



National Voluntary Laboratory Accreditation Program



CALIBRATION LABORATORIES

NVLAP LAB CODE 200914-0

Scope Revised: 2012-11-30

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Transcat - Rochester 35 Vantage Point Drive Rochester, NY 14264 Mr. Mike Sublett Phone: 585-352-9720 Fax: 800-395-0543 E-mail: msublett@transcat.com URL: www.transcat.com	Parameter(s) of Accreditation Dimensional Electromagnetics – DC/Low Frequency Time and Frequency Mechanical Electromagnetics – RF/Microwave Thermodynamic
	This laboratory is compliant to ANSI/NCSL Z540-1-1994; Part 1. (NVLAP Code: 20/A01)

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	0° to 75° 90°	(where L is length in inches) 5.4 as 1.1 as	Angle Blocks Granite Square
NVLAP Code: 20/D05 LENGTH & DIAMETER; STEP GAGES Micrometers & Calipers – Outside, Inside, Depth Field calibrations Available ^{Note 4}	0 in to 8 in 8 in to 24 in	$12 \mu\text{in} + 7L \mu\text{in}$ $7 \mu\text{in} + 7.5L \mu\text{in}$	Comparison to Gage Blocks
Surface Flatness Field calibrations Available ^{Note 4}	0 in to 4 in	$6.6 \mu\text{in}$	Optical Flats
Anvil Parallelism Field calibrations Available ^{Note 4}	0 in to 1 in	$6.6 \mu\text{in}$	Optical Flats
Digital & Dial Indicators Field calibrations Available ^{Note 4}	0 in to 6 in	$1.1 \mu\text{in} + 7.5L \mu\text{in}$	Gage Blocks with Surface Plate
Single Axis – Outside	0 in to 6 in 6 in to 12 in	$4.7 \mu\text{in} + 1.5L \mu\text{in}$ $4.5 \mu\text{in} + 1.7L \mu\text{in}$	P & W Labmaster

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Single Axis – Inside	0 in to 2 in 2 in to 6 in 6 in to 12 in	(where L is length in inches) 4 μ in to $3L \mu$ in 6.3 μ in to $1.5L \mu$ in 24 μ in to $1.1L \mu$ in	P & W Labmaster
Height Measuring Equipment Field calibrations Available ^{Note 4}	0 in to 8 in 8 in to 24 in	28 μ in to $6L \mu$ in 4.0 μ in to $7L \mu$ in	Comparison to Gage Blocks
Height Measure	0 in to 12 in	26 μ in to $3L \mu$ in	Gage Blocks & Amplifier
Parallelism & Straightness	0 in to 48 in	36 μ in	Gage Amp & Surface Plate
Length Measuring Equipment – Linear Displacement	0 ft to 12 ft	0.5 μ in to $0.6L \mu$ in	Laser Interferometer
NVLAP Code: 20/D07 MEASURING WIRES	2 TPI to 120 TPI	8.6 μ in	P & W Labmaster
NVLAP Code: 20/D08 OPTICAL REFERENCE PLANES	150 mm to 300 mm	1.2 μ m	Calibration Grids
NVLAP Code: 20/D11 SPHERICAL DIAMETER; PLUG/RING GAGES	0 in to 6 in	7 μ in + $1.3L \mu$ in	P & W Labmaster
NVLAP Code: 20/D13 SURVEYING RODS AND TAPES	0 ft to 100 ft	0.00055 in	Accu-Gage
NVLAP Code: 20/D14 THREADED PLUG & RING GAGES Plug – Outer Pitch Diameter Ring – Inner Pitch Diameter	0 in to 6 in 0 in to 2 in	75 μ in 0.00014 in	P&W Labmaster with thread wires Master Plug Gages

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NVLAP Code: 20/D15 Two Dimensional Gages Two Axis (X-Y)	9 in to 12 in 6 in to 9 in 5 in to 6 in 4 in to 5 in 3 in to 4 in 2 in to 3 in 1 in to 2 in 0.00005 in to 1 in	0.00016 in 0.00014 in 0.00012 in 0.00011 in 0.0001 in 96 μ in 90 μ in 84 μ in	Starrett Galileo
Z Axis	4 in to 5 in 2 in to 4 in 1 in to 2 in 0.1 in to 1 in	0.00017 in 0.00016 in 0.00015 in 0.00015 in	

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY				
NVLAP Code 20/E02 AC RESISTORS ACI Measuring Equipment Field calibrations Available ^{Note 4}	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	0.031 % + 16 nA 0.019 % + 10 nA 0.015 % + 8.0 nA 0.030 % + 12 nA 0.11 % + 65 nA	Fluke 5700
	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 0.014 % + 35 nA 0.021 % + 0.11 μ A 0.11 % + 0.65 μ A	
	2.2 mA to 22 mA	10 Hz to 20 Hz	0.039 % + 0.40 μ A	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (<i>k</i> =2) ^{Note 3,5}	Remarks
		20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.019 % + 0.35 μ A 0.014 % + 0.35 μ A 0.021 % + 0.55 μ A 0.11 % + 5.0 μ A	
	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 % + 4.0 μ A 0.018 % + 3.5 μ A 0.014 % + 2.5 μ A 0.021 % + 3.5 μ A 0.11 % + 10 μ A	
	220 mA to 2.2 A	0.02 kHz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.027 % + 35 μ A 0.046 % + 80 μ A 0.70 % + 0.16 mA	
	2.2 A to 11 A	5 kHz to 10 kHz	0.36 % + 0.75 mA	Fluke 5520A
		0.04 kHz to 1 kHz 1 kHz to 5 kHz	0.051 % + 0.17 mA 0.098 % + 0.38 mA	Fluke 5700A/EP w/5725A
	11 A to 20.5 A	10 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 5 kHz	0.095 % + 2.0 mA 0.12 % + 5.0 mA 2.3 % + 5.0 mA	Fluke 5520A
Extended Frequency Ranges Field calibrations Available ^{Note 4}	29 μ A to 330 μ A 330 μ A to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA	10 kHz to 30 kHz 10 kHz to 30 kHz 10 kHz to 30 kHz 10 kHz to 30 kHz	1.2 % + 4.0 μ A 0.78 % + 0.60 μ A 0.31 % + 4.0 μ A 0.31 % + 0.20 mA	Fluke 5520A
Clamp-on Ammeter Toroidal Type Field calibrations Available ^{Note 4}	20 A to 150 A 20 A to 150 A 150 A to 1000 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 % + 0.026 A 0.95 % + 0.047 A 0.39 % + 0.12 A 1.2 % + 0.22 A	Fluke 5520A w/5500A/Coil
Clamp-on Ammeter Non-Toroidal Type	20 A to 150 A 20 A to 150 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.66 % + 0.25 A 1.2 % + 0.25 A	Fluke 5520A w/5500A/Coil

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
Field calibrations Available ^{Note 4}	150 A to 1000 A 150 A to 1000 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.68 % + 0.9 A 1.4 % + 0.92 A	
AC Current – Measure Field calibrations Available ^{Note 4}	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 20 A 20 A to 100 A	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 0.1 kHz to 5 kHz 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.4 % + 30 nA 0.16 % + 30 nA 0.063 % + 30 nA 0.063 % + 30 nA 0.4 % + 0.2 μA 0.15 % + 0.2 μA 0.062 % + 0.2 μA 0.034 % + 0.2 μA 0.4 % + 2 μA 0.15 % + 2 μA 0.062 % + 2 μA 0.034 % + 2 μA 0.4 % + 20 μA 0.15 % + 20 μA 0.062 % + 20 μA 0.033 % + 20 μA 0.40 % + 0.20 mA 0.16 % + 0.20 mA 0.085 % + 0.20 mA 0.10 % + 0.20 mA 0.11 % + 0.02 A 0.11 % + 0.1 A	Agilent 3458A opt 002 Valhalla 2575A Gen Rad 1689M
AC Resistance – Measure Field calibrations Available ^{Note 4}	0.02 kΩ to 100 kΩ	1 kHz	0.025 % + 0.01 Ω	

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
NVLAP Code: 20/E05 DC RESISTANCE Measuring Equipment and Measure Field calibrations Available ^{Note 4}	0 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 10 kΩ 19 kΩ to 109 kΩ 100 kΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1 GΩ	19 μΩ/Ω + 50 μΩ 15 μΩ/Ω + 0.50 mΩ 12 μΩ/Ω + 0.50 mΩ 12 μΩ/Ω + 5.0 mΩ 13 μΩ/Ω + 50 mΩ 19 μΩ/Ω + 2.0 Ω 62 μΩ/Ω + 100 Ω 0.059 % + 1 kΩ 0.58 % + 10 kΩ	HP3458A w/Decade Resistor
Measuring Equipment Field calibrations Available ^{Note 4}	1 mΩ 10 mΩ 100 mΩ 1 GΩ to 100 GΩ 1 TΩ 10 TΩ	0.012 % 0.012 % 0.012 % 0.60 % 0.60 % 0.88 %	L&N Shunt Guildline 9200
DC Current – Measuring Equipment Field calibrations Available ^{Note 4}	0 mA to 0.22 mA 0.22 mA 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 100 A	36 μA/A + 6.0 nA 36 μA/A + 7.0 nA 35 μA/A + 40 nA 48 μA/A + 0.7 μA 0.02 % + 12 μA 0.04 % + 0.48 mA 0.047 %	Fluke 5700A/EP Fluke 5700A/EP w/5725A L&N 4360 Shunt w/source
DC Current – Measure Field calibrations Available ^{Note 4}	0 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 10 A 10 A to 100 A	26 μA/A + 0.8 nA 26 μA/A + 5.0 nA 26 μA/A + 50 nA 43 μA/A + 0.50 μA 0.13 % + 10 μA 0.047 % 0.047 %	Agilent 3458A Opt 002 L&N 4361 Shunt L&N 4360 Shunt

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
Clamp-on Ammeter Non-Toroidal Type Field calibrations Available ^{Note 4}	20 A to 150 A 150 A to 1000 A	0.51 % + 0.14 A 0.52 % + 0.5 A	Fluke 5520A w/ 5500A/Coil
NVLAP Code: 20/E06 DC VOLTAGE Measure Field calibrations Available ^{Note 4}	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 20 kV to 100 kV	7.1 μ V/V + 0.50 μ V 5.0 μ V/V + 0.50 μ V 5.1 μ V/V + 0.50 μ V 7.6 μ V/V + 30 μ V 11 μ V/V + 0.10 mV 16 μ V/V + 0.10 mV 21 μ V/V + 0.10 mV 0.047 % + 0.40 V 0.047 % + 4.0 V 0.22 %	3458A Opt 002 Vitrek 4600A High Voltage Divider
Measuring Equipment Field calibrations Available ^{Note 4}	0 V to 0.22 V 0.22 V to 2.2 V 2.2 V to 11 V 11 V to 22 V 22 V to 220 V 220 V to 1100 V	7.6 μ V/V + 0.4 μ V 5.1 μ V/V + 0.7 μ V 3.6 μ V/V + 2.5 μ V 3.6 μ V/V + 4 μ V 5.5 μ V/V + 40 μ V 6.9 μ V/V + 500 μ V	Fluke 5700A/EP Fluke 5700A/EP w/5725A

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY				
NVLAP Code: 20/E09 LF AC VOLTAGE Measure Field calibrations Available ^{Note 4}	0 mV to 10 mV	1 Hz to 40 Hz 40 Hz to 1 kHz	0.039 % + 3.0 μ V 0.028 % + 1.1 μ V	Agilent 3458A opt 002

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
		1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz	0.038 % + 1.1 μ V 0.15 % + 1.1 μ V 0.59 % + 1.1 μ V 4.6 % + 2.0 μ V	
	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 % + 4.0 μ V 95 μ V/V + 2.0 μ V 0.017 % + 2.0 μ V 0.037 % + 2.0 μ V 0.093 % + 2.0 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 95 μ V/V + 20 μ V 0.017 % + 20 μ V 0.036 % + 20 μ V 0.093 % + 20 μ V 0.35 % + 0.1 mV 1.2 % + 0.1 mV	
	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	95 μ V/V + 0.40 mV 95 μ V/V + 0.20 mV 0.017 % + 0.20 mV 0.036 % + 0.20 mV 0.093 % + 0.20 mV 0.35 % + 1.0 mV 1.2 % + 1.0 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 % + 4.0 mV 0.024 % + 2.0 mV 0.024 % + 2.0 mV 0.041 % + 2.0 mV 0.14 % + 2.0 mV 0.46 % + 10 mV 1.7 % + 10 mV	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (<i>k</i> =2) ^{Note 3,5}	Remarks
AC Voltage Measuring Equipment Field calibrations Available ^{Note 4}	100 V to 700 V 1 kV to 2 kV 2 kV to 20 kV 20 kV to 85 kV	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 20 Hz to 100 Hz 100 Hz to 400 Hz 20 Hz to 100 Hz 60 Hz	0.047 % + 40 mV 0.047 % + 20 mV 0.071 % + 20 mV 0.14 % + 20 mV 0.35 % + 20 mV 0.098 % + 2.0 V 0.47 % + 4.0 V 0.25 % + 20 V 1.4 %	Vitrek 4600A Ross HV Divider

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (<i>k</i> =2) ^{Note 3,5}	Remarks
		300 kHz to 500 kHz 500 kHz to 1 MHz	0.15 % + 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 300 kHz to 500 kHz 500 kHz to 1 MHz	0.028 % + 40 μ V 0.01 % + 15 μ V 0.0048 % + 8.0 μ V 0.0082 % + 10 μ V 0.012 % + 30 μ V 0.044 % + 80 μ V 0.10 % + 0.20 mV 0.18 % + 0.30 mV	
	2.2 V to 22 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 300 kHz to 500 kHz 500 kHz to 1 MHz	0.028 % + 0.40 mV 0.01 % + 0.15 mV 0.0049 % + 50 μ V 0.0083 % + 0.10 mV 0.012 % + 0.20 mV 0.030 % + 0.60 mV 0.11 % + 2.0 mV 0.17 % + 3.2 mV	
	22 V to 220 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 300 kHz to 500 kHz 500 kHz to 1 MHz	0.028 % + 4.0 mV 0.01 % + 1.5 mV 0.0056 % + 0.60 mV 0.0093 % + 1.0 mV 0.017 % + 2.5 mV 0.085 % + 16 mV 0.44 % + 40 mV 0.8 % + 80 mV	
	220 V to 750 V	30 kHz to 50 kHz 50 kHz to 100 kHz	0.061 % + 11 mV 0.23 % + 45 mV	5700A/EP w/ 5725A
	220 V to 1100 V	40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 30 kHz	0.0091 % + 4.0 mV 0.017 % + 6.0 mV 0.067 % + 11 mV	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
NVLAP Code 20/E10 LF CAPACITANCE Measure				
Field calibrations Available ^{Note 4}	Up to 10 pF 10 pF to 100 pF 100 pF to 1000 nF 1 μF to 100 μF 100 μF to 1 mF	1 kHz 1 kHz 1 kHz 1 kHz 1 kHz	0.47 % + 0.05 pF 0.058 % + 0.05 pF 0.024 % + 0.05 pF 0.041 % 0.24 %	GenRad 1689M
Measure Equipment				
Field calibrations Available ^{Note 4}	0.1 nF to 0.5 nF 0.5 nF to 1400 nF 0.19 nF to 1.1 nF 1.1 nF to 3.3 nF 3.3 nF to 11 nF 11 nF to 110 nF 110 nF to 330 nF 0.33 μF to 1.1 μF 1.1 μF to 3.3 μF 3.3 μF to 11 μF 11 μF to 33 μF 33 μF to 110 μF 110 μF to 330 μF 0.33 mF to 1.1 mF 1.1 mF to 3.3 mF 3.3 mF to 11 mF 11 mF to 33 mF 33 mF to 110 mF	0.1 kHz to 1 kHz 0.1 kHz to 1 kHz 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 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	0.58 pF 0.12 % + 0.018 pF 0.39 % + 7.8 pF 0.39 % + 7.8 pF 0.21 % + 7.8 pF 0.21 % + 7.8 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 0.35 % + 78 nF 0.35 % + 0.23 μF 0.35 % + 0.78 μF 0.35 % + 2.3 μF 0.35 % + 7.8 μF 0.58 % + 23 μF 0.85 % + 78 μF	Arco SS32 Fluke 5520A
NVLAP Code: 20/E11 LF INDUCTANCE Measure				
Field calibrations Available ^{Note 4}	1 mH to 100 mH 100 mH to 10 H	1 kHz 1 kHz	0.04 % + 0.1 μH 0.18 % + 1.4 μH	GenRad 1689M
Measuring Equipment				
Field calibrations Available ^{Note 4}	100 mH 1 H 2 H	1 kHz 1 kHz 1 kHz	0.14 % 0.14 % 0.14 %	Standard Inductor

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	5 H 10 H	1 kHz 1 kHz	0.14 % 0.14 %	
NVLAP Code: 20/E15 PHASE METERS Measuring Equipment Field calibrations Available ^{Note 4}	0 ° to 90 ° 0 ° to 90 °	10 Hz to 65 Hz 65 Hz to 500 Hz 500 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 10 kHz to 30 kHz	0.10 ° 0.20 ° 0.37 ° 1.8 ° 3.6 ° 7.3 °	Fluke 5520A

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
TIME AND FREQUENCY			
NVLAP Code: 20/F01 FREQUENCY DISSEMINATION Source and Measure In-Lab	10 MHz	Uncertainty values of derivatives of 10 MHz will differ due to resolution, noise, and gating errors. 3.7×10^{-12}	Fluke 910R
Field Service ^{Note 4}	10 MHz	2.9×10^{-9}	HP 53132A Counter
NVLAP Code: 20/F04 PULSE WAVEFORM Rise time (Generate) Field calibrations Available ^{Note 4}	≤ 25 ps	5.6 ps	Fluke 9500B
Rise Time (Measure)	≤ 700 ps	$0.18 \% + 2.5$ ps	Agilent DSO6102
Total Harmonic Distortion (0 dB to -80 dB) Field calibrations Available ^{Note 4}	20 Hz to 2 GHz	1.5 dB	Agilent 8903 w/8590A

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Total Harmonic Distortion (5 Hz to 600 kHz fundamental) Field calibrations Available ^{Note 4}	(Harmonic Range)		
Input Voltage Range < 30 V			
100 % to 0.3 %	10 Hz to 1 MHz	3.5 %	
0.1%	1 MHz to 3 MHz	6.9 %	
	10 Hz to 20 Hz	14 %	
	20 Hz to 30 Hz	6.9 %	
	30 Hz to 300 kHz	3.5 %	
	300 kHz to 500 kHz	6.9 %	
	500 kHz to 1.2 MHz	14 %	
Input Voltage Range > 30 V			
100 % to 0.3 %	0.01 kHz to 300 kHz	3.5 %	
0.1 %	300 kHz to 500 kHz	6.9 %	
	0.5 MHz to 3 MHz	14 %	
	0.5 Hz to 1.2 MHz	14 %	
	10 Hz to 20 Hz	14 %	
	20 Hz to 30 Hz	6.9 %	
	30 Hz to 300 kHz	3.5 %	
	300 kHz to 500 kHz	6.9 %	
	500 kHz to 1.2 MHz	14 %	
MECHANICAL			
NVLAP Code: 20/M06 FORCE Force Measuring Equipment	1 lbf to 300 lbf	0.01 %	Deadweight
NVLAP Code: 20/M08 MASS Balances & Scales Field calibrations Available ^{Note 4}			
(Readability)			
0.0001 mg	1 mg to 5 kg	4 µg/g + 12 µg	
0.001 mg	1 mg to 5 kg	4 µg/g + 13 µg	
0.01 mg	1 mg to 5 kg	4 µg/g + 18 µg	
0.1 mg	1 mg to 5 kg	4 µg/g + 72 µg	

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
0.001 g ≥ 0.001 g	1 mg to 5 kg 2.2 lb to 300 lb	4 $\mu\text{g/g}$ + 0.6 mg 0.013 %	NIST Class F Weights
NVLAP Code: 20/M15 TORQUE Torque Measure	5 lbf-in to 250 lbf-ft	0.85 %	Torque Calibrator
ELECTROMAGNETICS – RF/MICROWAVE			
NVLAP Code: 20/R11 RF-DC VOLTAGE /CURRENT CONVERTERS Sinewave Flatness Field calibrations Available ^{Note 4}	10 Hz to 1 MHz 1 MHz to 10 MHz 10 MHz to 30 MHz 30 MHz to 50 MHz 50 MHz to 80 MHz 80 MHz to 100 MHz	0.06 % 0.10 % 0.18 % 0.41 % 0.71 % 0.84 %	Thermal Converter/HP3458A

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
NVLAP Code: 20/R13 RF/MICROWAVE ATTENUATORS Relative RF Power	0 dB to -10 dB -10 dB to -20 dB -20 dB to -30 dB -30 dB to -40 dB -40 dB to -50 dB	100 kHz to 18 GHz 100 kHz to 18 GHz 100 kHz to 18 GHz 100 kHz to 18 GHz 100 kHz to 18 GHz	1.1 % + M 1.4 % + M 1.5 % + M 1.5 % + M 4.3 % + M	Agilent 438A with 8481A and 8482A Where M is mismatch Uncertainty at time of test.
NVLAP Code: 20/R17 RF/MICROWAVE POWER METERS RF Power Field calibrations Available ^{Note 4}	1 mW Reference	50 MHz	0.85 %	Agilent 478A-H75

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
	10 dB to 20 dB	10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz	4.6 % 4.7 % 4.8 %	Agilent 438A w/8481A
	0 dB to 10 dB	10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz	2.2 % 2.3 % 2.6 %	
	-10 dB to 0 dB	10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz	2.2 % 2.3 % 2.6 %	
	-20 dB to -10 dB	10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz	2.4 % 2.5 % 2.7 %	
	-20 dB to -30 dB	10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz	2.4 % 2.5 % 2.7 %	Agilent 438A w/8481A

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
THERMODYNAMIC			
NVLAP Code: 20/T02 HUMIDITY Measuring Equipment (-10 °C to 70 °C)	10 % to 95 %	0.5 %	Thunder Scientific 2500
Measure Field calibrations Available ^{Note 4}	20 % to 90 %	1.3 %	Vaisala HMI41/HMP46

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
NVLAP Code: 20/T03 LABORTORY THERMOMETERS Measure Field calibrations Available ^{Note 4}	-195 °C to 0 °C 0 °C to 420 °C 420 °C to 660 °C 660 °C to 1000 °C 1000 °C to 1450 °C	0.013 °C 0.024 °C 0.034 °C 0.6 °C 2.8 °C	Hart 5628 w/Black Stack Hart 5628 w/Black Stack Hart 5628 w/Black Stack Type-R TC Type-R TC
Measuring Equipment Field calibrations Available ^{Note 4}	-80 °C to 100 °C 100 °C to 300 °C 300 °C to 500 °C 500 °C to 1000 °C 1000 °C to 1200 °C	0.014 °C 0.12 °C 0.06 °C 0.81 °C 2.9 °C	Hart 5628 w/Hart Bath Hart 5628 w/Hart Well Hart 5628 w/ salt bath Type-R TC w/Furnace Type-R TC w/Furnace
NVLAP Code: 20/T05 PRESSURE Absolute Measure & Measuring Equipment	25 to 500 psia 10 to 25 psia 3 to 10 psia 0 to 3 psia	0.0067 % + 0.001 psia 0.0019 psia 0.0023 % + 0.001 psia 0.0019 psia	Ruska 7250xi Ruska 7250xi DHI PPC2 Ruska 7250xi
Gage Pressure Measure & Measuring Equipment – Pneumatic	-14.7 psig to 25 psig 25 psig to 500 psig -36 in H ₂ O to -22 in H ₂ O -22 in H ₂ O to 22 in H ₂ O -2 in H ₂ O to 2 in H ₂ O 22 in H ₂ O to 60 in H ₂ O 60 in H ₂ O to 72 in H ₂ O 72 in H ₂ O to 804 in H ₂ O	0.0041 % + 0.0013 psig 0.0065% 0.0090 % + 150 µin H ₂ O 0.002 in H ₂ O 0.0012 in H ₂ O 0.0090 % + 150 µin H ₂ O 0.0065 in H ₂ O 0.0090 % + 150 µin H ₂ O	Ruska 7250xi DHI PPC4-ui DHI PPC4-ui Dwyer 1430 DHI PPC4-ui DHI PPC4-ui DHI PPC4-ui
Gage Pressure Measuring Equipment – Pneumatic Field calibrations Available ^{Note 4}	-14.7 psig to -0.5 psig 3 psig to 500 psig	0.018 % 0.0086 %	Pressurements T3500

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks	
Pressure Measuring Equipment – Hydraulic Field calibrations Available ^{Note 4}	500 psig to 16 000 psig 500 psia to 16 000 psia	0.011 % 0.011 % + 0.003 psia	Pressurments P3125-3 DWT	
NVLAP Code: 20/T06 RADIATION THERMOMETRY Infrared Temperature – Measuring equipment	-15 °C to 0 °C 0 °C to 50 °C 50 °C to 100 °C 100 °C to 120 °C 120 °C to 200 °C 200 °C to 350 °C 350 °C to 500 °C	0.98 °C 0.67 °C 0.71 °C 0.77 °C 0.98 °C 1.7 °C 2.3 °C	Hart Black Body	
NVLAP Code: 20/T08 THERMOCOUPLES & PYROMETER INDICATORS Electrical Calibration of Thermocouple Devices Field calibrations Available ^{Note 4}	Type J Type K Type T Type E Type R Type S Type N Type B Type B Type B Type B	-210 °C to 1200 °C -270 °C to 1372 °C -270 °C to 400 °C -270 °C to 1000 °C 0 °C to 1767 °C 0 °C to 1767 °C -270 °C to 1300 °C 600 °C to 800 °C 800 °C to 1000 °C 1000 °C to 1550 °C 1550 °C to 1820 °C	0.1 °C 0.1 °C 0.1 °C 0.10 °C 0.24 °C 0.22 °C 0.17 °C 0.34 °C 0.26 °C 0.23 °C 0.26 °C	Thermocouple Half Junctions Fluke 5520

END

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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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