National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200990-0**

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Transcat – Denver	**Parameter(s) of Accreditation**
3251 Lewiston St, Suite 12 Denver, CO 80011 Mr. Ryan Gohl Phone: 303-364-8325 Fax: 303-364-8353 E-mail: rgohl@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			
ANGULAR (20/D01)			
Angle	0º to 75º 90º	1.5” 1.9”	Master Angle Blocks Master Square
LENGTH & DIAMETER; STEP GAGES (20/D05)			
Micrometers & Calipers – Outside, Inside, Depth Field calibrations Available Note 4	0.05 in to 48 in	7.6 µin/in + 6 µin	Comparison to Gage Blocks
Anvil Flatness Field calibrations Available Note 4	0 in to 1 in	4.5 µin	Optical Flats
Digital & Dial Indicators Field calibrations Available Note 4	0 in to 0.05 in 0.05 in to 5 in	28 µin 4 µin/in + 44 µin	Dial Indicator Calibrator Horizontal Comparator
Single Axis – Outside	0 in to 5 in	8 µin/in + 6 µin	Horizontal Comparator
Single Axis – Inside Height Measuring Equipment Field calibrations Available Note 4	0 in to 5 in 0.4 in to 8 in 8 in to 48 in	3 µin/in + 22 µin 5 µin/in + 30 µin 8 µin/in + 4 µin	Horizontal Comparator Gage Blocks

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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
SPHERICAL DIAMETER (20/D11)			
Plug Gages	0 in to 5 in	8 µin/in + 6 µin	Horizontal Comparator
Ring Gages	0 in to 5 in	3 µin/in + 22 µin	
SURVEYING RODS AND TAPES (20/D13)			
Rulers	0 in to 12 in	840 µin	Optical Comparator
THREADED PLUG & RING GAGES (20/D14)			
Plug – Outer Pitch Diameter	0 in to 1 in 1 in to 3 in 3 in to 5 in	79 µin 84 µin 94 µin	ULM w/Thread Wires
Ring – Inner Pitch Diameter	0 in to 2 in	140 µin	Master Plug Gages

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/DC VOLTAGE CONVERTORS (20/E01)				
Sinewave Flatness Field calibrations available [Note 4]	0.3 V to 3 V	10 Hz to 1 MHz 1 MHz to 10 MHz 10 MHz to 30 MHz 30 MHz to 50 M Hz 50 MHz to 80 MHz 80 MHz to 100 MHz	0.066 % 0.10 % 0.18 % 0.41 % 0.71 % 0.84 %	Thermal Converter/HP3458A
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 % + 8.0 nA 0.030 % + 12 nA 0.11 % + 65 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
	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	0.014 % + 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	0.022 % + 0.55 µA	
		5 kHz to 10 kHz	0.12 % + 5.0 µA	
	22 mA to 220 mA	10 Hz to 20 Hz	0.033 % + 4.0 µA	
		20 Hz to 40 Hz	0.018 % + 3.5 µA	
		40 Hz to 1 kHz	0.015 % + 2.5 µA	
		1 kHz to 5 kHz	0.021 % + 3.5 µA	
		5 kHz to 10 kHz	0.12 % + 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 % + 0.16 mA	
	2.2 A to 11 A	40 Hz to 1 kHz	0.048 % + 0.17 mA	Fluke 5700A/EP with 5725
		1 kHz to 5 kHz	0.096 % + 0.38 mA	
		5 kHz to 10 kHz	0.036 % + 0.75 mA	
	11 A to 20.5 A	45 Hz to 100 Hz	0.093 % + 5.0 mA	Fluke 5520A
		0.1 kHz to 1 kHz	0.12 % + 5.0 mA	
		1 kHz to 5 kHz	2.3 % + 5.0 mA	
Extended Frequency Ranges Field calibrations Available [Note 4]	29 µA to 330 µA	10 kHz to 30 kHz	1.2 % + 0.40 µA	Fluke 5520A
	0.33 mA to 3.3 mA	10 kHz to 30 kHz	0.78 % + 0.60 µA	
	3.3 mA to 33 mA	10 kHz to 30 kHz	0.31 % + 4.0 µA	
	33 mA to 330 mA	10 kHz to 30 kHz	0.31 % + 0.20 mA	

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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
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	0.30 % + 0.026 A 0.83 % + 0.047 A 0.35 % + 0.12 A 1.1 % + 0.22 A	Fluke 5520A with 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	0.57 % + 0.25 A 1.0 % + 0.25 A 0.60 % + 0.9 A 1.3 % + 0.92 A	Fluke 5520A with 5500A/Coil
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	0.4 % + 30 nA 0.15 % + 30 nA 0.063 % + 30 nA 0.063 % + 30 nA	Agilent 3458A /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	0.40 % + 0.2 µA 0.15 % + 0.2 µA 0.062 % + 0.2 µA 0.034 % + 0.2 µA	
	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	0.40 % + 2 µA 0.15 % + 2 µA 0.062 % + 2 µA 0.034 % + 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	0.40 % + 20 µA 0.15 % + 20 µA 0.061 % + 20 µA 0.033 % + 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	0.40 % + 0.20 mA 0.16 % + 0.20 mA 0.085 % + 0.20 mA 0.10 % + 0.20 mA	

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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 A to 20 A	50 Hz to 100 Hz	0.023 %	Fluke Y5020
		100 Hz to 300 Hz	0.025 %	
		300 Hz to 1 kHz	0.033 %	
		1 kHz to 3 kHz	0.061 %	
		3 kHz to 4 kHz	0.075 %	
		4 kHz to 5 kHz	0.09 %	
AC Resistance– Measure Field calibrations Available [Note 4]	20 Ω to 100 kΩ	1 kHz	0.039 % + 0.01 Ω	Gen Rad 1689
	0.1 Ω to 15 Ω	50 Hz to 100 kHz	0.12 %	Agilent 4284A
	15 Ω to 420 Ω	100 Hz to 100 kHz	0.058 %	
	420 Ω to 32 kΩ	100 Hz to 10 kHz	0.058 %	
	32 kΩ to 320 kΩ	100 Hz to 100 kHz	0.058 %	
	320 kΩ to 10 MΩ	100 Hz to 100 kHz	0.12 %	
AC Resistance-Measuring Equipment	0.1 Ω	1 Hz to 1 MHz	0.17 %	Impedance Standards
	1 Ω	1 Hz to 1 MHz	0.12 %	
	10 Ω	1 Hz to 1 MHz	0.12 %	
	100 Ω	1 Hz to 1 MHz	0.046 %	
	1 kΩ	1 Hz to 1 MHz	0.053 %	
	10 kΩ	1 Hz to 1 MHz	0.13 %	
	100 kΩ	1 Hz to 1 MHz	0.26 %	

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)			
Measuring Equipment and Measure Field calibrations Available [Note 4]	0 Ω to 10 Ω	20 μΩ/Ω + 50 μΩ	HP3458A w/Resistors
	10 Ω to 100 Ω	15 μΩ/Ω + 0.50 mΩ	
	100 Ω to 1 kΩ	13 μΩ/Ω + 0.50 mΩ	
	1 kΩ to 10 kΩ	12 μΩ/Ω + 5.0 mΩ	
	10 kΩ to 100 kΩ	13 μΩ/Ω + 50 mΩ	
	100 kΩ to 1 MΩ	19 μΩ/Ω + 2.0 Ω	
	1 MΩ to 10 MΩ	62 μΩ/Ω + 100 Ω	

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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
	10 MΩ to 100 MΩ	0.059 % + 1 kΩ	
	100 MΩ to 1 GΩ	0.58 % + 10 kΩ	
	1 GΩ to 2 GΩ	1.7% + 100 kΩ	Keithley 617
	2 GΩ to 20 GΩ	1.7% + 1 MΩ	
	20 GΩ to 200 GΩ	1.8% + 10 MΩ	
Measuring Equipment Field calibrations Available [Note 4]	333 µΩ	0.12 %	Guildline 9211
	1 mΩ	0.06 %	
	10 mΩ	0.012 %	
	100 mΩ	0.012%	
	1 Ω	0.012 %	
	1 GΩ	0.20 %	IET HRRS-Q-8-100k-10kV
	10 GΩ	0.50 %	
	100 GΩ	0.55 %	
	1 TΩ	0.56 %	
DC Current – Measuring Equipment Field calibrations Available [Note 4]	0 pA to 2 pA	0.80 % + 10 fA	Keithley 263
	2 pA to 20 pA	0.44 % + 10 fA	
	20 pA to 200 pA	0.30 % + 30 fA	
	200 pA to 2 nA	0.077 % + 100 fA	
	2 nA to 20 nA	0.076 % + 1 pA	
	20 nA to 200 nA	0.041 % + 10 pA	
	200 nA to 220 µA	41 µA/A + 6.0 nA	Fluke 5700A/EP
	220 µA to 2.2 mA	36 µA/A + 7.0 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	0.02 % + 12 µA	
	2.2 A to 11 A	0.04 % + 0.48 mA	Fluke 5700A/EP w/5725A
	11 A to 20.5 A	0.082 % + 0.75 mA	Fluke 5520A
	1 A to 10 A	0.012 %	Guildline 9211 with source
	10 A to 100 A	0.058 %	
	100 A to 300 A	0.12 %	

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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 Current – Measure	0 to 2 pA	2.1 % + 6.6 fA	Keithley 617
Field calibrations Available [Note 4]	2 pA to 20 pA	1.9 % + 7 fA	
	20 pA to 200 pA	1.9 % + 10 fA	
	200 pA to 2 nA	0.3 % + 500 fA	
	2 nA to 20 nA	0.3 % + 1 pA	
	20 nA to 200nA	0.3 % + 10 pA	
	200 nA to 1 µA	26 µA/A + 0.4 pA	HP 3458A Opt 002
	1 µA to 10 µA	26 µA/A + 0.1 nA	
	10 µA to 100 µA	28 µA/A + 0.8 nA	
	100 µA to 1 mA	29 µA/A + 5.0 nA	
	1 mA to 10 mA	29 µA/A + 50 nA	
	10 mA to 100 mA	47 µA/A + 0.50 µA	
	100 mA to 1 A	0.11 % + 10 µA	
	1 A to 10 A	0.012 %	Guildline 9211 with meter
	10 A to 100 A	0.058 %	
	100 A to 300 A	0.12 %	
Clamp-on Ammeter Non-Toroidal Type	20 A to 150 A	0.50 % + 0.14 A	Fluke 5520A with 5500A/Coil
Field calibrations available [Note 4]	150 A to 1000 A	0.51 % + 0.5 A	
DC VOLTAGE (20/E06)			
Measure	0 mV to 100 mV	10.2 µV/V + 0.50 µV	3458A Opt 002
Field calibrations Available [Note 4]	100 mV to 10 V	5.2 µV/V + 0.50 µV	
	10 V to 100 V	7.9 µV/V + 30 µV	
	100 V to 500 V	12 µV/V + 0.10 mV	
	500 V to 800 V	15 µV/V + 0.10 mV	
	800 V to 1 kV	21 µV/V + 0.10 mV	
	1 kV to 120 kV	0.014 %	High Voltage Divider
Measuring Equipment	0 V to 220 mV	8.5 µV/V + 0.5 µV	Fluke 5700A/EP
Field calibrations Available [Note 4]	220 mV to 2.2 V	5.1 µV/V + 0.7 µV	
	2.2 V to 11 V	4.0 µV/V + 2.5 µV	
	11 V to 22 V	4.0 µV/V + 4 µV	
	22 V to 220 V	6.2 µV/V + 40 µV	
	220 V to 1100 V	7.6 µV/V + 500 µV	Fluke 5700A/EP w/5725A

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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
	1100 V to 36 kV	0.07 %	HV Divider with source

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				
LF AC VOLTAGE (20/E09)				
Measure Field calibrations Available [Note 4]	0 mV to 1 mV	0.1 MHz to 1 MHz 1 MHz to 3 MHz 3 MHz to 10 MHz 10 MHz to 20 MHz	1.8 % + 2.4 µV 3.5 % + 2.4 µV 9.3 % + 2.4 µV 23 % + 2.4 µV	Rhode & Schwarz URE3
	1 mV to 3 mV	0.1 MHz to 1 MHz 1 MHz to 3 MHz 3 MHz to 10 MHz 10 MHz to 20 MHz	0.97 % + 2 µV 3.5 % + 2 µV 9.3 % + 2 µV 23 % + 2 µV	
	3 mV to 100 mV	0.1 MHz to 1 MHz 1 MHz to 3 MHz 3 MHz to 10 MHz 10 MHz to 20 MHz 20 MHz to 30 MHz	0.91 % + 3 µV 1.8 % + 3 µV 2.9 % + 3 µV 6.9 % + 3 µV 14 % + 3 µV	
	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 µV 0.028 % + 1.0 µV 0.038 % + 1.0 µV 0.15 % + 1.0 µV 0.59 % + 1.0 µV 4.6 % + 2.0 µV	Agilent 3458A/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	0.013 % + 4.0 µV 0.0095 % + 2.0 µV 0.017 % + 2.0 µV 0.037 % + 2.0 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
		50 kHz to 100 kHz	0.093 % + 2.0 µV	
		100 kHz to 300 kHz	0.36 % + 10 µV	
		300 kHz to 1 MHz	1.2 % + 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 % + 0.1 mV	
		300 kHz to 1 MHz	1.2 % + 0.1 mV	
	1 V to 10 V	1 Hz to 40 Hz	0.0095 % + 0.40 mV	
		40 Hz to 1 kHz	0.0095 % + 0.20 mV	
		1 kHz to 20 kHz	0.017 % + 0.20 mV	
		20 kHz to 50 kHz	0.036 % + 0.20 mV	
		50 kHz to 100 kHz	0.093 % + 0.20 mV	
		100 kHz to 300 kHz	0.35 % + 1.0 mV	
		300 kHz to 1 MHz	1.2 % + 1.0 mV	
	10 V to 100 V	1 Hz to 40 Hz	0.024 % + 4.0 mV	
		40 Hz to 1 kHz	0.024 % + 2.0 mV	
		1 kHz to 20 kHz	0.024 % + 2.0 mV	
		20 kHz to 50 kHz	0.041 % + 2.0 mV	
		50 kHz to 100 kHz	0.14 % + 2.0 mV	
		100 kHz to 300 kHz	0.46 % + 10 mV	
		300 kHz to 1 MHz	1.7 % + 10 mV	
	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 85 kV	60 Hz	0.58 %	HV Divider

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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
AC Voltage Measuring Equipment Field calibrations Available [Note 4]	0 mV to 2.2 mV	10 Hz to 20 Hz	0.16 % + 4.0 µV	5700A/EP
		20 Hz to 40 Hz	0.10 % + 4.0 µV	
		40 Hz to 20 kHz	0.078 % + 4.0 µV	
		20 kHz to 50 kHz	0.13 % + 4.0 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 % + 4.0 µV	
		20 Hz to 40 Hz	0.030 % + 4.0 µV	
		40 Hz to 20 kHz	0.014 % + 4.0 µV	
		20 kHz to 50 kHz	0.030 % + 4.0 µV	
		50 kHz to 100 kHz	0.058 % + 5.0 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 % + 7.0 µV	
		40 Hz to 20 kHz	0.008 % + 7.0 µV	
		20 kHz to 50 kHz	0.021 % + 7.0 µV	
		50 kHz to 100 kHz	0.047 % + 17 µV	
		100 kHz to 300 kHz	0.091 % + 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	0.011 % + 15 µV	
		40 Hz to 20 kHz	0.0048 % + 8.0 µV	
		20 kHz to 50 kHz	0.0084 % + 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 % + 0.20 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
		500 kHz to 1 MHz	0.18 % + 0.30 mV	
	2.2 V to 22 V	10 Hz to 20 Hz	0.028 % + 0.40 mV	
		20 Hz to 40 Hz	0.01 % + 0.15 mV	
		40 Hz to 20 kHz	0.0049 % + 50 µV	
		20 kHz to 50 kHz	0.0083 % + 0.10 mV	
		50 kHz to 100 kHz	0.012 % + 0.20 mV	
		100 kHz to 300 kHz	0.030 % + 0.60 mV	
		300 kHz to 500 kHz	0.11 % + 2.0 mV	
		500 kHz to 1 MHz	0.17 % + 3.2 mV	
	22 V to 220 V	10 Hz to 20 Hz	0.028 % + 4.0 mV	
		20 Hz to 40 Hz	0.01 % + 1.5 mV	
		40 Hz to 20 kHz	0.0056 % + 0.60 mV	
		20 kHz to 50 kHz	0.0093 % + 1.0 mV	
		50 kHz to 100 kHz	0.016 % + 2.5 mV	
		100 kHz to 300 kHz	0.090 % + 16 mV	
		300 kHz to 500 kHz	0.44 % + 40 mV	
		500 kHz to 1 MHz	0.8 % + 80 mV	
	220 V to 750 V	30 kHz to 50 kHz	0.061 % + 11 mV	5700A/EP with 5725A
		50 kHz to 100 kHz	0.23 % + 45 mV	
	220 V to 1100 V	40 Hz to 1 kHz	0.011 % + 4.0 mV	
		1 kHz to 20 kHz	0.017 % + 6.0 mV	
		20 kHz to 30 kHz	0.067 % + 11 mV	
LF CAPACITANCE (20/E10)				
Measure Field calibrations Available [Note 4]	Up to 10 pF	1 kHz	0.47 % + 0.05 pF	GenRad 1689
	10 pF to 100 pF	1 kHz	0.058 % + 0.05 pF	
	100 pF to 1 µF	1 kHz	0.024 % + 0.05 pF	
	1 µF to 100 µF	1 kHz	0.041 %	
	100 µF to 1 mF	1 kHz	0.24 %	
	10 nF to 100 µF	100 Hz to 120 Hz	0.058 %	Agilent 4284A
	100 µF to 12 mF	100 Hz to 120 Hz	0.12 %	

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

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) [Note 3,5]	Remarks
	10 nF to 10 µF	400 Hz	0.058 %	
	120 fF to 80 pF	10 kHz	0.12 %	
	80 pF to 1 µF	10 kHz	0.058 %	
	12 fF to 90 pF	100 kHz	0.12 %	
	90 pF to 100 nF	100 kHz	0.058 %	
	100 nF to 100 µF	100 kHz	0.12 %	
	10 fF to 90 pF	1 MHz	0.12 %	
	90 pF to 10 nF	1 MHz	0.058 %	
Measure Equipment Field calibrations Available [Note 4]	0.1 nF to 0.5 nF	1 kHz	0.59 pF	
	0.5 nF to 1.4 µF	1 kHz	0.12 % + 0.018 pF	Arco SS32
	1 pF	1 kHz - 1 MHz	0.06 %	HP16381A
	10 pF	1 kHz – 1 MHz	0.02 %	HP16382A
	100 pF	1 kHz – 1 MHz	0.004 %	HP16383A
	1000 pF	1 kHz – 1 MHz	0.007 %	HP16384A
	0.19 nF to 1.1 nF	10 Hz to 10 kHz	0.39 % + 7.8 pF	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	0.20 % + 7.8 pF	
	11 nF to 110 nF	10 Hz to 1 kHz	0.20 % + 78 pF	
	110 nF to 330 nF	10 Hz to 1 kHz	0.20 % + 0.23 nF	
	0.33 µF to 1.1 µF	10 Hz to 600 Hz	0.20 % + 0.78 nF	
	1.1 µF to 3.3 µF	10 Hz to 300 Hz	0.20 % + 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 INDUCTANCE (20/E11)				
Measure Field calibrations Available [Note 4]	1 mH to 100 mH	0.1 kHz to 1 kHz	0.04 % + 0.1 µH	GenRad 1689
	100 mH to 10 H	0.1 kHz to 1 kHz	0.057 % + 1.4 µH	

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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
	5 µH to 5 mH	400 Hz	0.12 %	Agilent 4284A
	5 mH to 10 H	400 Hz	0.058 %	
	120 µH to 20 mH	100 Hz to 120 Hz	0.12 %	
	20 mH to 10 H	100 Hz to 120 Hz	0.058 %	
	1 µH to 1 mH	1 kHz	0.12 %	
	5 nH to 120 µH	10 kHz	0.12 %	
	120 µH to 100 mH	10 kHz	0.058 %	
Measuring Equipment Field calibrations Available [Note 4]	100 mH	1 kHz	0.14 %	Standard Inductor
LF POWER/ENERGY (20/E12)				
Power – Measuring Equipment (for current range listed below) 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 %	
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 %	

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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
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	0.10 ° 0.20 ° 0.40 ° 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			
FREQUENCY DISSEMINATION (20/F01)			
Source and Measure In-Lab	10 MHz	3.7×10^{-12}	Fluke 910R
Field Service [Note 4]	10 MHz	3.8×10^{-9}	HP 53132A Counter

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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, 9	Remarks
SIGNAL CHARACHTERIZATION (20/F03)				
AM Depth – Measure Field calibrations available Note 4				
50 Hz to 10 kHz	5 % to 40 % 40 % to 99 %	150 kHz to 10 MHz	(0.021*AM* + 0.014) % (0.021*AM* + 0.14) %	Agilent 8902A With 11722A
20 Hz to <50 Hz	5 % to 40 % 40 % to 99 %	150 kHz to 10 MHz	(0.031*AM* + 0.014) % (0.031*AM* + 0.14) %	
50 Hz to 50 kHz	5 % to 40 % 40 % to 99 %	10 MHz to 1.3 GHz	(0.011*AM* + 0.014) % (0.011*AM* + 0.14) %	
50 Hz to 50 kHz	5 % to 40 % 40 % to 99 %	1.3 GHz to 26.5 GHz	(0.016*AM* + 0.014) % (0.016*AM* + 0.14) %	Agilent 8902A With 11722A, 11792A, and 11793A
(20 Hz to 50 Hz) or (50 kHz to 100 kHz)	5 % to 40 % 40 % to 99 %	10 MHz to 26.5 GHz 10 MHz to 26.5 GHz	(0.031*AM* + 0.014) % (0.031*AM* + 0.14) %	
FM Modulation – Measure Field calibrations available Note 4				
20 Hz to 10 kHz	0 kHz to 4 kHz 4 kHz to 40 kHz 40 kHz to 400 kHz	250 kHz to 10 MHz	(0.021*FM* + 20) Hz (0.021*FM* + 22) Hz (0.021*FM* + 100) Hz	Agilent 8902A With 11722A
50 Hz to 100 kHz	0 kHz to 4 kHz 4 kHz to 40 kHz 40 kHz to 400 kHz	100 MHz to 26.5 GHz	(0.011*FM* + 20) Hz (0.011*FM* + 22) Hz (0.011*FM* + 100) Hz	Agilent 8902A With 11722A, 11792A, and 11793A
20 Hz to <50 Hz	0 kHz to 4 kHz 4 kHz to 40 kHz 40 kHz to 400 kHz		(0.050*FM* + 20) Hz (0.050*FM* + 22) Hz (0.050*FM* + 100) Hz	
>100 kHz to 200 kHz	0 kHz to 4 kHz 4 kHz to 40 kHz 40 kHz to 400 kHz		(0.050*FM* + 100) Hz (0.050*FM* + 100) Hz (0.050*FM* + 100) Hz	

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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, 9	Remarks
Phase Modulation – Measure Field calibrations available Note 4				
200 Hz to 10 kHz	0 rad to < 4 rad 4 rad to < 40 rad 40 rad to 400 rad	150 kHz to 10 MHz	(0.042*PM* + 0.030) rad (0.042*PM* + 0.030) rad (0.042*PM* + 0.10) rad	Agilent 8902A with 11722A
200 Hz to 20 kHz	0 rad to < 4 rad 4 rad to < 40 rad 40 rad to 400 rad	10 MHz to 26.5 GHz	(0.036*PM* + 0.030) rad (0.036*PM* + 0.030) rad (0.036*PM* + 0.10) rad	8902A with 1722A, 11792A, And 11793A
Harmonic Distortion Field calibrations available Note 4	0 dBc to -80 dBc	30 Hz to 6.5 GHz 6.5 GHz to 22 GHz 22 GHz to 26.5 GHz	1.7 dB 2.6 dB 3.3 dB	Agilent 8566B
Total Harmonic Distortion Field calibrations available Note 4	0 dB to -80 dB	20 Hz to 20 kHz 20 kHz to 100 kHz	1.2 dB 2.3 dB	Agilent 8903B
AM Total Harmonic Distortion Field calibrations available Note 4	0 dB to -80 dB	20 Hz to 100 kHz	2.7 dB	
Total Harmonic Distortion 5 Hz to 600 kHz Field calibrations available Note 4				
Input Voltage Range < 30 V	100 % to 0.3 %	10 Hz to 1 MHz 1 MHz to 3 MHz	3 % 6 %	Agilent 334A
	0.1 %	10 Hz to 20 Hz 20 Hz to 30 Hz 30 Hz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1.2 MHz	12 % 6 % 3 % 6 % 12 %	

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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, 9	Remarks
Input Voltage Range > 30 V	100 % to 0.3 %	10 Hz to 300 kHz	3 %	
		300 kHz to 500 kHz	6 %	
		500 kHz to 3 MHz	12 %	
	0.1 %	20 Hz to 30 Hz	12 %	
		30 Hz to 300 kHz	3 %	
		300 kHz to 500 kHz	6 %	
		500 kHz to 1.2 MHz	12 %	

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	≥ 13 ps	2.4 ps	Pulser
Rise Time (Measure)	≥ 17 ps	3.9 ps + 2 %	Sampling System
MECHANICAL			
FORCE (20/M06)			
Force Measuring Equipment	1 lbf to 100 lbf	0.06 %	Deadweight
VIBRATION (20/M11)			
Acceleration	20 Hz to 100 Hz	2.1 %	Standard Accelerometer
	100 Hz to 2.5 kHz	1.6 %	
	2.5 kHz to 10 kHz	2.9 %	
TORQUE (20/M15)			
Torque - Measure Field calibrations Available Note 4	0.5 ozf-in to 15 ozf-in	0.83 %	Wheel w/ weight
	15 ozf-in to 200 ozf-in	0.40 %	Torque Calibrator
	4 lbf-in to 80 lbf-in	0.43 %	
	80 lbf-in to 1000 lbf-in	0.40 %	
	20 lbf-ft to 2000 lbf-ft	0.40 %	

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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
Torque – Measuring Equipment	1000 lbf-ft to 5000 lbf-ft	1.0 %	
	0.5 ozf-in to 16 ozf-in	0.83 %	Torque Wheel with Weights
	1 lbf-in to 40 lbf-in	0.075 %	
	40 lbf-in to 260 lbf-in	0.074 %	
	260 lbf-in to 3000 lbs-in	0.066 %	Torque Arm with Weights
WEIGHING INSTRUMENTS (20/M16)			
Balances & Scales Field calibrations Available [Note 4]	5 mg to 500 mg	0.12 mg	ASTM Class 1 & 2 Weights
	500 mg to 5 g	0.13 mg	
	5 g to 10 g	0.14 mg	
	10 g to 20 g	0.16 mg	
	20 g to 30 g	0.19 mg	
	30 g to 50 g	0.28 mg	
	50 g to 100 g	0.52 mg	
	100 g to 200 g	1.0 mg	
	200 g to 500 g	1.7 mg	
	500 g to 1 kg	5.1 mg	
	1 kg to 2 kg	1.3 mg	
	2 kg to 3 kg	1.4 mg	
	3 kg to 4 kg	1.5 mg	
	4 kg to 5 kg	2.8 mg	
	5 kg to 10 kg	13 mg	
	10 kg to 20 kg	2 g	NIST Class F Weights
	1 lb to 500 lb	0.01 %	
ELECTROMAGNETICS – RF/MICROWAVE			
RF/MICROWAVE POWER (20/R17)			
Absolute RF Power Field calibrations available [Note 4]			
50 MHz	1 mW Reference	0.63 % (0.03 dBm)	Agilent 478A- H75, 432A, and 3458A
100 kHz to 2.6 GHz	+30 dBm to +20 dBm	0.07 dBm	Agilent 8902A with 11722A

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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
2.6 GHz to 12 GHz	+20 dBm to +10 dBm +10 dBm to 0 dBm 0 dBm to -10 dBm -10 dBm to -20 dBm +30 dBm to +20 dBm +20 dBm to +10 dBm +10 dBm to 0 dBm 0 dBm to -10 dBm -10 dBm to -20 dBm	0.06 dBm 0.07 dBm 0.06 dBm 0.10 dBm 0.14 dBm 0.13 dBm 0.13 dBm 0.13 dBm 0.15 dBm	Agilent 8902A w/ 11722A, 11792A & 11793A
12 GHz to 18 GHz	+30 dBm to +20 dBm +20 dBm to +10 dBm +10 dBm to 0 dBm 0 dBm to -10 dBm -10 dBm to -20 dBm	0.17 dBm 0.16 dBm 0.16 dBm 0.16 dBm 0.17 dBm	
SCATTERING PARAMETERS (20/R18)			
Reflection (VSWR) Field calibrations available [Note 4] 10 MHz to 18 GHz	(Rho) 0.022 to 0.1 0.1 to 0.2 0.2 to 0.3 0.3 to 0.4	(Rho) 0.022 0.027 0.033 0.042	VSWR Bridge
Relative Tuned RF Power Field calibrations available [Note 4] 250 kHz to 18 GHz	0 dB to -20 dB -20 dB to -40 dB -40 dB to -60 dB -60 dB to -80 dB -80 dB to -100 dB -100 dB to -120 dB	0.11 dB 0.13 dB 0.16 dB 0.20 dB 0.30 dB 0.32 dB	Agilent 8902A with 11722A, 11793A
THERMODYNAMIC			
HUMIDITY (20/T02)			
Measuring Equipment	10 % to 90 %	1.3 %	Vaisala HMI41/HMP46 with Source

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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**
Measure Field calibrations Available [Note 4]	10 % to 90 %	1.3 %	Vaisala HMI41/HMP46
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	0.011 °C + 0.001 % 0.025 °C + 0.001 % 0.034 °C + 0.001 %	Hart 5628 w/ Black Stack
Measure	-195 °C to 0 °C 0 °C to 420 °C 420 °C to 660 °C	0.010 °C + 0.001 % 0.020 °C + 0.001 % 0.028 °C + 0.001 %	Hart 5628 w/ Hart 1575
Measuring Equipment Field calibrations Available [Note 4]	-25 °C to 140 ºC 140 °C to 600 ºC	0.06 ºC 0.03 ºC	Hart 5628 w/Hart Well
PRESSURE (20/T05)			
Absolute Measure & Measuring Equipment	25 to 500 psia 0 to 25 psia	0.0067 % + 0.001 psia 0.0019 psia	Ruska 7250xi
Gage Pressure Measure & Measuring Equipment – Pneumatic	-36 in H_2O to -22 in H_2O -22 in H_2O to 22 in H_2O 22 in H_2O to 60 in H_2O 60 in H_2O to 72 in H_2O 72 in H_2O to 804 in H_2O	0.0090% + 150 µin H_2O 0.002 in H_2O 0.0090% + 150 µin H_2O 0.0065 in H_2O 0.0090% + 150 µin H_2O	DHI PPC4-ui
Pressure Measuring Equipment – Hydraulic	-14.7 psig to 25 psig 25 psig to 500 psig	0.0016 psig 0.0065%	Ruska 7250xi
	500 psig to 10 000 psig	2.9 psig	Mensor 2101
	5 psig to 15 000 psig	0.018 %	Fluke P3125-PSI
	15 000 psig to 30 000 psig	35 psig	Pressure Transducer

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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
RADIATION THERMOMETRY (20/T06)			
Infrared Temperature – Measuring Equipment	-15 °C to 0 °C	0.98 °C	Hart Black Body
	0 °C to 50 °C	0.67 °C	
	50 °C to 100 °C	0.71 °C	
	100 °C to 120 °C	0.76 °C	
	120 °C to 200 °C	0.99 °C	
	200 °C to 350 °C	1.7 °C	
	350 °C to 500 °C	2.3 °C	
THERMOCOUPLES & PYROMETER INDICATORS (20/T08)			
Electrical Calibration of Thermocouple Devices Field calibrations Available [Note 4]			
Type J	-210 °C to -100 °C	0.21 °C	Fluke 5520A
	-100 °C to -30 °C	0.13 °C	
	-30 °C to 150 °C	0.12 °C	
	150 °C to 760 °C	0.14 °C	
	760 °C to 1200 °C	0.18 °C	
Type K	-200 °C to -100 °C	0.26 °C	
	-100 °C to -25 °C	0.15 °C	
	-25 °C to 120 °C	0.13 °C	
	120 °C to 1000 °C	0.21 °C	
	1000 °C to 1372 °C	0.31 °C	
Type T	-250 °C to -150 °C	0.50 °C	
	-150 °C to 0 °C	0.20 °C	
	0 °C to 120 °C	0.13 °C	
	120 °C to 400 °C	0.12 °C	
Type E	-250 °C to -100 °C	0.39 °C	
	-100 °C to -25 °C	0.13 °C	
	-25 °C to 350 °C	0.12 °C	
	350 °C to 650 °C	0.13 °C	
	650 °C to 1000 °C	0.17 °C	

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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
Type R	0 °C to 250 °C	0.45 °C	
	250 °C to 400 °C	0.29 °C	
	400 °C to 1000 °C	0.26 °C	
	1000 °C to 1767 °C	0.32 °C	
Type S	0 °C to 250 °C	0.45 °C	
	250 °C to 1000 °C	0.30 °C	
	1000 °C to 1400 °C	0.29 °C	
	1400 °C to 1767°C	0.36 °C	
Type N	-200 °C to -100 °C	0.32 °C	
	-100 °C to -25 °C	0.18 °C	
	-25 °C to 120 °C	0.15 °C	
	120 °C to 410 °C	0.15 °C	
	410 °C to 1300 °C	0.21 °C	
Type B	600 °C to 800 °C	0.35 °C	
	800 °C to 1000 °C	0.28 °C	
	1000 °C to 1550 °C	0.24 °C	
	1550 °C to 1820 °C	0.26 °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 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.
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: Where AM, FM, and PM is the value of the respective modulation measured. AM uncertainty is expressed in percent of modulation depth.

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