is length in inches. $9 \mu\text{in} + 4.5L \mu\text{in}$	Helios Supra 500 Comparator
Inner Diameter – Ring Gages	0.125 in to 20 in	L is length in inches. $14 \mu\text{in} + 3.5L \mu\text{in}$	Helios Supra 500 Comparator
Height Measuring Equipment – Height Gages, Dial and Digital Indicators Field calibrations available <small>Note 4</small>	0 in to 6 in 6 in to 24 in	L is length in inches. $29 \mu\text{in} + 5L \mu\text{in}$ $9 \mu\text{in} + 8L \mu\text{in}$	Comparison to Gage Blocks
Height Measure – Height Masters 1-2-3 Blocks, Caliper Masters, Parallels	0 in to 4 in	L is length in inches. $49 \mu\text{in} + 3L \mu\text{in}$	Gage Blocks with Amplifier
Magnification – Optical Comparators Field calibrations available <small>Note 4</small>	10x to 50x	L is length in inches. $600 \mu\text{in} + 23L \mu\text{in}$	Glass Scale and Magnification
NVLAP Code: 20/D11 SPHERICAL DIAMETER; PLUG / RING GAGES			
Outer Spherical Diameter	0.1 in to 1 in	46 μin	Helios Supra 500 Comparator
NVLAP Code: 20/D12 SURFACE TEXTURE			
Surface Plate Flatness Field calibrations available <small>Note 4</small>	12 in to 100 in	D is the diagonal of the plate in feet. $45 \mu\text{in} + \sqrt{D} \mu\text{in}$	Differential Levels

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Flatness, Straightness and Parallelism Field calibrations available <small>Note 4</small>	0 in to 18 in	120 μ in	Gage Amplifier and Surface Plate
NVLAP Code: 20/D14 THREADED PLUG and RING GAGES Threaded Plugs –			
Inner Diameter	0 in to 6 in	150 μ in	Comparison to Master Setting Plugs
Outer Pitch Diameter	0 in to 6 in	80 μ in	Comparator with Thread Wires

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY				
NVLAP Code: 20/E02 AC RESISTORS and CURRENT AC Current – Measuring Equipment Field calibrations available <small>Note 4</small>	0 μ A to 220 μ A	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.030 % + 16 nA 0.019 % + 10 nA 0.015 % + 8 nA 0.030 % + 10 nA 0.11 % + 65 nA	Fluke 5720A
	220 μ A to 2.2 mA	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.030 % + 40 nA 0.018 % + 35 nA 0.013 % + 35 nA 0.021 % + 110 nA 0.11 % + 650 nA	
	2.2 mA to 22 mA	10 Hz to 20 Hz	0.039 % + 400 nA	

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		20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.019 % + 350 nA 0.014 % + 350 nA 0.021 % + 0.55 μA 0.11 % + 5 μA	
	22 mA to 220 mA	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.033 % + 4 μA 0.018 % + 3.5 μA 0.014 % + 2.5 μA 0.021 % + 3.5 μA 0.11 % + 10 μA	
	220 mA to 2.2 A	20 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.027 % + 35 μA 0.046 % + 80 μA 0.70 % + 160 μA	
	2.2 A to 11 A	40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.048 % + 170 μA 0.096 % + 380 μA 0.36 % + 750 μA	
	11 A to 20 A	45 Hz to 1 kHz 1 kHz to 5 kHz	0.092 % + 5 mA 2.3 % + 5 mA	Fluke 5520A
Extended Frequency Ranges Field calibrations Available <small>Note 4</small>	29 μA to 329.99 μA 330 μA to 3.299 mA 3.3 mA to 32.99 mA 29 mA to 329.99 mA	10 kHz to 30 kHz	1.2 % + 3 μA 0.78 % + 0.5 μA 0.31 % + 3 μA 0.31 % + 0.16 mA	Fluke 5520A
Clamp-on Ammeter Toroidal Type Field calibrations Available <small>Note 4</small>	20 A to 150 A 150 A to 1000 A	45 Hz to 65 Hz 65 Hz to 440 Hz 45 Hz to 65 Hz 65 Hz to 440 Hz	0.34 % + 35 mA 0.95 % + 66 mA 0.38 % + 0.17 A 1.2 % + 0.35 A	Fluke 5520A with 5500A/Coil
Clamp-on Ammeter Non-Toroidal Type Field calibrations	20 A to 150 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.66 % + 0.26 A 1.2 % + 0.29 A	Fluke 5520A with 5500A/Coil

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Available <small>Note 4</small>	150 A to 1000 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.68 % + 1.0 A 1.4 % + 1.2 A	
AC Current – Measure Field calibrations available <small>Note 4</small>	0 μ A to 100 μ A	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.46 % + 30 nA 0.17 % + 30 nA 0.072 % + 30 nA 0.072 % + 30 nA	HP 3458A opt. 2
	100 μ A to 1 mA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.46 % + 200 nA 0.17 % + 200 nA 0.071 % + 200 nA 0.038 % + 200 nA	
	1 mA to 10 mA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.46 % + 2 μ A 0.17 % + 2 μ A 0.071 % + 2 μ A 0.038 % + 2 μ A	
	10 mA to 100 mA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.46 % + 20 μ A 0.17 % + 20 μ A 0.071 % + 20 μ A 0.038 % + 20 μ A	
	100 mA to 1 A	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.46 % + 200 μ A 0.19 % + 200 μ A 0.097 % + 200 μ A 0.12 % + 200 μ A	

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
NVLAP Code: 20/E05 DC RESISTANCE and CURRENT DC Current – Measuring Equipment Field calibrations available <small>Note 4</small>	0 μA to 220 μA 220 μA to 2.2 mA 2.2 mA to 22 mA 22 mA to 220 mA 220 mA to 2.2 A 2.2 A to 11 A 11 A to 20 A	41 μA/A + 6 nA 36 μA/A + 7 nA 36 μA/A + 40 nA 57 μA/A + 0.7 μA 200 μA/A + 12 μA 400 μA/A + 480 μA 0.78 % + 580 μA	Fluke 5720A Fluke 5720A with 5725A Amplifier Fluke 5520A
Clamp-on Ammeter Non-Toroidal Type Field calibrations Available <small>Note 4</small>	20 A to 150 A 150 A to 1000 A	0.58 % + 0.14 A 0.59 % + 0.53 A	Fluke 5520A with 5500A/Coil
DC Current – Measure	0 μA to 100 μA 100 μA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 3 A	26 μA/A + 0.8 nA 26 μA/A + 5 nA 26 μA/A + 50 nA 43 μA/A + 500 nA 130 μA/A + 10 μA 0.14 % + 0.6 mA	HP 3458A opt. 2 HP 34401A
DC Resistance – Measuring Equipment Field calibrations Available <small>Note 4</small>	1 mΩ 10 mΩ 100 mΩ 1 GΩ 10 GΩ 100 GΩ	160 μΩ/Ω 160 μΩ/Ω 160 μΩ/Ω The measurement uncertainty is dependent on the applied measurement voltage of the device under test. 0.61 % + 1.2 μΩ/Ω/V 0.64 % + 2 μΩ/Ω/V 1.3 % + 5 μΩ/Ω/V	Standard Resistor IET VRS-100

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
DC Resistance – Measure Field calibrations Available <small>Note 4</small>	0 Ω to 25 Ω 25 Ω to 400 Ω 400 Ω to 1 kΩ 1 kΩ to 40 kΩ 40 kΩ to 100 kΩ 100 kΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1 GΩ	0.036 mΩ 2.3 μΩ/Ω 4.5 μΩ/Ω 10 μΩ/Ω 12 μΩ/Ω + 50 mΩ 19 μΩ/Ω + 2 Ω 62 μΩ/Ω + 100 Ω 0.059 % + 1 kΩ 0.58 % + 10 kΩ	Hart 1590 with Reference Resistor HP 3458A opt. 2
NVLAP Code: 20/E06 DC VOLTAGE DC Voltage – Measure Field calibrations Available <small>Note 4</small>	0 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 500 V 500 V to 800 V 800 V to 1 kV 1 kV to 2 kV 2 kV to 20 kV	7.1 μV/V + 0.5 μV 5 μV/V + 0.5 μV 5.1 μV/V + 0.5 μV 7.6 μV/V + 30 μV 11 μV/V + 100 μV 16 μV/V + 100 μV 21 μV/V + 100 μV 0.047 % + 0.4 V 0.047 % + 4 V	Agilent 3458A opt. 2 Vitrek 4600A
DC Voltage – Measuring Equipment Field calibrations Available <small>Note 4</small>	0 mV to 220 mV 220 mV to 2.2 V 2.2 V to 11 V 11 V to 22 V 22 V to 220 V 220 V to 1.1 kV	8 μV/V + 0.4 μV 5.4 μV/V + 0.7 μV 4.0 μV/V + 2.5 μV 4.0 μV/V + 4.0 μV 6.2 μV/V + 40 μV 7.5 μV/V + 400 μV	Fluke 5720A Fluke 5720A with 5725A

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NVLAP Code: 20/E09 LF AC VOLTAGE AC Voltage – Measuring Equipment Field calibrations available <small>Note 4</small>	0 mV to 2.2 mV	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.12 % + 4 μ V 0.10 % + 4 μ V 0.08 % + 4 μ V 0.12 % + 4 μ V 0.17 % + 5 μ V 0.33 % + 10 μ V 0.47 % + 20 μ V 0.58 % + 20 μ V	Fluke 5720A

2.2 mV to 22 mV

10 Hz to 20 Hz
20 Hz to 40 Hz
40 Hz to 20 kHz
20 kHz to 50 kHz
50 kHz to 100 kHz
100 kHz to 300 kHz
300 kHz to 500 kHz
500 kHz to 1 MHz

0.044 % + 4 μ V
0.031 % + 4 μ V
0.015 % + 4 μ V
0.031 % + 4 μ V
0.059 % + 5 μ V
0.12 % + 10 μ V
0.16 % + 20 μ V
0.31 % + 20 μ V

22 mV to 220 mV

10 Hz to 20 Hz
20 Hz to 40 Hz
40 Hz to 20 kHz
20 kHz to 50 kHz
50 kHz to 100 kHz
100 kHz to 300 kHz
300 kHz to 500 kHz
500 kHz to 1 MHz

0.028 % + 12 μ V
0.011 % + 7 μ V
0.009 % + 7 μ V
0.021 % + 7 μ V
0.047 % + 17 μ V
0.09 % + 20 μ V
0.14 % + 25 μ V
0.28 % + 45 μ V

220 mV to 2.2 V

10 Hz to 20 Hz
20 Hz to 40 Hz
40 Hz to 20 kHz
20 kHz to 50 kHz
50 kHz to 100 kHz
100 kHz to 300 kHz

0.028 % + 40 μ V
0.010 % + 15 μ V
0.005 % + 8 μ V
0.008 % + 10 μ V
0.012 % + 30 μ V
0.043 % + 80 μ V

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
AC Voltage – Measure Field calibrations available <small>Note 4</small>	2.2 V to 22 V	300 kHz to 500 kHz	0.10 % + 200 μ V	
		500 kHz to 1 MHz	0.18 % + 300 μ V	
		10 Hz to 20 Hz	0.028 % + 0.4 mV	
		20 Hz to 40 Hz	0.010 % + 0.15 mV	
		40 Hz to 20 kHz	0.005 % + 0.05 mV	
		20 kHz to 50 kHz	0.008 % + 0.1 mV	
		50 kHz to 100 kHz	0.011 % + 0.2 mV	
		100 kHz to 300 kHz	0.03 % + 0.6 mV	
		300 kHz to 500 kHz	0.10 % + 2 mV	
		500 kHz to 1 MHz	0.17 % + 3.2mV	
AC Voltage – Measure Field calibrations available <small>Note 4</small>	22 V to 220 V	10 Hz to 20 Hz	0.028 % + 4 mV	Fluke 5720A with 5725A
		20 Hz to 40 Hz	0.010 % + 1.5 mV	
		40 Hz to 20 kHz	0.0056 % + 0.6 mV	
		20 kHz to 50 kHz	0.0093 % + 1 mV	
		50 kHz to 100 kHz	0.016 % + 2.5 mV	
		100 kHz to 300 kHz	0.009 % + 16 mV	
		300 kHz to 500 kHz	0.44 % + 40 mV	
		500 kHz to 1 MHz	0.80 % + 80 mV	
		30 kHz to 50 kHz	0.061 % + 11 mV	
		50 kHz to 100 kHz	0.23 % + 45 mV	
AC Voltage – Measure Field calibrations available <small>Note 4</small>	220 V to 750 V	40 Hz to 1 kHz	0.011 % + 4 mV	HP 3458A opt. 2
		1 kHz to 20 kHz	0.017 % + 6 mV	
		20 kHz to 30 kHz	0.061 % + 11 mV	
		1 Hz to 40 Hz	0.039 % + 3 μ V	
		40 Hz to 1 kHz	0.028 % + 1 μ V	
		1 kHz to 20 kHz	0.038 % + 1 μ V	
		20 kHz to 50 kHz	0.15 % + 1 μ V	
		50 kHz to 100 kHz	0.59 % + 1 μ V	
		100 kHz to 300 kHz	4.6 % + 2 μ V	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
	10 mV to 100 mV	1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz	0.013 % + 4 μ V 0.0094 % + 2 μ V 0.017 % + 2 μ V 0.037 % + 2 μ V 0.093 % + 2 μ V 0.36 % + 10 μ V 1.2 % + 10 μ V	
	100 mV to 1 V	1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz	0.0098 % + 40 μ V 0.0094 % + 20 μ V 0.017 % + 20 μ V 0.036 % + 20 μ V 0.093 % + 20 μ V 0.35 % + 100 μ V 1.2 % + 100 μ V	
	1 V to 10 V	1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz	0.0095 % + 400 μ V 0.0095 % + 200 μ V 0.017 % + 200 μ V 0.036 % + 200 μ V 0.093 % + 200 μ V 0.35 % + 1 mV 1.2 % + 1 mV	
	10 V to 100 V	1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz	0.024 % + 4 mV 0.024 % + 2 mV 0.024 % + 2 mV 0.041 % + 2 mV 0.14 % + 2 mV 0.46 % + 10 mV 1.7 % + 10 mV	
	100 V to 700 V	1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz	0.047 % + 40 mV 0.047 % + 20 mV 0.071 % + 20 mV 0.14 % + 20 mV	

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	700 V to 2 kV 2 kV to 15 kV	50 kHz to 100 kHz 20 Hz to 100 Hz	0.035 % + 20 mV 0.098 % + 2 V 0.25 % + 20 V	Vitrek 4600A
NVLAP Code: 20/E10 LF CAPACITANCE Capacitance – Measuring Equipment Field calibrations available <small>Note 4</small>	0.19 nF to 1.0999 nF 1.1 nF to 3.2999 nF 3.3 nF to 10.9999 nF 11 nF to 32.9999 nF 33 nF to 109.9999 nF 110 nF to 329.999 nF 0.33 μ F to 1.09999 μ F 1.1 μ F to 3.29999 μ F 3.3 μ F to 10.9999 μ F 11 μ F to 32.9999 μ F 33 μ F to 109.999 μ F 110 μ F to 329.999 μ F 0.33 mF to 1.09999 mF 1.1 mF to 3.29999 mF 33 mF to 10.9999 mF 11 mF to 32.9999 mF 33 mF to 110 mF	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 Hz to 600 Hz 10 Hz to 300 Hz 10 Hz to 150 Hz 10 Hz to 120 Hz 10 Hz to 80 Hz DC to 50 Hz DC to 20 Hz DC to 6 Hz DC to 2 Hz DC to 0.6 Hz DC to 0.2 Hz	0.39 % + 7.8 pF 0.39 % + 7.8 pF 0.21 % + 7.8 pF 0.21 % + 78 pF 0.21 % + 78 pF 0.21 % + 0.23 nF 0.20 % + 0.78 nF 0.20 % + 2.3 nF 0.20 % + 7.8 nF 0.32 % + 23 nF 0.36 % + 78 nF 0.36 % + 0.23 μ F 0.35 % + 0.78 μ F 0.35 % + 2.3 μ F 0.35 % + 7.8 μ F 0.58 % + 23 μ F 0.85 % + 78 μ F	Fluke 5520A

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
NVLAP Code: 20/E20 OSCILLOSCOPES Sine Wave Flatness Field calibrations Available <small>Note 4</small>	50 kHz to 100 MHz 100 MHz to 300 MHz	1.7 % + 100 μ V 2.2 % + 100 μ V	Fluke 5500A/SC300

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Rise Time Field calibrations Available <small>Note 4</small>	≤ 1 ns	2.5 %	Fluke 5500A/SC300
TIME and FREQUENCY			
NVLAP Code: 20/F01 FREQUENCY DISSEMINATION Frequency Measuring Equipment Uncertainty values of derivatives of 10 MHz will differ due resolution, noise, and gating errors.	10 MHz	5.8×10^{-10}	Rubidium Frequency Standard
MECHANICAL			
NVLAP Code: 20/M08 MASS Scales and Balances Field calibrations Available <small>Note 4</small>	20 kg 5 kg 3 kg 2 kg 1 kg 500 g 300 g 200 g 100 g 50 g 30 g 20 g 10 g 5 g 2 g 1 g 500 mg 200 mg 50 mg 20 mg	61 mg 10 mg 2.3 mg 1.5 mg 3 mg 0.55 mg 0.55 mg 0.15 mg 0.15 mg 0.076 mg 0.031 mg 0.031 mg 0.011 mg 0.011 mg 0.011 mg 0.0034 mg 0.0034 mg 0.0034 mg 0.0034 mg	ASTM Class 1 Weights

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Mass - Metric	10 mg	0.0034 mg	Echelon III
	5 mg	0.0034 mg	
	2 mg	0.0034 mg	
	1 mg	0.0034 mg	
	30 kg	0.3 g	
	20 kg	0.2 g	
	10 kg	0.1 g	
	5 kg	50 mg	
	2 kg	20 mg	
	1 kg	10 mg	
Mass - Avoirdupois	0.5 kg	5 mg	Echelon III
	65 lb	0.3 g	
	50 lb	0.23 g	
	30 lb	0.14 g	
	20 lb	91 mg	
	10 lb	46 mg	
	5 lb	23 mg	
	3 lb	14 mg	
	2 lb	9.1 mg	
	1 lb	4.6 mg	
NVLAP Code: 20/M13 HARDNESS Rockwell Hardness – Measuring Equipment Field calibrations Available <small>Note 4</small>	20 HRC to 40 HRC	0.38 HRC	Hardness Blocks
	40 HRC to 60 HRC	0.36 HRC	
	60 HRC to 70 HRC	0.32 HRC	
Tungsten Carbide Balls Field calibrations Available <small>Note 4</small>	20 HRBW to 50 HRBW	1.0 HRBW	Hardness Blocks Hardness Blocks Hardness Blocks
	50 HRBW to 75 HRBW	0.64 HRBW	
	75 HRBW to 105 HRBW	0.46 HRBW	
NVLAP Code: 20/M15 TORQUE Torque – Measuring Equipment	2.5 lbf-in to 50 lbf-in	0.07 %	5 inch Torque Wheel with F Class Weights

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Field calibrations Available <small>Note 4</small>	50 lbf-in to 250 lbf-ft	0.09 %	10 inch Torque Butterfly with F Class Weights 40 inch Torque Arm with F Class Weights
	250 lbf-in to 800 lbf-ft	0.09 %	
Torque – Measure Field calibrations Available <small>Note 4</small>	5 lbf-in to 250 lbf-in	1.0 %	CDI 950-DT
THERMODYNAMIC			
NVLAP Code: 20/T02 HUMIDITY Relative Humidity – Measuring Equipment Field calibrations Available <small>Note 4</small>	0 % RH to 80 % RH	1.3 % RH	Vaisala HMI41/HMP46 with Salt Solutions
NVLAP Code: 20/T03 LABORATORY THEMOMETERS, DIGITAL and ANALOG Temperature – Measuring Equipment Field calibrations Available <small>Note 4</small>	-100 °C to -40 °C -40 °C to 100 °C 100 °C to 270 °C 270 °C to 400 °C 400 °C to 600 °C	1.8 mK 1.2 mK 2.4 mK 4.8 mK 21 mK	Hart 5699 SPRT with Precision Bath
Temperature – Measure Field calibrations Available <small>Note 4</small>	-40 °C to 600 °C	26 mK	Hart 5699 SPRT with Furnace
			Hart Black Stack with SPRT

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CALIBRATION LABORATORIES

NVLAP LAB CODE 200867-0

Scope Revised: 2012-09-05

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
NVLAP Code: 20/T05 PRESSURE			
Pressure – Pneumatic Field calibrations Available <small>Note 4</small>	-15 psi to 25 psi 25 psi to 500 psi -2 inH ₂ O to 2 inH ₂ O -36 inH ₂ O to -22 inH ₂ O -22 inH ₂ O to 22 inH ₂ O 22 inH ₂ O to 60 inH ₂ O 60 inH ₂ O to 72 inH ₂ O 72 inH ₂ O to 804 inH ₂ O	0.0016 psi 0.0065 % 0.0010 inH ₂ O 0.009 % + 150 μ inH ₂ O 0.002 inH ₂ O 0.009 % + 150 μ inH ₂ O 0.0065 inH ₂ O 0.009 % + 150 μ inH ₂ O	Ruska 7250xi Pressure Controller Dwyer 1430 Microtector DHI PPC4 Controller
Pressure – Hydraulic Field calibrations Available <small>Note 4</small>	500 psi to 15 000 psi	0.0084 %	Ametek T-150 Deadweight Tester
Pressure – Absolute Field calibrations Available <small>Note 4</small>	0 psiA to 25 psiA 25 psiA to 500 psiA	0.0018 psiA 0.0067 % + 0.001 psiA	Ruska 7250xi Pressure Controller
NVLAP Code: 20/T07 RESISTANCE THERMOMETRY			
Fixed Point Cells	0.010 °C 156.598 °C 231.928 °C 419.527 °C 660.323 °C	0.6 mK 1.9 mK 2.1 mK 3.5 mK 8.6 mK	Comparison to TPW Cell Comparison to In Fixed Point Cell Comparison to Sn Fixed Point Cell Comparison to Zn Fixed Point Cell Comparison to Al Fixed Point Cell

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
SPRT Comparison	-195 °C -80 °C -38.8 °C	2.4 mK 1.8 mK 1.1 mK	Hart 5699 SPRT with NBPLN2 Hart 5699 SPRT with Precision Bath
NVLAP Code: 20/T11 THERMOCOUPLES Field calibrations Available <small>Note 4</small>			
Thermocouple Type			Thermocouple Half-Junction with HP 3458A
Type R	-50 °C to 1768 °C	0.24 °C	
Type S	-50 °C to 1768 °C	0.22 °C	
Type E	-270 °C to 1000 °C	0.093 °C	
Type T	-270 °C to 400 °C	0.098 °C	
Type K	-270 °C to 1372 °C	0.091 °C	
Type J	-210 °C to 1200 °C	0.090 °C	

END

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CALIBRATION LABORATORIES

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Notes

Note 1: A Calibration and Measurement Capability (CMC) is a description of the best result of a calibration or measurement (result with the smallest uncertainty of measurement) that is available to the laboratory's customers under normal conditions, when performing more or less routine calibrations of nearly ideal measurement standards or instruments. The CMC is described in the laboratory's scope of accreditation by: the measurement parameter/device being calibrated, the measurement range, the uncertainty associated with that range (see note 3), and remarks on additional parameters, if applicable.

Note 2: Calibration and Measurement Capabilities are traceable to the national measurement standards of the U.S. or to the national measurement standards of other countries and are thus traceable to the internationally accepted representation of the appropriate SI (Système International) unit.

Note 3: The uncertainty associated with a measurement in a CMC is an expanded uncertainty using a coverage factor, $k = 2$, with a level of confidence of approximately 95 %. Units for the measurand and its uncertainty are to match. Exceptions to this occur when marketplace practice employs mixed units, such as when the artifact to be measured is labeled in non-SI units and the uncertainty is given in SI units (Example: 5 lb weight with uncertainty given in mg).

Note 3a: The uncertainty of a specific calibration by the laboratory may be greater than the uncertainty in the CMC due to the condition and behavior of the customer's device and specific circumstances of the calibration. The uncertainties quoted do not include possible effects on the calibrated device of transportation, long term stability, or intended use.

Note 3b: As the CMC represents the best measurement results achievable under normal conditions, the accredited calibration laboratory shall not report smaller uncertainty of measurement than that given in a CMC for calibrations or measurements covered by that CMC.

Note 3c: As described in Note 1, CMCs cover calibrations and measurements that are available to the laboratory's customers under *normal conditions*. However, the laboratory may have the capability to offer special tests, employing special conditions, which yield calibration or measurement results with lower uncertainties. Such special tests are not covered by the CMCs and are outside the laboratory's scope of accreditation. In this case, NVLAP requirements for the labeling, on calibration reports, of results outside the laboratory's scope of accreditation apply. These requirements are set out in Annex A.1.h. of NIST Handbook 150, Procedures and General Requirements.

Note 4: Uncertainties associated with field service calibration may be greater as they incorporate on-site environmental contributions, transportation effects, or other factors that affect the measurements. (This note applies only if marked in the body of the scope.)

Note 5: Values listed with percent (%) are percent of reading or generated value unless otherwise noted.

Note 6: NVLAP accreditation is the formal recognition of specific calibration capabilities. Neither NVLAP nor NIST guarantee the accuracy of individual calibrations made by accredited laboratories.

Note 7: See [NIST Handbook 150](#) for further explanation of these notes.

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