National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200866-0**

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Transcat – St. Louis 527 Mae Court Fenton, MO 63026 Mr. Jim Beckner Phone: 636-349-7722 Fax: 636-349-4590 E-mail: jbeckner@transcat.com URL: www.transcat.com	**Fields of Calibration** Dimensional Electromagnetics – DC/Low Frequency Time and Frequency Mechanical Electromagnetics – DC/Low Frequency 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 3,8	**Remarks**
DIMENSIONAL			
LENGTH and DIAMETER; STEP GAGES (20/D05)			
Micrometers and Calipers Field calibrations available Note 4	0 in to 6 in 6 in to 12 in	20 µin + 3.1 µin/in 30 µin + 4.3 µin/in	Comparison to Gage Blocks
Anvil Flatness Field calibrations available Note 4	0 in to 1 in	7.2 µin	Optical Flats
Dial and Digital Indicators Field calibrations available Note 4	0 in to 4 in	75 µin + 0.6 µin/in	Comparison to Gage Blocks
Distance Measuring Equipment	0 ft to 99 999 ft	0.05 ft + 0.0001 ft/ft	Cylindrical Square with Counter

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 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 40 Hz to 1 kHz	0.030 % + 16 nA 0.019 % + 10 nA 0.015 % + 8 nA	Fluke 5700A-EP

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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
		1 kHz to 5 kHz	0.027 % + 12 nA	
		5 kHz to 10 kHz	0.11 % + 65 nA	
	220 µA 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	0.014 % + 35 nA	
		1 kHz to 5 kHz	0.021 % + 0.11 µA	
		5 kHz to 10 kHz	0.11 % + 0.65 µA	
	2.2 mA to 22 mA	10 Hz to 20 Hz	0.039 % + 0.40 µA	
		20 Hz to 40 Hz	0.019 % + 0.35 µA	
		40 Hz to 1 kHz	0.014 % + 0.35 µA	
		1 kHz to 5 kHz	0.021 % + 0.55 µA	
		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	
	220 mA to 2.2 A	20 Hz to 1 kHz	0.027 % + 35 µA	Fluke 5700A with EP/5725A
		1 kHz to 5 kHz	0.046 % + 80 µA	
		5 kHz to 10 kHz	0.70 % + 0.16 mA	
	2.2 A to 11 A	40 Hz to 1 kHz	0.048 % + 0.17 mA	
		1 kHz to 5 kHz	0.096 % + 0.38 mA	
		5 kHz to 10 kHz	0.36 % + 0.75 mA	
	11 A to 20.5 A	45 Hz to 100Hz	0.097 % + 3.9 mA	Fluke 5520A
		100 Hz to 1 kHz	0.12 % + 3.9 mA	
		1 kHz to 5 kHz	2.3 % + 3.9 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 33 mA	10 kHz to 30 kHz	0.31 % + 3 µA	

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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	0.4 % + 26 mA	
		65 Hz to 440 Hz	0.97 % + 47 mA	
	150 A to 1000 A	45 Hz to 65 Hz	0.43 % + 0.12 A	
		65 Hz to 440 Hz	1.3 % + 0.22 A	
Clamp-on Ammeter Non-Toroidal Type Field calibrations available Note 4	20 A to 150 A	45 Hz to 65 Hz	0.63 % + 0.25 A	Fluke 5520A with 5500A/Coil
		65 Hz to 440 Hz	1.2 % + 0.25 A	
	150 A to 1000 A	45 Hz to 65 Hz	0.65 % + 0.90 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	0.46 % + 35 nA	Agilent 3458A Opt 002
		20 Hz to 45 Hz	0.18 % + 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	0.07 % + 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	

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
DC RESISTANCE and CURRENT (20/E05)			
DC Current – Measuring Equipment Field calibrations available Note 4	0 µA to 220 µA	41 µA/A + 6 nA	Fluke 5700A-EP
	220 µA to 2.2 mA	36 µA/A + 7 nA	
	2.2 mA to 22 mA	36 µA/A + 40 nA	
	22 mA to 220 mA	49 µA/A + 0.7 µA	
	220 mA to 2.2 A	200 µA/A + 12 µA	
	2.2 A to 11 A	410 µA/A + 480 µA	Fluke 5700A- EP/5725A
	11 A to 20.5 A	840 µA/A + 0.58 mA	Fluke 5520A
Clamp-on Ammeter Non-Toroidal Type Field calibrations available Note 4	20 A to 150 A	0.51 % + 0.14 A	Fluke 5520A with 5500A/Coil
	150 A to 1000 A	0.52 % + 0.50 A	
DC Current – Measure	0 µA to 100 µA	26 µA/A + 0.92 nA	Agilent 3458A opt. 2
	100 µA to 1 mA	26 µA/A + 6 nA	
	1 mA to 10 mA	26 µA/A + 58 nA	
	10 mA to 100 mA	43 µA/A + 580 nA	
	100 mA to 1 A	130 µA/A + 12 µA	
	1 A to 3 A	0.15% + 0.7 mA	HP 34401A
DC Resistance – Measuring Equipment and Measure Field calibrations available Note 4	0.01 Ω to 10 Ω	18 µΩ/Ω + 58 µΩ	Agilent 3458A opt. 2
	10 Ω to 100 Ω	15 µΩ/Ω + 0.58 mΩ	
	100 Ω to 1 kΩ	12 µΩ/Ω + 0.58 mΩ	
	1 kΩ to 10 kΩ	12 µΩ/Ω + 58 mΩ	
	10 kΩ to 100 kΩ	12 µΩ/Ω + 58 mΩ	
	100 kΩ to 1 MΩ	19 µΩ/Ω + 2.3 Ω	
	1 MΩ to 10 MΩ	62 µΩ/Ω + 120 Ω	
	10 MΩ to 100 MΩ	0.059 % + 1.2 kΩ	
	100 MΩ to 1 GΩ	0.58 % + 12 kΩ	
DC Resistance – Measuring Equipment Field calibrations available Note 4	1 GΩ to 10 GΩ	0.60 %	Biddle 72-6349
	10 GΩ to 100 GΩ	1.2 %	
	100 GΩ to 500 GΩ	4.2 %	

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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 VOLTAGE (20/E06)			
DC Voltage – Measuring Equipment Field calibrations available [Note 4]	0 mV to 220 mV	8.6 µV/V + 0.4 µV	Fluke 5700A-EP
	220 mV to 2.2 V	5.1 µV/V + 0.7 µV	
	2.2 V to 11 V	3.9 µV/V + 2.5 µV	
	11 V to 22 V	3.9 µV/V + 4 µV	
	22 V to 220 V	6.2 µV/V + 40 µV	
	220 V to 1.1 kV	7.6 µV/V + 400 µV	Fluke 5700A-EP5725A
DC Voltage – Measure Field calibrations available [Note 4]	0 mV to 100 mV	7.1 µV/V + 0.58 µV	Agilent 3458A opt. 2
	100 mV to 1 V	5 µV/V + 0.58 µV	
	1 V to 10 V	5.1 µV/V + 0.58 µV	
	10 V to 100 V	7.6 µV/V + 35 µV	
	100 V to 500 V	11 µV/V + 0.12 mV	
	500 V to 800 V	16 µV/V + 0.12 mV	
	800 V to 1 kV	21 µV/V + 0.12 mV	
	1 kV to 2 kV	0.05 % + 0.4 V	Vitrek 4600A
	2 kV to 20 kV	0.05 % + 4 V	
	20 kV to 100 kV	0.6 %	Hipotronics KVM100-A

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)				
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-EP
		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	0.17 % + 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	0.042 % + 4 µV	
		20 Hz to 40 Hz	0.030 % + 4 µV	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
		40 Hz to 20 kHz	0.014 % + 4 µV	
		20 kHz to 50 kHz	0.03 % + 4 µV	
		50 kHz to 100 kHz	0.058 % + 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	0.27 % + 20 µV	
	22 mV to 220 mV	10 Hz to 20 Hz	0.028 % + 12 µV	
		20 Hz to 40 Hz	0.011 % + 7 µV	
		40 Hz to 20 kHz	0.009 % + 7 µV	
		20 kHz to 50 kHz	0.021 % + 7 µV	
		50 kHz to 100 kHz	0.047 % + 17 µV	
		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	0.027 % + 40 µV	
		20 Hz to 40 Hz	0.010 % + 15 µV	
		40 Hz to 20 kHz	0.0048 % + 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	0.10 % + 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	0.01 % + 0.15 mV	
		40 Hz to 20 kHz	0.0049 % + 0.05 mV	
		20 kHz to 50 kHz	0.0083 % + 0.1 mV	
		50 kHz to 100 kHz	0.012 % + 0.2 mV	
		100 kHz to 300 kHz	0.03 % + 0.6 mV	
		300 kHz to 500 kHz	0.10 % + 2 mV	
		500 kHz to 1 MHz	0.17 % + 3.2mV	
	22 V to 220 V	10 Hz to 20 Hz	0.028 % + 4 mV	
		20 Hz to 40 Hz	0.010 % + 1.5 mV	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
		40 Hz to 20 kHz	0.0056 % + 0.6 mV	
		20 kHz to 50 kHz	0.0093 % + 1 mV	
		50 kHz to 100 kHz	0.016 % + 2.5 mV	
		100 kHz to 300 kHz	0.009 % + 16 mV	
		300 kHz to 500 kHz	0.44 % + 40 mV	
		500 kHz to 1 MHz	0.80 % + 80 mV	
	220 V to 750 V	30 kHz to 50 kHz	0.061 % + 11 mV	Fluke 5700A-EP5725A
		50 kHz to 100 kHz	0.23 % + 45 mV	
	220 V to 1100 V	40 Hz to 1 kHz	0.011 % + 4 mV	
		1 kHz to 20 kHz	0.017 % + 6 mV	
		20 kHz to 30 kHz	0.061 % + 11 mV	
AC Voltage – Measure Field calibrations available Note 4	0 mV to 10 mV	1 Hz to 40 Hz	0.039 % + 35 µV	Agilent 3458A opt. 2
		40 Hz to 1 kHz	0.028 % + 1.2 µV	
		1 kHz to 20 kHz	0.038 % + 1.2 µV	
		20 kHz to 50 kHz	0.15 % + 1.2 µV	
		50 kHz to 100 kHz	0.59 % + 1.2 µV	
		100 kHz to 300 kHz	4.6 % + 2.3 µV	
	10 mV to 100 mV	1 Hz to 40 Hz	0.013 % +4.6 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	1.1 % + 12 µV	
		1 MHz to 2 MHz	1.7 % + 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 % + 0.12 mV	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
		300 kHz to 1 MHz	1.2 % + 0.12 mV	
		1 MHz to 2 MHz	1.7 % +0.12 mV	
	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 % + 0.23 mV	
		20 kHz to 50 kHz	0.036 % + 0.23 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	1.1 % + 1.2 mV	
		1 MHz to 2 MHz	1.4 % + 1.2 mV	
	10 V to 100 V	1 Hz to 40 Hz	0.024 % + 4.6 mV	
		40 Hz to 1 kHz	0.024 % + 2.3 mV	
		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	
	100 V to 700 V	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	0.035 % + 23 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	
	20 kV to 80 kV	60 Hz	1.0 %	Hipotronics KVM100-A

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
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 3.2 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 33 nF	10 Hz to 1 kHz	0.21 %+ 0.78 pF	
	33 nF to 110 nF	10 Hz to 1 kHz	0.21 %+ 0.78 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	0.2 %+ 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	0.35 %+ 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 %	

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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)				
LF Phase – Measuring Equipment Field calibrations available Note 4	0° to 180°	10 Hz to 65 Hz	0.1°	Fluke 5520A
		65 Hz to 500 Hz	0.2°	
		500 Hz to 1 kHz	0.37°	
		1 kHz to 5 kHz	1.8°	
		5 kHz to 10 kHz	3.6°	
		10 kHz to 20 kHz	7.3°	

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Measured Parameter or Device Calibrated	Range	Uncertainty (k=2) Note 3,5	Remarks
TIME and FREQUENCY			
FREQUENCY DISSEMINATION (20/F01)			
Frequency Measuring Equipment	10 MHz	5.8×10^{-10}	Rubidium Frequency Standard
PULSE WAVEFORM (20/F04)			
Rise Time Field calibrations available Note 4	250 ps Nominal	51 ps Note 9	Fluke 5520A/SC1100
MECHANICAL			
MASS DETERMINATION (20/M08)			
Mass – Metric	10 kg 20 kg	0.26 g 0.48 g	Echelon III
Mass – Avoirdupois	10 lb 20 lb 50 lb	0.10 g 0.10 g 0.15 g	Echelon III
TORQUE (20/M15)			
Torque – Measure Field calibrations available Note 4	5 lbf-in to 250 lbf-ft	1.0 %	CDI 950-DT
Torque Screwdrivers – Measure Field calibrations available Note 4	5 lbf-in to 100 lbf-in	1.5 %	CDI 950-DT
WEIGHING INSTRUMENTS (20/M16)			
Scales and Balances	2 kg 1 kg 500 g 200 g 100 g 50 g 20 g 10 g	17 mg 16 mg 12 mg 1.2 mg 1.2 mg 1.2 mg 1.2 mg 1.2 mg	ASTM Class 2 Mass Standards

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
	5 g 2 g 1 g 500 mg 200 mg 100 mg	1.2 mg 1.2 mg 1.2 mg 1.2 mg 1.2 mg 1.2 mg	
ELECTROMAGNETICS – RF/MICROWAVE			
RF POWER (20/R17)			
Frequency Response Field calibrations available Note 4 5 mV to 5.5 V	50 kHz to 100 MHz 100 MHz to 300 MHz 300 MHz to 600 MHz	1.7 % + 100 µV 2.2 % + 100 µV 4.1 % + 100 µV	Fluke 5520A/SC1100
4 mV to 3.5 V	600 MHz to 1.1 GHz	5.1 % + 100 µV	
THERMODYNAMIC			
LABORATORY THEMOMETERS, DIGITAL and ANALOG (20/T03)			
Temperature – Measure Field calibrations available Note 4	-100 °C to 660 °C	0.015 °C	Hart 5626, 1560, 2560
Temperature – Measuring Equipment Field calibrations available Note 4	-30 °C to -20 °C -20 °C to 150 °C 150 °C to 600 °C	0.045 ºC 0.021 ºC 0.23 °C	Hart 5626, 1560, 2560, 7103 Hart 5626, 1560, 2560, 7320 Hart 5626, 1560, 2560, 9122
PRESSURE (20/T05)			
Pressure – Gage Field calibrations available Note 4	-15 psi to 25 psi 25 psi to 500 psi	0.0017 psi 0.0065 %	Ruska 7250xi Pressure Controller
	-36 inH2O to -22 inH2O -22 inH_2O to 22 inH_2O 22 inH_2O to 60 inH_2O 60 inH_2O to 72 inH_2O	0.009 % + 150 µinH2O 0.0022 inH_2O 0.0090 % + 0.00015 inH_2O 0.0067 inH_2O	DHI PPC4 Controller

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CALIBRATION LABORATORIES **NVLAP LAB CODE 200866-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
	72 inH_2O to 804 inH_2O	0.0090 % + 0.00015 inH_2O	Ametek T-150 Deadweight Tester
	500 psi to 15 000 psi	0.0084 %	
Pressure – Absolute Field calibrations available Note 4	0 psi to 25 psi 25 psi to 500 psi	0.0019 psi 0.0066 % + 0.001 psi	Ruska 7250xi Controller
TEMPERATURE INDICATORS (20/T08)			
Electrical Simulation of Thermocouples Field calibrations available Note 4			
Type B	600 ºC to 800 ºC 800 ºC to 1000 ºC 1000 ºC to 1550 ºC 1550 ºC to 1820 ºC	0.45 ºC 0.35 ºC 0.32 ºC 0.35 ºC	Fluke 5520A
Type E	-250 ºC to -100 ºC -100 ºC to -25 ºC -25 ºC to 350 ºC 350 ºC to 650 ºC 650 ºC to 1000 ºC	0.51 ºC 0.19 ºC 0.17 ºC 0.19 ºC 0.23 ºC	
Type J	-210 ºC to -100 ºC -100 ºC to -30 ºC -30 ºC to 150 ºC 150 ºC to 760 ºC 760 ºC to 1200 ºC	0.29 ºC 0.19 ºC 0.17 ºC 0.20 ºC 0.25 ºC	
Type K	-200 ºC to -100 ºC -100 ºC to -25 ºC -25 ºC to 120 ºC 120 ºC to 1000 ºC 1000 ºC to 1372 ºC	0.35 ºC 0.21 ºC 0.19 ºC 0.28 ºC 0.41 ºC	
Type N	-200 ºC to -100 ºC -100 ºC to -25 ºC	0.41 ºC 0.24 ºC	

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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
	-25 ºC to 120 ºC	0.22 ºC	
	120 ºC to 410 ºC	0.21 ºC	
	410 ºC to 1300 ºC	0.29 ºC	
Type R	0 ºC to 250 ºC	0.58 ºC	
	250 ºC to 400 ºC	0.36 ºC	
	400 ºC to 1000 ºC	0.35 ºC	
	1000 ºC to 1767 ºC	0.47 ºC	
Type S	0 ºC to 250 ºC	0.48 ºC	
	250 ºC to 1000 ºC	0.37 ºC	
	1000 ºC to 1400 ºC	0.38 ºC	
	1400 ºC to 1767 ºC	0.47 ºC	
Type T	-250 ºC to -150 ºC	0.64 ºC	
	-150 ºC to 0 ºC	0.26 ºC	
	0 ºC to 120 ºC	0.19 ºC	
	120 ºC to 400 ºC	0.17 ºC	
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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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.

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