



National Voluntary Laboratory Accreditation Program



CALIBRATION LABORATORIES

NVLAP LAB CODE 200915-0

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Transcat - Boston 230 Ballardvale Wilmington, MA 01887 Mr. Chris Herrmann Phone: 978-988-3911 Fax: 978-988-3973 E-mail: cherrmann@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)
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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/D05 LENGTH & DIAMETER; STEP GAGES Micrometers & Calipers – Outside, Inside, Depth Field calibrations Available ^{Note 4}	0.01 in to 18 in	14 μ in + 15L μ in	Comparison to Gage Blocks Where L is length in inches of device under test.
Anvil Flatness Field calibrations Available ^{Note 4}	0 in to 1 in	8.1 μ in	Optical Flats
Anvil Parallelism Field calibrations Available ^{Note 4}	0 in to 1 in	9.1 μ in	Optical Flats
Digital & Dial Indicators Field calibrations Available ^{Note 4}	0 in to 6 in	13 μ in + 14L μ in	Gage Blocks with Surface Plate

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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
ELECTROMAGNETICS – DC/LOW FREQUENCY				
NVLAP Code 20/E02 AC RESISTORS AC Current Measuring Equipment Field calibrations Available ^{Note 4}	0 μA to 220 μA	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	0.072 % + 25 nA 0.037 % + 20 nA 0.016 % + 16 nA 0.061 % + 40 nA 0.16 % + 80 nA	Fluke 5700
	0.22 mA 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	0.072 % + 40 nA 0.036 % + 35 nA 0.015 % + 35 nA 0.061 % + 0.40 μA 0.16 % + 0.80 μA	
	2.2 mA to 22 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	0.076 % + 0.40 μA 0.036 % + 0.35 μA 0.016 % + 0.35 μA 0.061 % + 4.0 μA 0.16 % + 8.0 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	0.073 % + 4.0 μA 0.036 % + 3.5 μA 0.016 % + 3.5 μA 0.061 % + 40 μA 0.016 % + 80 μA	
	0.22 A to 2.2 A	0.02 kHz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.067 % + 35 μA 0.076 % + 80 μA 0.85 % + 0.16 mA	
	2.2 A to 11 A	0.4 kHz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.051 % + 0.17 mA 0.098 % + 0.38 mA 0.36 % + 0.75 mA	Fluke 5700A/EP w/5725A

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Extended Frequency Ranges Field calibrations Available ^{Note 4}	11 A to 20.5 A	0.045 kHz to 1 kHz 1 kHz to 5 kHz	0.12 % + 5.0 mA 2.3 % + 5.0 mA	Fluke 5520A
	29 μ A to 330 μ A	10 kHz to 30 kHz	1.2 % + 4.0 μ A	
	0.33 mA to 3.3 mA	10 kHz to 30 kHz	0.78 % + 0.60 μ A	
	3.3 mA to 33 mA	10 kHz to 30 kHz	0.31 % + 4.0 μ A	
	33 mA to 330 mA	10 kHz to 30 kHz	0.31 % + 0.20 mA	
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 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	0.66 % + 0.25 A 1.2 % + 0.25 A 0.68 % + 0.9 A 1.4 % + 0.92 A	
AC Current – Measure Field calibrations Available ^{Note 4}	0 μ A to 100 μ A 0.1 mA to 1 mA 1 mA to 10 mA 10 mA to 100 mA	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 0.1 kHz to 5 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	0.40 % + 30 nA 0.16 % + 30 nA 0.063 % + 30 nA 0.063 % + 30 nA 0.40 % + 0.2 μ A 0.15 % + 0.2 μ A 0.062 % + 0.2 μ A 0.034 % + 0.2 μ A 0.40 % + 2 μ A 0.15 % + 2 μ A 0.062 % + 2 μ A 0.034 % + 2 μ A 0.40 % + 20 μ A 0.15 % + 20 μ A	Agilent 3458A opt 002

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
AC Resistance— Measure Field calibrations Available ^{Note 4}	0.1 A to 1 A 1 A to 20 A 20 A to 100 A	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 0.1 kHz to 5 kHz 0.05 kHz to 5 kHz 0.05 kHz to 5 kHz	0.062 % + 20 μ A 0.033 % + 20 μ A 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	Valhalla 2575A Gen Rad 1689-9700

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

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	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 0.1 k Ω to 1 k Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω 100 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω 100 M Ω to 1 G Ω	19 μ Ω / Ω + 50 μ Ω 15 μ Ω / Ω + 0.50 m Ω 12 μ Ω / Ω + 0.50 m Ω 12 μ Ω / Ω + 5.0 m Ω 13 μ Ω / Ω + 50 m Ω 19 μ Ω / Ω + 2.0 Ω 62 μ Ω / Ω + 100 Ω 0.059 % + 1 k Ω 0.58 % + 10 k Ω	HP3458A w/Decade Resistor
Measuring Equipment Field calibrations Available ^{Note 4}	10 G Ω 100 G Ω	0.59 % 1.2 %	Biddle Megadek
DC Current – Measuring Equipment Field calibrations Available ^{Note 4}	1 A to 11 A 11 A to 20.5 A	0.04 % + 0.48 mA 0.08 % + 0.58 mA %	Fluke 5700A w/5725A Fluke 5520A

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3}	Remarks
DC Current – Measure & Measuring Equipment Field calibrations Available ^{Note 4}	0 to 100 μ A 0.1 mA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 0.1 A to 1 A	30 μ A/A + 0.8 nA 28 μ A/A + 5.0 nA 28 μ A/A + 50 nA 43 μ A/A + 0.50 μ A 0.013 % + 10 μ A	HP 3458A with current source
DC Current – Measure Field calibrations Available ^{Note 4}	1 A to 10 A 10 A to 100 A	0.062 % 0.012 %	Guildline 9711A Shunt w/DVM
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}	1 kV to 2 kV 2 kV to 20 kV 20 kV to 100 kV	0.047 % + 0.40 V 0.047 % + 4.0 V 0.26 %	Vitrek 4600A
Measuring Equipment Field calibrations Available ^{Note 4}	220 V to 1.1 kV	9.3 μ V/V + 500 μ V	High Voltage Divider Fluke 5700A/EP w/5725A
Measuring Equipment & Measure Field calibrations Available ^{Note 4}	0 mV to 100 mV 0.1 V 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	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	3458A Opt 002 w/5700A

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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 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz	0.039 % + 3.0 μ V 0.028 % + 1.10 μ V 0.038 % + 1.10 μ V 0.15 % + 1.10 μ V 0.59 % + 1.10 μ V 4.6 % + 2.0 μ V	Agilent 3458A opt 002
	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 0.0095 % + 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 0.0095 % + 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 % + 0.10 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	0.0095 % + 0.40 mV 0.0095 % + 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	0.024 % + 4.0 mV 0.024 % + 2.0 mV	

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AC Voltage Measuring Equipment Field calibrations Available ^{Note 4}		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 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 50 kHz to 100 kHz 1 kV to 2 kV 20 Hz to 100 Hz 100 Hz to 400 Hz 20 Hz to 100 Hz 2 kV to 20 kV 60 Hz 0.098 % + 2.0 V 0.47 % + 4.0 V 0.25 % + 20 V 20 kV to 85 kV 60 Hz 0.95 % 0 mV to 2.2 mV 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 Hz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz 2.2 mV to 22 mV 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 Hz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.024 % + 2.0 mV 0.041 % + 2.0 mV 0.14 % + 2.0 mV 0.46 % + 10 mV 1.7 % + 10 mV 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 0.17 % + 4.5 μ V 0.10 % + 4.5 μ V 0.078 % + 4.5 μ V 0.13 % + 4.5 μ V 0.19 % + 7 μ V 0.34 % + 13 μ V 0.48 % + 25 μ V 0.62 % + 25 μ V 0.067 % + 5.0 μ V 0.036 % + 5.0 μ V 0.017 % + 5.0 μ V 0.044 % + 5.0 μ V 0.091 % + 7.0 μ V 0.13 % + 12 μ V 0.19 % + 25 μ V 0.37 % + 25 μ V	Vitrek 4600A Ross Voltage Divider Fluke 5700A

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
	22 mV to 220 mV	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 Hz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.057 % + 13 μ V 0.022 % + 8.0 μ V 0.011 % + 8.0 μ V 0.033 % + 8.0 μ V 0.086 % + 25 μ V 0.11 % + 25 μ V 0.17 % + 35 μ V 0.35 % + 80 μ V	
	220 mV to 2.2 V	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 Hz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.052 % + 80 μ V 0.017 % + 25 μ V 0.0077 % + 6.0 μ V 0.013 % + 16 μ V 0.026 % + 70 μ V 0.045 % + 0.13 mV 0.11 % + 0.35 mV 0.23 % + 0.85 mV	
	2.2 V to 22 V	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 Hz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.052 % + 0.80 mV 0.017 % + 0.25 mV 0.0077 % + 60 μ V 0.013 % + 0.16 mV 0.026 % + 0.35 mV 0.052 % + 1.5 mV 0.13 % + 4.3 mV 0.28 % + 8.5 mV	
	22 V to 220 V	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 Hz to 50 kHz 50 kHz to 100 kHz	0.052 % + 8.0 mV 0.017 % + 2.5 mV 0.0083 % + 0.80 mV 0.023 % + 3.5 mV 0.051 % + 8.0 mV	
	220 V to 750 V	30 kHz to 50 kHz 50 kHz to 100 kHz	0.061 % + 11 mV 0.23 % + 45 mV	Fluke5700A w/ 5725A

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
	220 V to 1 100 V	40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 30 kHz	0.011 % + 4.0 mV 0.017 % + 6.0 mV 0.061 % + 11 mV	
NVLAP Code 20/E10 LF CAPACITANCE Measure				
Field calibrations Available ^{Note 4}	1pF to 10 pF 10 pF to 100 pF 100 pF to 1 μ F 1 μ F to 100 μ F 100 μ F 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 1689-9700
Measure Equipment	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 μ F to 1.1 μ F 1.1 μ F to 3.3 μ F 3.3 μ F to 11 μ F 11 μ F to 33 μ F 33 μ F to 110 μ F 110 μ F to 330 μ F 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 % + 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 0.35 % + 78 nF 0.35 % + 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	Arco SS32 5520A
NVLAP Code: 20/E11 LF INDUCTANCE Measure				
Field calibrations Available ^{Note 4}	1 mH to 10 mH 10 mH to 10 H	1 kHz 1 kHz	0.04 % + 0.1 μ H 0.04 % + 1.4 μ H	GenRad 1689-9700

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
Measuring Equipment Field calibrations Available ^{Note 4}	100 mH	1 kHz	0.12 %	Standard Inductor
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

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

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	10 MHz	Uncertainty values of derivatives of 10 MHz will differ due to resolution, noise and gating errors. 5.8×10^{-10}	Rubidium
NVLAP Code: 20/F04 PULSE WAVEFORM Rise time (Generate) Field calibrations Available ^{Note 4}	≤ 300 ps	2.6 %	5520A SC1100
Total Harmonic Distortion (0 dB to -80 dB) Field calibrations Available ^{Note 4}	20 Hz to 100 kHz	1.2 %	Agilent 8903B
Total Harmonic Distortion (5 Hz to 600 kHz fundamental) Field calibrations Available ^{Note 4}	(Harmonic Range) 10 Hz to 1 MHz 1 MHz to 3 MHz	3.5 % 6.9 %	Agilent 334A
Input Voltage Range < 30 V 100 to 0.3 %			

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
Input Voltage Range > 30 V	10 Hz to 20 Hz	14 %	
	20 Hz to 30 Hz	6.9 %	
	0.03 kHz to 300 kHz	3.5 %	
	300 kHz to 500 kHz	6.9 %	
	0.5 MHz to 1.2 MHz	14 %	
	10 Hz to 20 Hz	14 %	
	20 Hz to 30 Hz	6.9 %	
	0.03 kHz to 300 kHz	3.5 %	
	0.5 Hz to 1.2 MHz	14 %	
	300 kHz to 500 kHz	6.9 %	
0.3 % to 100 %	0.01 kHz to 300 kHz	3.5 %	
	300 kHz to 500 kHz	6.9 %	
	0.5 MHz to 1.2 MHz	14 %	
	10 Hz to 20 Hz	14 %	
	20 Hz to 30 Hz	6.9 %	
MECHANICAL			
NVLAP Code: 20/M08 MASS Balances & Scales Field calibrations Available ^{Note 4}			Actual uncertainty will be between the lower limit of approximately 0.6 of the readability and the upper limit shown
(Readability)			
0.0001 mg	3 g to 1 kg	0.012 mg	ASTM Class 1 Weights
0.001 mg	3 g to 1 kg	0.047 mg	
0.01 mg	3 g to 1 kg	0.04 mg	
0.1 mg	3 g to 1 kg	0.4 mg	
0.001 g	3 g to 1 kg	11 mg	
≥ 0.001 g	2.2 lb to 300 lb	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 –CD VOLTAGE /CURRENT CONVERTERS Sinewave Flatness Field calibrations Available ^{Note 4}	10 Hz to 1 MHz	0.06 %	Thermal Converter/HP3458A

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	1 MHz to 10 MHz	0.10 %	
	10 MHz to 30 MHz	0.18 %	
	30 MHz to 50 M Hz	0.41 %	
	50 MHz to 80 MHz	0.71 %	
	80 MHz to 100 MHz	0.84 %	

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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	0.59 % + M 1.1 % + M 1.1 % + M 1.1 % + M 4.2 % + 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}	10 dB to 20 dB 0 dB to 10 dB -10 dB to 0 dB -20 dB to -10 dB	10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz 10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz 10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz 10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz	4.4 % 4.5 % 4.6 % 1.7 % 2.0 % 2.1 % 1.7 % 1.8 % 2.1 % 1.9 % 2.0 % 2.3 %	Agilent 438A w/8481A

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
	-20 dB to -30 dB	10 MHz to 4.2 GHz 4.2 GHz to 14 GHz 14 GHz to 18 GHz	1.9 % 2.0 % 2.3 %	

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THERMODYNAMIC			
NVLAP Code: 20/T02 HUMIDITY Measure Field calibrations Available ^{Note 4}	10 % to 90 %	2.1 %	Vaisala HMI31
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	0.014 °C + 0.001 % 0.019 °C + 0.001 % 0.024 °C + 0.001 %	Hart 5626 w/Black Stack
Measuring Equipment Field calibrations Available ^{Note 4}	-20 °C to 150 °C 150 °C to 400 °C	0.024 °C 0.18 °C	Hart 5626 w/Dry Well
NVLAP Code: 20/T05 PRESSURE Measuring Equipment Hydraulic	5 psig to 10 000 psig	0.03 %	Ametek T 150 Deadweight Tester
NVLAP Code: 20/T08 THERMOCOUPLE & PYROMETER INDICATORS Field calibrations Available ^{Note 4}	-250 °C to -100 °C -100 °C to -25 °C -25 °C to 350 °C 350 °C to 650 °C 650 °C to 1000 °C	0.39 °C 0.12 °C 0.11 °C 0.12 °C 0.16 °C	Fluke 5520A

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
TYPE J	-210 °C to -100 °C	0.21 °C	
	-100 °C to -30 °C	0.12 °C	
	-30 °C to 150 °C	0.11 °C	
	150 °C to 760 °C	0.13 °C	
	760 °C to 1200 °C	0.18 °C	
TYPE K	-200 °C to -100 °C	0.26 °C	
	-100 °C to -25 °C	0.14 °C	
	-25 °C to 120 °C	0.12 °C	
	120 °C to 1000 °C	0.20 °C	
	1000 °C to 1372 °C	0.31 °C	
TYPE T	-250 °C to -150 °C	0.49 °C	
	-150 °C to 0 °C	0.19 °C	
	0 °C to 120 °C	0.12 °C	
	120 °C to 400 °C	0.11 °C	
TYPE R	0 °C to 250 °C	0.44 °C	
	250 °C to 400 °C	0.27 °C	
	400 °C to 1000 °C	0.26 °C	
	1000 °C to 1767 °C	0.31 °C	
TYPE S	0 °C to 250 °C	0.36 °C	
	250 °C to 1000 °C	0.28 °C	
	1000 °C to 1400 °C	0.29 °C	
	1400 °C to 1767 °C	0.36 °C	
TYPE N	-200 °C to -100 °C	0.31 °C	
	-100 °C to -25 °C	0.17 °C	
	-25 °C to 120 °C	0.15 °C	
	120 °C to 410 °C	0.14 °C	
	410 °C to 1300 °C	0.21 °C	

END

2012-10-01 through 2013-09-30
Effective dates

For the National Institute of Standards and Technology



National Voluntary Laboratory Accreditation Program



CALIBRATION LABORATORIES

NVLAP LAB CODE 200915-0

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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