National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200995-0**

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Transcat – Nashville	**Parameter(s) of Accreditation**
201 Space Park North Drive Goodlettsville, TN 37072 Mr. Brian Samuelson Phone: 615-859-4807 Fax: 615-859-4848 E-mail: bsamuelson@transcat.com URL: 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. (20/A01)

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	**Range**	**Uncertainty (*k*=2)** Note 3,5	**Remarks**
DIMENSIONAL			
LENGTH & DIAMETER; STEP GAGES (20/D05)			
Micrometers & Calipers – Outside, Inside, Depth Field calibrations Available Note 4	0 in to 0.05 in 0.05 in to 0.45 in 0.45 in to 1.0 in 1.0 in to 4.0 in 4.0 in to 40 in	8 µin 8.0 µin/in + 6 µin 12 µin/in + 5 µin 15 µin/in + 2 µin 15 µin/in + 1 µin	Comparison to Gage Blocks
Anvil Flatness Field calibrations Available Note 4	0 in to 1 in	4.4 µin	Optical Flats
Anvil Parallelism Field calibrations Available Note 4	0 in to 1 in	7.2 µin	Optical Parallels
Height Gages, Digital & Dial Indicators Field calibrations Available Note 4	0 in to 0.45 in 0.45 in to 1.0 in 1.0 in to 4.0 in 4.0 in to 24 in	2.0 µin/in + 31 µin 5.0 µin/in + 30 µin 13 µin/in + 22 µin 15 µin/in + 6 µin	Comparison to Gage Blocks
Length, Single Axis – Outside	0 in to 10 in	3 µin/in + 13 µin	Horizontal Comparator

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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
Height Measure	0 in to 0.50 in 0.50 in to 2.0 in 2.0 in to 4.0 in	53 µin 55 µin 10 µin/in + 41 µin	Indirect Comparison to Gage Blocks
SURFACE TEXTURE (20/D12)			
Flatness, Straightness and Parallelism	0 in to 18 in	120 µin	Gage Amplifier and Surface Plate
THREADED PLUG & RING GAGES (20/D14)			
Plug – Outer Pitch Diameter	0 in to 6.0 in	120 µin	Supermicrometer with Thread Wires
Major Diameter	0.05 in to 0.10 in 0.10 in to 0.45 in 0.45 in to 1.0 in 1.0 in to 6.0 in	15 µin 5.0 µin/in + 14 µin 10 µin/in + 12 µin 15 µin/in + 6 µin	Supermicrometer

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				
AC RESISTORS (20/E02)				
ACI 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	0.031 % + 16 nA 0.019 % + 10 nA 0.015 % + 8 nA 0.030 % + 12 nA 0.11 % + 65 nA	Fluke 5700A
	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	0.030 % + 40 nA 0.018 % + 35 nA 0.013 % + 35 nA 0.021 % + 110 nA 0.11 % + 650 nA	

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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
	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	0.019 % + 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	Fluke 5700A with 5725A
		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	0.05 % + 170 µA	
		1 kHz to 5 kHz	0.097 % + 380 µA	
		5 kHz to 10 kHz	0.36 % + 750 µA	
	11 A to 20 A	45 Hz to 1 kHz	0.095 % + 2 mA	Fluke 5520A
		1 kHz to 5 kHz	2.3 % + 5 mA	
Extended Frequency Ranges Field calibrations Available [Note 4]	29 µA to 330 µA	10 kHz to 30 kHz	1.2 % + 0.30 µA	Fluke 5520A
	0.33 mA to 3.3 mA	10 kHz to 30 kHz	0.78 % + 0.50 µA	
	3.3 mA to 33 mA	10 kHz to 30 kHz	0.31 % + 3.0 µA	
	33 mA to 330 mA	10 kHz to 30 kHz	0.31 % + 0.16 mA	
Clamp-on Ammeter Toroidal Type Field calibrations Available [Note 4]	20 A to 150 A	45 Hz to 65 Hz	0.34 % + 26 mA	Fluke 5520A with 5500A/Coil
	20 A to 150 A	65 Hz to 440 Hz	0.95 % + 47 mA	
	150 A to 1000 A	45 Hz to 65 Hz	0.38 % + 0.12 A	
	150 A to 1000 A	65 Hz to 440 Hz	1.2 % + 0.22 A	
Clamp-on Ammeter Non-Toroidal Type Field calibrations Available [Note 4]	20 A to 150 A	45 Hz to 65 Hz	0.66 % + 0.25 A	Fluke 5520A with 5500A/Coil
	20 A to 150 A	65 Hz to 440 Hz	1.2 % + 0.25 A	
	150 A to 1000 A	45 Hz to 65 Hz	0.68 % + 0.90 A	

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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
	150 A to 1000 A	65 Hz to 440 Hz	1.4 % + 0.92 A	
AC Current – Measure Field calibrations Available [Note 4]	0 µA to 100 µA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz	0.46 % + 30 nA 0.17 % + 30 nA 0.072 % + 30 nA 0.072 % + 30 nA	Agilent 3458A opt 002
	100 µA 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 µA 0.17 % + 2 µA 0.071 % + 2 µA 0.038 % + 2 µA	
	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 µA 0.17 % + 20 µA 0.07 % + 20 µA 0.037 % + 20 µA	
	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 µA 0.19 % + 200 µA 0.097 % + 200 µA 0.12 % + 200 µA	
	1 A to 3 A	10 Hz to 5 kHz 5 kHz to 10 kHz	0.24 % + 0.10 mA 1.3 % + 0.10 mA	Fluke 8846A
	3 A to 10 A	10 Hz to 5 kHz	0.81 % + 0.4 mA	

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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**
DC RESISTANCE (20/E05)			
DC Resistance – Measuring Equipment and Measure Field calibrations Available [Note 4]	0 Ω to 10 Ω	18 μΩ/Ω + 50 μΩ	HP3458A w/Resistors
	10 Ω to 100 Ω	15 μΩ/Ω + 0.5 mΩ	
	100 Ω to 1 kΩ	12 μΩ/Ω + 0.5 mΩ	
	1 kΩ to 10 kΩ	12 μΩ/Ω + 5 mΩ	
	10 kΩ to 100 kΩ	12 μΩ/Ω + 50 mΩ	
	100 kΩ to 1 MΩ	19 μΩ/Ω + 2 Ω	
	1 MΩ to 10 MΩ	62 μΩ/Ω + 100 Ω	
	10 MΩ to 100 MΩ	0.059 % + 1 kΩ	
	100 MΩ to 1 GΩ	0.58 % + 10 kΩ	
Measuring Equipment Field calibrations Available Note 4	10 MΩ to 100 MΩ	0.08 %	IET HRRS-B-7-100k-5kV
	100 MΩ to 1 GΩ	0.24 %	
	1 GΩ to 10 GΩ	0.41 %	
	10 GΩ to 100 GΩ	0.84 %	
	100 GΩ to 1.0 TΩ	2.50 %	
DC Current – Measuring Equipment Field calibrations Available Note 4	200 nA to 220 μA	49 μA/A + 6.0 nA	Fluke 5700A/EP
	220 μA to 2.2 mA	49 μA/A + 6.0 nA	
	2.2 mA to 22 mA	49 μA/A + 80 nA	
	22 mA to 220 mA	66 μA/A + 0.80 μA	
	220 mA to 2.2 A	0.015 % + 23 μA	
	2.2 A to 11 A	0.036 % + 0.37 mA	Fluke 5700A/EP w/5725A
	11 A to 20.5 A	0.082 % + 0.58 mA	Fluke 5520A
DC Current – Measure Field calibrations Available Note 4	10 μA to 100 μA	26 μA/A + 0.80 nA	HP 3458A Opt 002
	100 μA to 1 mA	26 μA/A + 5.0 nA	
	1 mA to 10 mA	26 μA/A + 50 nA	
	10 mA to 100 mA	48 μA/A + 0.50 μA	
	100 mA to 1 A	0.013 % + 10 μA	
	1 A to 3 A	1.4 mA/A + 50 μA	Fluke 8846A
	3 A to 10 A	4.0 mA/A + 50 μA	

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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**
Clamp-on Ammeter Non-Toroidal Type Field calibrations available [Note 4]	20 A to 150 A 150 A to 1000 A	0.50 % + 0.14 A 0.51 % + 0.5 A	Fluke 5520A w/ 5500A/Coil
DC VOLTAGE (20/E06)			
DC Voltage – Measuring Equipment	0 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	8.6 µV/V + 0.6 µV 6.7 µV/V + 0.9 µV 6.7 µV/V + 3.1 µV 6.6 µV/V + 6.2 µV 8.2 µV/V + 78 µV	Fluke 5700A
	220 V to 1.1 kV	9.8 µV/V + 0.47 mV	Fluke 5700A/5725A
DC Voltage – Measure	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	7.1 µV/V + 0.5 µV 5.0 µV/V + 0.5 µV 5.1 µV/V + 0.5 µV 7.6 µV/V + 30 µV 11 µV/V + 100 µV 14 µV/V + 100 µV 21 µV/V + 100 µV	Agilent 3458A opt 002
	1 kV to 2 kV 2 kV to 20 kV	0.048 % + 0.4 V 0.048 % + 4 V	Vitrek 4600A

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

Measured Parameter or Device Calibrated	**Range**	**Frequency Range**	**Uncertainty (*k*=2)** [Note 3,5]	**Remarks**
LF AC VOLTAGE (20/E09)				
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	0.039 % + 3 µV 0.028 % + 1 µV 0.038 % + 1 µV 0.15 % + 1 µV 0.59 % + 1 µV	Agilent 3458A opt 002

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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
		100 kHz to 300 kHz	4.6 % + 2 µV	
	10 mV to 100 mV	1 Hz to 40 Hz	0.013 % + 4 µV	
		40 Hz to 1 kHz	0.0094 % + 2 µV	
		1 kHz to 20 kHz	0.017 % + 2 µV	
		20 kHz to 50 kHz	0.037 % + 2 µV	
		50 kHz to 100 kHz	0.093 % + 2 µV	
		100 kHz to 300 kHz	0.36 % + 10 µV	
		300 kHz to 1 MHz	1.1 % + 10 µV	
		1 MHz to 2 MHz	1.7 % + 10 µV	
	100 mV to 1 V	1 Hz to 40 Hz	0.0098 % + 40 µV	
		40 Hz to 1 kHz	0.0094 % + 20 µV	
		1 kHz to 20 kHz	0.017 % + 20 µV	
		20 kHz to 50 kHz	0.036 % + 20 µV	
		50 kHz to 100 kHz	0.093 % + 20 µV	
		100 kHz to 300 kHz	0.35 % + 100 µV	
		300 kHz to 1 MHz	1.2 % + 100 µV	
		1 MHz to 2 MHz	1.7 % + 100 µV	
	1 V to 10 V	1 Hz to 40 Hz	0.0095 % + 400 µV	
		40 Hz to 1 kHz	0.0095 % + 200 µV	
		1 kHz to 20 kHz	0.017 % + 200 µV	
		20 kHz to 50 kHz	0.036 % + 200 µV	
		50 kHz to 100 kHz	0.093 % + 200 µV	
		100 kHz to 300 kHz	0.35 % + 1 mV	
		300 kHz to 1 MHz	1.1 % + 1 mV	
		1 MHz to 2 MHz	1.4 % + 1 mV	
	10 V to 100 V	1 Hz to 40 Hz	0.024 % + 4 mV	
		40 Hz to 1 kHz	0.024 % + 2 mV	
		1 kHz to 20 kHz	0.024 % + 2 mV	
		20 kHz to 50 kHz	0.041 % + 2 mV	
		50 kHz to 100 kHz	0.14 % + 2 mV	
		100 kHz to 300 kHz	0.46 % + 10 mV	
		300 kHz to 1 MHz	1.7 % + 10 mV	

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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
	100 V to 700 V	1 Hz to 40 Hz	0.047 % + 40 mV	
		40 Hz to 1 kHz	0.047 % + 20 mV	
		1 kHz to 20 kHz	0.071 % + 20 mV	
		20 kHz to 50 kHz	0.14 % + 20 mV	
		50 kHz to 100 kHz	0.35 % + 20 mV	
	700 V to 2 kV	20 Hz to 100 Hz	0.098 % + 2 V	Vitrek 4600A
		100 Hz to 400 Hz	0.47 % + 4 V	
	2 kV to 20 kV	20 Hz to 100 Hz	0.25 % + 20 V	
AC Voltage – Measuring Equipment Field calibrations Available [Note 4]	0 mV to 2.2 mV	10 Hz to 20 Hz	0.16 % + 4 µV	Fluke 5700A
		20 Hz to 40 Hz	0.10 % + 4 µV	
		40 Hz to 20 kHz	0.077 % + 4 µV	
		20 kHz to 50 kHz	0.13 % + 4 µV	
		50 kHz to 100 kHz	0.18 % + 6 µV	
		100 kHz to 300 kHz	0.33 % + 12 µV	
		300 kHz to 500 kHz	0.47 % + 26 µV	
		500 kHz to 1 MHz	0.58 % + 31 µV	
	2.2 mV to 22 mV	10 Hz to 20 Hz	0.047 % + 5 µV	
		20 Hz to 40 Hz	0.035 % + 5 µV	
		40 Hz to 20 kHz	0.016 % + 5 µV	
		20 kHz to 50 kHz	0.040 % + 5 µV	
		50 kHz to 100 kHz	0.080 % + 6 µV	
		100 kHz to 300 kHz	0.12 % + 12 µV	
		300 kHz to 500 kHz	0.16 % + 23 µV	
		500 kHz to 1 MHz	0.40 % + 31 µV	
	22 mV to 220 mV	10 Hz to 20 Hz	0.049 % + 12 µV	
		20 Hz to 40 Hz	0.020 % +8 µV	
		40 Hz to 20 kHz	0.091 % + 8 µV	
		20 kHz to 50 kHz	0.029 % + 8 µV	
		50 kHz to 100 kHz	0.071 % + 23 µV	
		100 kHz to 300 kHz	0.087 % + 23 µV	
		300 kHz to 500 kHz	0.14 % + 31 µV	
		500 kHz to 1 MHz	0.29 % + 78 µV	

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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
	220 mV to 2.2 V	10 Hz to 20 Hz	0.049 % + 78 µV	
		20 Hz to 40 Hz	0.015 % + 23 µV	
		40 Hz to 20 kHz	0.0068 % + 6 µV	
		20 kHz to 50 kHz	0.011 % + 16 µV	
		50 kHz to 100 kHz	0.022 % + 62 µV	
		100 kHz to 300 kHz	0.039 % + 120 µV	
		300 kHz to 500 kHz	0.095 % + 310 µV	
		500 kHz to 1 MHz	0.20 % + 780 µV	
	2.2 V to 22 V	10 Hz to 20 Hz	0.049 % + 0.78 mV	
		20 Hz to 40 Hz	0.015 % + 0.23 mV	
		40 Hz to 20 kHz	0.0069 % + 0.05 mV	
		20 kHz to 50 kHz	0.011 % + 0.16 mV	
		50 kHz to 100 kHz	0.020 % + 0.2 mV	
		100 kHz to 300 kHz	0.048 % + 1.3 mV	
		300 kHz to 500 kHz	0.11 % + 3.9 mV	
		500 kHz to 1 MHz	0.25 % + 7.0 mV	
	22 V to 220 V	10 Hz to 20 Hz	0.048 % + 8 mV	
		20 Hz to 40 Hz	0.015 % + 2.3 mV	
		40 Hz to 20 kHz	0.0073 % + 0.8 mV	
		20 kHz to 50 kHz	0.020 % + 3.1 mV	
		50 kHz to 100 kHz	0.047 % + 8 mV	
		100 kHz to 300 kHz	0.12 % + 85 mV	
		300 kHz to 500 kHz	0.42 % + 85 mV	
		500 kHz to 1 MHz	1.0 % + 170 mV	
	220 V to 750 V	30 kHz to 50 kHz	0.047 % + 9 mV	Fluke 5700A with 5725A
		50 kHz to 100 kHz	0.18 % + 35 mV	
	220 V to 1100 V	40 Hz to 1 kHz	0.0094 % + 3 mV	
		1 kHz to 20 kHz	0.013 % + 5 mV	
		20 kHz to 30 kHz	0.047 % + 9 mV	

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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
LF CAPACITANCE (20/E10)				
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	0.20 % + 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	0.35 % + 78 nF	
	110 µF to 330 µF	DC to 50 Hz	0.37 % + 0.23 µF	
	0.33 mF to 1.1 mF	DC to 20 Hz	0.37 % + 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 %	
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 %	

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9 mA to 33 mA	0.3 mW to 10 mW 10 mW to 33 W	10 Hz to 65 Hz 10 Hz to 65 Hz	0.089 % 0.077 %	
33 mA to 90 mA	1 mW to 30 mW 30 mW to 90 W	10 Hz to 65 Hz 10 Hz to 65 Hz	0.071 % 0.057 %	
90 mA to 330 mA	3.0 mW to 100 mW 100 mW to 300 W	10 Hz to 65 Hz 10 Hz to 65 Hz	0.089 % 0.078 %	
0.33 A to 0.9 A	11 mW to 300 mW 300 mW to 900 W	10 Hz to 65 Hz 10 Hz to 65 Hz	0.071 % 0.081 %	
0.9 A to 2.2 A	30 mW to 720 mW 720 mW to 2 kW	10 Hz to 65 Hz 10 Hz to 65 Hz	0.089 % 0.079 %	
2.2 A to 4.5 A	80 mW to 1.4 W 1.4 W to 4.5 kW	10 Hz to 65 Hz 10 Hz to 65 Hz	0.088 % 0.18 %	
4.5 A to 20.5 A	150 mW to 6.7 W 6.7 W to 20 kW	10 Hz to 65 Hz 10 Hz to 65 Hz	0.17 % 0.17 %	
PHASE METERS (20/E15)				
Measuring Equipment Field calibrations Available [Note 4]	0° to 179.99°	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	0.11° 0.20° 0.40° 1.9° 3.9° 7.8°	Fluke 5520A

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) [Note 3,5]	Remarks
TIME AND FREQUENCY			
FREQUENCY DISSEMINATION (20/F01)			
Source and Measure [Note 9]	10 MHz	5.8×10^{-10}	Rubidium Standard
PULSE WAVEFORM (20/F04)			
Rise time (Generate) Field calibrations Available [Note 4]	≤ 300 ps	2.6 %	Fluke 5520A/SC1100

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

Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) [Note 3,5]	Remarks
MECHANICAL			
TORQUE (20/M15)			
Torque - Measure Field calibrations Available [Note 4]	15 ozf-in to 200 ozf-in 4 lbf-in to 250 lbf-ft 250 lbf-ft to 600 lbf-ft	1.0 % 1.0 % 1.0 %	C.D.I. 2000-5-02 C.D.I. 2000-400-02 C.D.I. 2000-12-02
WEIGHING INSTRUMENTS (20/M16)			
Balances & Scales [Note 10] (Range is 1 lb to 300 lb) Field calibrations Available [Note 4]	1 lbs 2 lbs 5 lbs 10 lbs 20 lbs	0.11 g 0.15 g 0.37 g 0.74 g 1.5 g	ASTM Class 4 Weights
ELECTROMAGNETICS – RF/MICROWAVE			
RF/MICROWAVE POWER (20/R17)			
Frequency Response Field calibrations available [Note 4]	50 kHz to 100 MHz 100 MHz to 300 MHz 300 MHz to 600 MHz 600 MHz to 1100 MHz	1.4 % + 78 µV 1.8 % + 78 µV 3.2 % + 78 µV 4.0 % + 78 µV	Fluke 5520A/SC1100

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CALIBRATION LABORATORIES **NVLAP LAB CODE 200995-0**

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

Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) [Note 3,5]	Remarks
THERMODYNAMIC			
LABORTORY THERMOMETERS (20/T03)			
Measure Field calibrations Available [Note 4]	-195 °C to 0 °C 0 °C to 420 °C 420 °C to 660 °C	0.012 °C + 0.001 % 0.026 °C + 0.001 % 0.036 °C + 0.001 %	Hart 5628 w/ Black Stack Hart 5628 w/Black Stack Hart 5628 w/Black Stack
PRESSURE (20/T05)			
Measure & Measuring Equipment - Gage mode	-12 psig to 0 psig 0 psig to 30 psig 30 psig to 100 psig 125 psig to 2500 psig 2500 psig to 15 000 psig	0.0070 % 0.027 psi 0.051 psi 0.0070 % 0.024 %	Ruska 7250xi Fluke 700P05 Fluke 700P06 Ruska 7250xi Fluke E-DWT
Absolute Mode	0 psia to 15 psia	0.0019 psi	Ruska 7250xi
TEMPERATURE INDICATORS (20/T08)			
Electrical Calibration of Thermocouple Devices Field calibrations Available [Note 4]			
Type J	-210 °C to -100 °C -100 °C to -30 °C -30 °C to 150 °C 150 °C to 760 °C 760 °C to 1200 °C	0.29 °C 0.19 °C 0.17 °C 0.19 °C 0.25 °C	Fluke 5520A
Type K	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.35 °C 0.21 °C 0.19 °C 0.28 °C 0.41 °C	
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	0.64 °C 0.26 °C 0.19 °C 0.17 °C	

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CALIBRATION LABORATORIES **NVLAP LAB CODE 200995-0**

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

Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) [Note 3,5]	Remarks
Type E	-250 °C to -100 °C	0.51 °C	
	-100 °C to -25 °C	0.19 °C	
	-25 °C to 350 °C	0.17 °C	
	350 °C to 650 °C	0.19 °C	
	650 °C to 1000 °C	0.23 °C	
Type R	0 °C to 250 °C	0.58 °C	
	250 °C to 400 °C	0.36 °C	
	400 °C to 1000 °C	0.35 °C	
	1000 °C to 1767 °C	0.47 °C	
Type S	0 °C to 250 °C	0.48 °C	
	250 °C to 1000 °C	0.37 °C	
	1000 °C to 1400 °C	0.38 °C	
	1400 °C to 1767°C	0.47 °C	
Type N	-200 °C to -100 °C	0.41 °C	
	-100 °C to -25 °C	0.24 °C	
	-25 °C to 120 °C	0.22 °C	
	120 °C to 410 °C	0.21 °C	
	410 °C to 1300 °C	0.29 °C	
Type B	600 °C to 800 °C	0.45 °C	
	800 °C to 1000 °C	0.35 °C	
	1000 °C to 1550 °C	0.32 °C	
	1550 °C to 1820 °C	0.35 °C	
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 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.

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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:** Uncertainty values of derivatives of 10 MHz will differ due to resolution, noise, and gating errors. **Note 10:** Uncertainties shown are for each weight size. Multiple weights are utilized to generate values to top of range. The RSS combination of all uncertainties will be the total uncertainty of the measurement.

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