National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200976-0**

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Transcat – Phoenix	**Fields of Calibration**
8240 S. Kyrene Road Suite 107 Tempe, AZ 85284 Mr. Michael Sublett Phone: 800-828-1470 Fax: 800-395-0543 E-mail: msublett@transcat.com URL: http://www.transcat.com	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			
LENGTH and DIAMETER (20/D05)			
Micrometers – Outside, Inside, Depth Field calibrations available Note 4	0.05 in to 0.4 in 0.4 to 40 in	27 µin 19 µin/in + 10 µin	Comparison to Gage Blocks
Calipers – Outside, Inside, Depth Field calibrations available Note 4	0.05 in to 0.4 in 0.4 to 40 in	60 µin 19 µin/in + 60 µin	Comparison to Gage Blocks
Anvil Flatness Field calibrations available Note 4	0 in to 1 in	4.7 µin	Optical Flats
Dial Indicators Field calibrations available Note 4	0.01 in to 0.4 in 0.45 in to 3.0 in	7 µin 5.3 µin/in + 17 µin	Gage Blocks with Surface Plate
Height Measuring Equipment	0.01 in to 8 in 8 in to 40 in	3.4 µin/in + 17 µin 4.3 µin/in + 15 µin	Gage Blocks with Surface Plate
Height Measure	0.01 in to 6 in 6 in to 12 in	2.6 µin/in + 24 µin 4.4 µin/in + 14 µin	Gage Blocks with Surface Plate

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200976-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3	Remarks
Length Measurement – Single Axis	0 in to 10 in	8.0 µin/in + 21 µin	Super Micrometer and Gage Blocks
Outside Diameter – Cylindrical Gages	0.01 in to 2 in	20 µin	Super Micrometer
THREADED PLUG and RING GAGES (20/D14)			
Thread Plugs			
Outer Pitch Diameter	0 in to 2 in	76 µin	Comparator and Thread Wires
Major Diameter	0 in to 2 in	20 µin	Super Micrometer

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				
VOLTAGE/ CURRENT CONVERTER (20/E01)				
Sine Wave Flatness Field calibrations available Note 4 (0.3 V to 1 V, 50 Ω)		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	0.073 % 0.14 % 0.39 % 0.79 % 1.6 % 2.4 %	Agilent 11050A
(1 V to 3 V, 50 Ω)		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	0.071 % 0.11 % 0.21 % 0.47 % 0.96 % 1.3 %	Agilent 11049A
AC RESISTORS and CURRENT (20/E02)				
AC Current – Measuring Equipment Field calibrations available Note 4	0 µA to 220 µA	10 Hz to 20 Hz 20 Hz to 40 Hz	0.030 % + 16 nA 0.019 % + 10 nA	Fluke 5700A-EP

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
		40 Hz to 1 kHz	0.015 % + 8 nA	
		1 kHz to 5 kHz	0.030 % + 12 nA	
		5 kHz to 10 kHz	0.11 % + 65 nA	
	0.22 mA to 2.2 mA	10 Hz to 20 Hz	0.030 % + 40 nA	
		20 Hz to 40 Hz	0.018 % + 35 nA	
		40 Hz to 1 kHz	0.013 % + 35 nA	
		1 kHz to 5 kHz	0.021 % + 110 nA	
		5 kHz to 10 kHz	0.11 % + 650 nA	
	2.2 mA to 22 mA	10 Hz to 20 Hz	0.039 % + 400 nA	
		20 Hz to 40 Hz	0.019 % + 350 nA	
		40 Hz to 1 kHz	0.014 % + 350 nA	
		1 kHz to 5 kHz	0.021 % + 550 nA	
		5 kHz to 10 kHz	0.11 % + 5 µA	
	22 mA to 220 mA	10 Hz to 20 Hz	0.033 % + 4 µA	
		20 Hz to 40 Hz	0.018 % + 3.5 µA	
		40 Hz to 1 kHz	0.014 % + 2.5 µA	
		1 kHz to 5 kHz	0.021 % + 3.5 µA	
		5 kHz to 10 kHz	0.11 % + 10 µA	
	0.22 A to 2.2 A	20 Hz to 1 kHz	0.027 % + 35 µA	
		1 kHz to 5 kHz	0.046 % + 80 µA	
		5 kHz to 10 kHz	0.70 % + 160 µA	
	2.2 A to 11 A	40 Hz to 1 kHz	0.050 % + 170 µA	Fluke 5700A-EP with 5725A
		1 kHz to 5 kHz	0.097 % + 380 µA	
		5 kHz to 10 kHz	0.36 % + 750 µA	
	11 A to 20.5 A	45 Hz to 100 Hz	0.095 % + 3.3 mA	Fluke 5520A
		100 Hz to 5 kHz	0.12 % + 3.3 mA	
		1 kHz to 5 kHz	2.3 % + 3.3 mA	
Extended Frequency Ranges Field calibrations available Note 4	29 µA to 330 µA	10 kHz to 30 kHz	1.2 % + 0.31 µA	Fluke 5520A
	330 µA to 3.3 mA	10 kHz to 30 kHz	0.78 % + 0.47 µA	
	3.3 mA to 29 mA	10 kHz to 30 kHz	0.31 % + 3.1 µA	

2015-04-01 through 2016-03-31
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For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200976-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
Clamp-on Ammeter Toroidal Type Field calibrations available Note 4	29 mA to 330 mA	10 kHz to 30 kHz	0.31 % + 0.16 mA	Fluke 5520A with 5500A/Coil
	20 A to 150 A	45 Hz to 65 Hz	0.34 % + 30 mA	
		65 Hz to 440 Hz	0.95 % + 50 mA	
	150 A to 1000 A	45 Hz to 65 Hz	0.38 % + 0.13 A	
		65 Hz to 440 Hz	1.2 % + 0.23 A	
Clamp-on Ammeter Non-Toroidal Type Field calibrations available Note 4	20 A to 150 A	45 Hz to 65 Hz	0.57 % + 0.29 A	Fluke 5520A with 5500A/Coil
		65 Hz to 440 Hz	1.0 % + 0.29 A	
	150 A to 1000 A	45 Hz to 65 Hz	0.60 % + 1 A	
		65 Hz to 440 Hz	1.3 % + 1.1 A	
AC Current – Measure Field calibrations available Note 4	0 µA to 100 µA	10 Hz to 20 Hz	0.5 % + 35 nA	Agilent 3458A opt 2
		20 Hz to 45 Hz	0.17 % + 35 nA	
		45 Hz to 100 Hz	0.072 % + 35 nA	
		100 Hz to 5 kHz	0.072 % + 35 nA	
	100 µA to 1 mA	10 Hz to 20 Hz	0.46 % + 230 nA	
		20 Hz to 45 Hz	0.17 % + 230 nA	
		45 Hz to 100 Hz	0.071 % + 230 nA	
		100 Hz to 5 kHz	0.038 % + 230 nA	
	1 mA to 10 mA	10 Hz to 20 Hz	0.46 % + 2.3 µA	
		20 Hz to 45 Hz	0.17 % + 2.3 µA	
		45 Hz to 100 Hz	0.071 % + 2.3 µA	
		100 Hz to 5 kHz	0.038 % + 2.3 µA	
	10 mA to 100 mA	10 Hz to 20 Hz	0.46 % + 23 µA	
		20 Hz to 45 Hz	0.17 % + 23 µA	
		45 Hz to 100 Hz	0.071 % + 23 µA	
		100 Hz to 5 kHz	0.037 % + 23 µA	
	100 mA to 1 A	10 Hz to 20 Hz	0.46 % + 230 µA	
		20 Hz to 45 Hz	0.19 % + 230 µA	
		45 Hz to 100 Hz	0.097 % + 230 µA	
		100 Hz to 5 kHz	0.12 % + 230 µA	

2015-04-01 through 2016-03-31
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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
	1 A to 20 A	50 Hz to 100 Hz 100 Hz to 300 Hz 300 Hz to 1 kHz 1 kHz to 3 kHz 3 kHz to 4 kHz 4 kHz to 5 kHz	0.023 % + 640 µA 0.025 % + 220 µA 0.034 % + 280 µA 0.06 % + 540 µA 0.075 % + 1.4 mA 0.09 % + 2.2 mA	Fluke Y5020 with Agilent 3458A opt 2

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty (k=2) Note 3,5	Remarks
DC RESISTANCE and CURRENT (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 10 kΩ to 100 kΩ 100 kΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1 GΩ 1 GΩ to 10 GΩ 10 GΩ to 100 GΩ 100 GΩ to 1 TΩ	18 µΩ/Ω + 58 µΩ 15 µΩ/Ω + 0.58 mΩ 12 µΩ/Ω + 0.58 mΩ 12 µΩ/Ω + 5.8 mΩ 12 µΩ/Ω + 58 mΩ 19 µΩ/Ω + 2.3 Ω 62 µΩ/Ω + 0.12 kΩ 0.059 % + 1.2 kΩ 0.012 + 32 kΩ 0.012 + 480 kΩ 0.012 + 62 MΩ 0.016 + 15 GΩ	Agilent 3458A with Decade Resistor Extended Arm Bridge
DC Resistance – Measuring Equipment Field calibrations available Note 4	0.1 mΩ 1 mΩ 10 mΩ 100 mΩ	0.047 % 0.046 % 36 µΩ/Ω 67 µΩ/Ω	Fixed Resistor
DC Current – Measuring Equipment and 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	26 µA/A + 5.8 nA 26 µA/A + 5.0 nA 26 µA/A + 58 nA 46 µA/A + 0.58 µA 130 µA/A + 12 µA	Agilent 3458A with Current Source

2015-04-01 through 2016-03-31
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CALIBRATION LABORATORIES **NVLAP LAB CODE 200976-0**

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
DC Current – Measure	1 A to 20 A 20 A to 100 A	36 µA/A 0.046 %	Fluke Y5020 with Agilent 3458A opt 2
DC Current – Measuring Equipment Field calibrations available Note 4	220 mA to 2.2 A 2.2 A to 11 A 11 A to 20.5 A	86 µA/A + 12 µA 0.036 % + 480 µA 0.078 % + 580 µA	Fluke 5700A-EP Fluke 5700A-EP with 5725A Fluke 5520A
Clamp-on Ammeter Non-Toroidal Type Field calibrations available Note 4	20 A to 150 A 150 A to 1000 A	0.53 % + 0.17 A 0.52 % + 0.58 A	Fluke 5520A with 5500A/Coil
DC VOLTAGE (20/E06)			
DC Voltage – Measure Equipment Field calibrations available Note 4	0 V 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 1100 V	8.6 µV/V + 0.4 µV 5.4 µV/V + 0.7 µV 4 µV/V + 2.5 µV 4 µV/V + 4 µV 5.8 µV/V + 40 µV 7.6 µA/V + 400 µV	Fluke 5700A-EP Fluke 5700A-EP w/5725A
DC Voltage – Measure	0 mV to 100 mV 100 mV to 10 V 10 V to 100 V 100 V to 500 V 500 V to 800 V 800 V to 1000 V	7.1 µV/V + 0.5 µV 5.0 µV/V + 0.5 µV 7.6 µV/V + 35 µV 11 µV/V + 120 µV 17 µV/V + 120 µV 21 µV/V + 120 µV	Agilent 3458A opt 2
DC High Voltage – Measure and Measuring Equipment	1 kV to 2 kV 2 kV to 20 kV	0.051 % + 0.46 V 0.049 % + 4.6 V	Vitrek 4600A w/HV Source Vitrek 4640A w/HV Source

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (*k*=2) Note 3,5	Remarks
LF AC VOLTAGE (20/E09)				
AC High Voltage – Measure Field calibrations available Note 4	700 V to 2 kV	20 Hz to 100 Hz 100 Hz to 400 Hz	0.083 % + 2.3 V 0.47 % + 4.6 V	Vitrek 4600

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200976-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
	2 kV to 20 kV	20 Hz to 100 Hz	0.28 % + 23 V	
AC Voltage – Measure Field calibrations available Note 4	0 mV to 10 mV	1 Hz to 40 Hz	0.036 % + 3.5 µV	Agilent 3458A opt 2
		40 Hz to 1 kHz	0.024 % + 1.3 µV	
		1 kHz to 20 kHz	0.038 % + 1.3 µV	
		20 kHz to 50 kHz	0.12 % + 1.3 µV	
		50 kHz to 100 kHz	0.58 % + 1.3 µV	
		100 kHz to 300 kHz	4.6 % + 2.3 µV	
	10 mV to 100 mV	1 Hz to 40 Hz	0.013 % + 5.1 µV	
		40 Hz to 1 kHz	0.0094 % + 2.3 µV	
		1 kHz to 20 kHz	0.017 % + 2.3 µV	
		20 kHz to 50 kHz	0.037 % + 2.3 µV	
		50 kHz to 100 kHz	0.093 % + 2.3 µV	
		100 kHz to 300 kHz	0.36 % + 12 µV	
		300 kHz to 1 MHz	1.2 % + 12 µV	
		1 MHz to 2 MHz	1.8 % + 12 µV	
	100 mV to 1 V	1 Hz to 40 Hz	0.0098 % + 46 µV	
		40 Hz to 1 kHz	0.0094 % + 23 µV	
		1 kHz to 20 kHz	0.017 % + 23 µV	
		20 kHz to 50 kHz	0.036 % + 23 µV	
		50 kHz to 100 kHz	0.093 % + 23 µV	
		100 kHz to 300 kHz	0.35 % + 120 µV	
		300 kHz to 1 MHz	1.2 % + 120 µV	
	1 V to 10 V	1 Hz to 40 Hz	0.0095 % + 0.46 mV	
		40 Hz to 1 kHz	0.0095 % + 0.23 mV	
		1 kHz to 20 kHz	0.017 % + 0.230 mV	
		20 kHz to 50 kHz	0.036 % + 0.230 mV	
		50 kHz to 100 kHz	0.093 % + 0.23 mV	
		100 kHz to 300 kHz	0.35 % + 1.2 mV	
		300 kHz to 1 MHz	1.2 % + 1.2 mV	
		1 MHz to 2 MHz	1.7 % + 1.2 mV	
	10 V to 100 V	1 Hz to 40 Hz	0.024 % + 4.6 mV	

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
AC Voltage – Measuring Equipment Field calibrations available Note 4	100 V to 700 V	40 Hz to 1 kHz	0.024 % + 2.3 mV	Fluke 5700A-EP
		1 kHz to 20 kHz	0.024 % + 2.3 mV	
		20 kHz to 50 kHz	0.041 % + 2.3 mV	
		50 kHz to 100 kHz	0.14 % + 2.3 mV	
		100 kHz to 300 kHz	0.46 % + 12 mV	
		300 kHz to 1 MHz	1.7 % + 12 mV	
		1 Hz to 40 Hz	0.047 % + 46 mV	
		40 Hz to 1 kHz	0.047 % + 23 mV	
		1 kHz to 20 kHz	0.071 % + 23 mV	
		20 kHz to 50 kHz	0.14 % + 23 mV	
		50 kHz to 100 kHz	0.35 % + 23 mV	
	0 mV to 2.2 mV	10 Hz to 20 Hz	0.17 % + 4 µV	
		20 Hz to 40 Hz	0.17 % + 4 µV	
		40 Hz to 20 kHz	0.1 % + 4 µV	
		20 kHz to 50 kHz	0.12 % + 4 µV	
		50 kHz to 100 kHz	0.17 % + 5 µV	
		100 kHz to 300 kHz	0.33 % + 10 µV	
		300 kHz to 500 kHz	0.47 % + 20 µV	
		500 kHz to 1 MHz	0.58 % + 20 µV	
	2.2 mV to 22 mV	10 Hz to 20 Hz	0.044 % + 4 µV	
		20 Hz to 40 Hz	0.035 % + 4 µV	
		40 Hz to 20 kHz	0.02 % + 4 µV	
		20 kHz to 50 kHz	0.031 % + 4 µV	
		50 kHz to 100 kHz	0.059 % + 5 µV	
		100 kHz to 300 kHz	0.12 % + 10 µV	
		300 kHz to 500 kHz	0.16 % + 20 µV	
		500 kHz to 1 MHz	0.3 % + 20 µV	
	22 mV to 220 mV	10 Hz to 20 Hz	0.028 % + 12 µV	
		20 Hz to 40 Hz	0.017 % + 7 µV	
		40 Hz to 20 kHz	0.01 % + 7 µV	
		20 kHz to 50 kHz	0.021 % + 7 µV	
		50 kHz to 100 kHz	0.047 % + 17 µV	

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
		100 kHz to 300 kHz	0.092 % + 20 µV	
		300 kHz to 500 kHz	0.14 % + 25 µV	
		500 kHz to 1 MHz	0.28 % + 45 µV	
	220 mV to 2.2 V	10 Hz to 20 Hz	0.028 % + 40 µV	
		20 Hz to 40 Hz	0.016 % + 15 µV	
		40 Hz to 20 kHz	0.0063 % + 8 µV	
		20 kHz to 50 kHz	0.0081 % + 10 µV	
		50 kHz to 100 kHz	0.012 % + 30 µV	
		100 kHz to 300 kHz	0.043 % + 80 µV	
		300 kHz to 500 kHz	0.1 % + 200 µV	
		500 kHz to 1 MHz	0.18 % + 300 µV	
	2.2 V to 22 V	10 Hz to 20 Hz	0.028 % + 0.4 mV	
		20 Hz to 40 Hz	0.016 % + 0.15 mV	
		40 Hz to 20 kHz	0.0049 % + 50 µV	
		20 kHz to 50 kHz	0.0083 % + 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	0.1 % + 2 mV	
		500 kHz to 1 MHz	0.17 % + 3.2 mV	
	22 V to 220 V	10 Hz to 20 Hz	0.028 % + 4 mV	
		20 Hz to 40 Hz	0.016 % + 1.5 mV	
		40 Hz to 20 kHz	0.0069 % + 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	0.09 % + 16 mV	
		300 kHz to 500 kHz	0.44 % + 40 mV	
		500 kHz to 1 MHz	0.8 % + 80 mV	
	220 V to 1100 V	40 Hz to 1 kHz	0.011 % + 4 mV	Fluke 5700A-EP/5725A
		1 kHz to 20 kHz	0.017 % + 6 mV	
		20 kHz to 30 kHz	0.061 % + 11 mV	
	220 V to 750 V	30 kHz to 50 kHz	0.06 % + 11 mV	

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
		50 kHz to 100 kHz	0.23 % + 45 mV	
LF CAPACITANCE (20/E10)				
Capacitance – Measuring Equipment Field calibrations available Note 4	0.19 nF to < 1.1 nF	10 Hz to 10 kHz	0.39 % + 7.8 pF	Fluke 5520A
	1.1 nF to < 3.3 nF	10 Hz to 3 kHz	0.39 % + 7.8 pF	
	3.3 nF to < 11 nF	10 Hz to 1 kHz	0.21 % + 7.8 pF	
	11 nF to < 110 nF	10 Hz to 1 kHz	0.21 % + 78 pF	
	110 nF to < 330 nF	10 Hz to 1 kHz	0.21 % + 0.23 nF	
	0.33 µF to < 1.1 µF	10 Hz to 600 Hz	0.21 % + 0.78 nF	
	1.1 µF to < 3.3 µF	10 Hz to 300 Hz	0.21 % + 2.3 nF	
	3.3 µF to < 11 µF	10 Hz to 150 Hz	0.21 % + 7.8 nF	
	11 µF to < 33 µF	10 Hz to 120 Hz	0.32 % + 23 nF	
	33 µF to < 110 µF	10 Hz to 80 Hz	0.36 % + 78 nF	
	110 µF to < 330 µF	DC to 50 Hz	0.36 % + 0.23 µF	
	0.33 mF to < 1.1 mF	DC to 20 Hz	0.35 % + 0.78 µF	
	1.1 mF to < 3.3 mF	DC to 6 Hz	0.35 % + 2.3 µF	
	3.3 mF to < 11 mF	DC to 2 Hz	0.35 % + 7.8 µF	
	11 mF to < 33 mF	DC to 0.6 Hz	0.58 % + 23 µF	
	33 mF to < 110 mF	DC to 0.2 Hz	0.85 % + 78 µF	
LF POWER/ENERGY (20/E12)				
Power – Measuring Equipment DC Power				
0.33 mA to 330 mA	11 µW to 1.1 mW	DC	0.024 %	Fluke 5520A
	1.1 mW to 110 mW	DC	0.027 %	
	0.11W to 110 W	DC	0.024 %	
	110 W to 330 W	DC	0.018 %	
0.33 A to 3 A	11 W to 110 mW	DC	0.044 %	
	0.11 W to 990 W	DC	0.053 %	
	1 W to 3 kW	DC	0.0096 %	
3 A to 20.5 A	0.099 W to 0.99 W	DC	0.088 %	
	0.99 W to 6.8 kW	DC	0.07 %	
	6.8 W to 20.5 kW	DC	0.04 %	

2015-04-01 through 2016-03-31
Effective dates

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AC Power Note 8 (PF = 1)				
3.3 mA to 9 mA	0.11 mW to 3 mW	10 Hz to 65 Hz	0.13 %	
	3 mW to 9 W	10 Hz to 65 Hz	0.077 %	
9 mA to 33 mA	0.3 mW to 10 mW	10 Hz to 65 Hz	0.089 %	
	10 mW to 33 W	10 Hz to 65 Hz	0.077 %	
33 mA to 90 mA	1 mW to 30 mW	10 Hz to 65 Hz	0.071 %	
	30 mW to 90 W	10 Hz to 65 Hz	0.057 %	
90 mA to 330 mA	3.0 mW to 100 mW	10 Hz to 65 Hz	0.089 %	
	100 mW to 300 W	10 Hz to 65 Hz	0.078 %	
0.33 A to 0.9 A	11 mW to 300 mW	10 Hz to 65 Hz	0.071 %	
	300 mW to 900 W	10 Hz to 65 Hz	0.081 %	
0.9 A to 2.2 A	30 mW to 720 mW	10 Hz to 65 Hz	0.089 %	
	720 mW to 2 kW	10 Hz to 65 Hz	0.079 %	
2.2 A to 4.5 A	80 mW to 1.4 W	10 Hz to 65 Hz	0.088 %	
	1.4 W to 4.5 kW	10 Hz to 65 Hz	0.18 %	
4.5 A to 20.5 A	150 mW to 6.7 W	10 Hz to 65 Hz	0.17 %	
	6.7 W to 20 kW	10 Hz to 65 Hz	0.17 %	
PHASE METERS (20/E15)				
Phase Meters – Measure Equipment Field calibrations available Note 4	0° to 179.99°	10 Hz to 65 Hz	0.11°	Fluke 5520A
		65 Hz to 500 Hz	0.20°	
		500 Hz to 1 kHz	0.40°	
		1 kHz to 5 kHz	1.9°	
		5 kHz to 10 kHz	3.9°	
		10 kHz to 30 kHz	7.8°	

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Effective dates

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TIME and FREQUENCY				
FREQUENCY DISSEMINATION (20/F01)				
Frequency – Source and Measure		Uncertainty values of derivatives of 10 MHz will differ due to resolution, noise, and gating errors		
In-Lab	10 MHz		3.7×10^{-12}	Fluke 910R
Field Note 4	10 MHz		3.8×10^{-9}	Agilent 8648C
OSCILLATOR CHARACTERIZATION (20/F03)				
Total Harmonic Distortion	0.01 % to 100 %	20 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	13 % 21 % 37 %	Agilent 339A

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty (k=2) Note 3,5	Remarks
PULSE WAVEFORM (20/F04)			
Rise Time – Generate Field calibrations available Note 4	250 ps nominal	51 ps Note 9	Fluke 5520A SC1100
Rise Time – Measure	≥ 800 ps	0.13 % + 170 ps	Tektronix TDS 510A
MECHANICAL			
FORCE (20/M06) Force Measuring Equipment – Tension and Compression	1 lbf to 50 lbf 50 lbf to 250 lbf 1 gf to 4 kgf	0.013 % 0.0044 % + 0.0065 lbf 0.013 %	Dead Weight
TORQUE (20/M15)			
Torque – Measure Field calibrations available Note 4	20 ozf-in to 600 lbf-ft	0.65 %	Torque Calibrator
WEIGHING INSTRUMENTS (20/M16)			
Balances - Metric	2 kg	6 mg	Class S Weights

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200976-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
Field calibrations available Note 4	1 kg 500 g 200 g 100 g 50 g 20 g 10 g 5 g 2 g 1 g	3 mg 1.4 mg 0.6 mg 0.3 mg 150 µg 88 µg 59 µg 40 µg 40 µg 40 µg	
Balances - Avoirdupois	1 lb to 400 lb	0.012 %	NIST Class F Weights
THERMODYNAMIC			
LABORATORY THERMOMETERS (20/T03)			
Temperature – Measuring Equipment Field calibrations available Note 4	0°C to 100 °C	0.023 °C	Hart 5628 w/Dry Block
Temperature – Measure Field calibrations available Note 4	-195°C to 0 °C 0°C to 420 °C 420°C to 600 °C	0.012 °C 0.026 °C 0.036 °C	Hart 5628
PRESSURE (20/T05)			
Absolute Pressure – Source (Pneumatic)	0 psia to 25 psia 25 psia to 500 psia	0.0019 psia 0.0065 % + 0.001 psia	Ruska 7250xi
Gage Pressure – Source (Pneumatic) Field calibrations available Note 4	-15 psig to 25 psig 25 psig to 500 psig	0.0017 psig 0.0065 %	Ruska 7250xi
Gage Pressure – Source (Hydraulic) Field calibrations available Note 4	0 psig to 1500 psig 1500 psig to 15 000 psig	0.36 psi 0.023 %	Fluke RPM4-E-DWT

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200976-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
RADIATION THERMOMETRY (20/T06)			
Infrared Temperature – Measuring Equipment	-15 to 0 C	0.79 °C	Fluke Black Body
	0 to 50 C	0.54 °C	
	50 to 100 C	0.67 °C	
	100 to 120 C	0.74 °C	
	120 to 200 C	0.95 °C	
	200 to 350 C	1.7 °C	
	350 to 500 C	2.2 °C	
THERMOCOUPLES (20/T08)			
Electrical Calibration of Thermocouple Devices Field calibrations available Note 4			
E	-250 to -100	0.39 °C	Fluke 5520A
	-100 to -25	0.12 °C	
	-25 to 350	0.11 °C	
	350 to 650	0.12 °C	
	650 to 1000	0.16 °C	
J	-210 to -100	0.21 °C	
	-100 to -30	0.13 °C	
	-30 to 150	0.11 °C	
	150 to 760	0.13 °C	
	760 to 1200	0.18 °C	
K	-200 to -100	0.26 °C	
	-100 to 25	0.14 °C	
	-25 to 120	0.13 °C	
	120 to 1000	0.20 °C	
	1000 to 1372	0.31 °C	
T	-250 to -150	0.49 °C	
	-150 to 0	0.19 °C	
	0 to 120	0.13 °C	
	120 to 400	0.11 °C	

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

CALIBRATION LABORATORIES **NVLAP LAB CODE 200976-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) [Note 3,5]	Remarks
R	0 to 250	0.44 °C	
	250 to 400	0.27 °C	
	400 to 1000	0.26 °C	
	1000 to 1767	0.31 °C	
S	0 to 250	0.37 °C	
	250 to 1000	0.28 °C	
	1000 to 1400	0.29 °C	
	1400 to 1767	0.36 °C	
N	-200 to -100	0.31 °C	
	-100 to -25	0.17 °C	
	-25 to 120	0.15 °C	
	120 to 410	0.14 °C	
	410 to 1300	0.21 °C	
END			

2015-04-01 through 2016-03-31
Effective dates

For the National Institute of Standards and Technology

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 with a level of confidence of approximately 95 %, typically using a coverage factor of $k = 2$. However, laboratories may report a coverage factor different than $k = 2$ to achieve the 95 % level of confidence. 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.

2015-04-01 through 2016-03-31

Effective dates

For the National Institute of Standards and Technology

Notes
Note 8: The uncertainties shown are for the most favorable conditions. There is an increase in uncertainty that corresponds to the laboratory's AC voltage and current uncertainties at different frequencies other than the ones shown. Power factors (PF) other than the one shown contribute to the power uncertainty. PF is related to the cosine of phase. Therefore, uncertainties track the laboratory's phase uncertainty closely at PF near one, but are magnified heavily as PF approaches zero. The lab may also report reactive power, apparent power, and power factor under this accreditation. If needed, contact laboratory for more information regarding uncertainties at frequency and power factor combinations other than the ones shown. **Note 9:** The stated uncertainty is the laboratory's ability to source a fast rise pulse that is approximately 250 ps. In the typical application of measuring rise time of an oscilloscope, this value is one of the contributing factors, but other factors are derived from the DUT.

2015-04-01 through 2016-03-31

Effective dates

For the National Institute of Standards and Technology