National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200730-0**

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Transcat - Houston	**Fields of Calibration**
1181 Brittmoore, Suite 600 Houston, TX 77043 Mr. Scott Caine Phone: 713-465-4399 Fax: 713-465-0525 E-mail: scaine@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	**Remarks**
DIMENSIONAL			
ANGULAR (20/D01)			
Angles	0° to 360° 0° to 360°	0.0022° 0.009°	CMM OGP Vision System
LENGTH & DIAMETER; STEP GAGES (20/D05)			
Micrometers – Outside, Inside, Depth Field calibrations Available Note 4	0.01 in to 1 in 1 in to 2 in 2 in to 6 in 6 in to 12 in 12 in to 16 in 16 in to 24 in	22 µin + 1 µin/in 6 µin + 16 µin/in 32 µin + 3 µin/in 41 µin + 3 µin/in 9 µin + 7 µin/in 85 µin + 2.3 µin/in	Comparison to Gage Blocks
	24 in to 80 in	610 µin	End Standards and CMM; Zero Setting
	24 in to 80 in	130 µin	CMM; 0 in to 1 in Micrometer Travel
Anvil Flatness Field calibrations Available Note 4	0 in to 1 in	6.5 µin	Optical Flats

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3	Remarks
Calipers – Outside, Inside, Depth, Step Field calibrations Available Note 4	0 in to 1 in 1 in to 2 in 2 in to 6 in 6 in to 12 in 12 in to 16 in 16 in to 24 in 24 in to 80 in	22 µin + 1 µin/in 6 µin + 16 µin/in 32 µin + 3 µin/in 41 µin + 3 µin/in 9 µin + 7 µin/in 85 µin + 2.3 µin/in 640 µin	Comparison to Gage Blocks CMM
Dial Indicators	0 in to 1 in 1 in to 4 in 4 in to 6 in	10 µin + 19 µin/in 28 µin + 2 µin/in 46 µin + 3 µin/in	Comparison to Gage Blocks
Length Measurement – Single Axis – Outside	0 in to 1 in 1 in to 10 in 10 in to 13 in 13 in to 80 in	3.2 µin + 1.0 µin/in 1.6 µin + 2.5 µin/in 2.8 µin/in 12 µin + 1.5 µin/in	Pratt & Whitney Labmaster Laser Interferometer w/CMM
Length Measurement – Single Axis – Inside	0.04 in to 0.5 in 0.5 in to 4 in 4 in to11 in 11 in to 40 in 40 in to 80 in	5.0 µin + 4.0 µin/in 7.0 µin + 2.0 µin/in 3.0 µin + 3.0 µin/in 39 µin + 1.4 µin/in 250 µin	Pratt & Whitney Labmaster Gage Blocks with CMM CMM
Height Gages	0 in to 24 in	85 µin + 1.0 µin/in	Comparison to Gage Blocks
Linear Displacement Field calibrations Available Note 4	0 in to 1440 in	1.1 µin + 0.6 µin/in	Laser Interferometer
MEASURING WIRES (20/D07)			
Thread Wires	2 TPI to 120 TPI	9.7 µin	Pratt & Whitney Labmaster
SPHERICAL DIAMETER; PLUG/RING GAGES (20/D11)			
Outer Diameters - Plugs	0.001 in to 2 in 2 in to 4 in	6.0 µin + 1.3 µin/in 5.0 µin + 2.0 µin/in	Pratt & Whitney Labmaster

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3	Remarks
	4 in to 6 in	2.5 µin + 2.6 µin/in	
SURVEYING RODS and TAPES (20/D13)			
Steel Rules, Tape Measures, and PI Tapes	0 in to 72 in 72 in to 1200 in	490 µin + 3.5 µin/in 130 µin + 7.3 µin/in	CMM with Vision
THREADED PLUGS & RING GAGES (20/D14)			
Threaded Plugs – Outer Pitch Diameter	0 in to 6 in	79 µin + 1.0 µin/in	Comparator with Thread Wires
TWO DIMENSIONAL GAGES (20/D15)			
Linear Dimension – Two Axis (X-Y)	27 in x 27 in	150 µin + 21 µin/in	OGP Vision System
COORDINATE MEASURING MACHINES (20/D16)			
Volumetric	0 in^3 to 1 in^3 1 in^3 to 216 in^3 0.125 ft^3 to 18 ft^3 18 ft^3 to 66 ft^3	53 µin 120 µin 310 µin 0.0014 in	CMM
Volumetric Field calibrations Available Note 4	37 ft^3	0.012 in	Articulated Arm

ELECTROMAGNETICS – DC/LOW FREQUENCY

Measured Parameter or Device Calibrated	Remarks
AC to DC VOLTAGE/CURRENT CONVERTERS (20/E01)	
Flatness Relative to 1 kHz Field calibrations Available Note 4	**Uncertainty (*k*=2) in %** Note 3,5

Frequency Range	Range 7 V	2.2 V	700 mV	220 mV	70 mV	22 mV	7 mV	2.2 mV
10 Hz	0.006	0.01	0.01	0.015	0.017	0.019	0.02	0.022
20 Hz	0.007	0.011	0.011	0.015	0.017	0.019	0.02	0.022
50 Hz	0.005	0.006	0.006	0.007	0.008	0.008	0.009	0.009

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Measured Parameter or Device Calibrated	**Remarks**							
AC to DC VOLTAGE/CURRENT CONVERTERS (20/E01)								
Flatness Relative to 1 kHz Field calibrations Available Note 4	**Uncertainty (*k*=2) in % Note 3,5**							
	Range							
Frequency Range	7 V	2.2 V	700 mV	220 mV	70 mV	22 mV	7 mV	2.2 mV
105 Hz	0.007	0.007	0.007	0.008	0.009	0.009	0.010	0.010
200 Hz	0.005	0.006	0.006	0.007	0.008	0.008	0.009	0.009
2 kHz	0.005	0.006	0.006	0.007	0.008	0.008	0.009	0.009
10 kHz	0.006	0.006	0.006	0.007	0.008	0.008	0.009	0.009
20 kHz	0.005	0.006	0.006	0.007	0.008	0.008	0.009	0.009
50 kHz	0.006	0.006	0.006	0.007	0.008	0.008	0.009	0.009
100 kHz	0.005	0.006	0.006	0.007	0.008	0.008	0.009	0.009
200 kHz	0.006	0.006	0.006	0.007	0.008	0.008	0.009	0.009
500 kHz	0.005	0.006	0.006	0.007	0.008	0.008	0.009	0.009
700 kHz	0.011	0.012	0.012	0.013	0.014	0.014	0.015	0.016
1 MHz	0.011	0.012	0.013	0.014	0.014	0.015	0.015	0.016
1.2 MHz	0.012	0.013	0.014	0.014	0.014	0.015	0.016	0.016
2 MHz	0.014	0.015	0.016	0.016	0.016	0.017	0.018	0.018
3 MHz	0.017	0.019	0.02	0.021	0.022	0.023	0.023	0.025
4 MHz	0.019	0.02	0.022	0.022	0.023	0.024	0.024	0.025
6 MHz	0.023	0.025	0.027	0.028	0.028	0.03	0.031	0.032
8 MHz	0.028	0.029	0.031	0.032	0.032	0.034	0.034	0.036
9 MHz	0.027	0.029	0.03	0.031	0.032	0.033	0.034	0.035
10 MHz	0.026	0.029	0.031	0.030	0.031	0.032	0.033	0.035
12 MHz	0.036	0.039	0.041	0.042	0.043	0.045	0.046	0.048
15 MHz	0.037	0.04	0.042	0.042	0.043	0.046	0.047	0.049
17 MHz	0.042	0.045	0.047	0.047	0.048	0.050	0.050	0.052
20 MHz	0.045	0.048	0.051	0.052	0.054	0.057	0.059	0.061
23 MHz	0.068	0.070	0.073	0.074	0.076	0.079	0.081	0.084
26 MHz	0.083	0.084	0.087	0.09	0.093	0.096	0.098	0.10
28 MHz	0.094	0.096	0.10	0.10	0.11	0.11	0.12	0.12
30 MHz	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.13

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY	
AC RESISTORS and CURRENT (20/E02)	
AC Current	Fluke A40 Shunts with 792A

	Uncertainty (*k*=2) in µA/A Note 3 Frequency Range								
Range	10 Hz	20 Hz	40 Hz	400 Hz	1 kHz	5 kHz	10 kHz	20 kHz	50 kHz
100 µA	61	66	56	60	59	72	81	100	130
200 µA	62	43	38	36	36	63	73	98	130
1 mA	45	41	31	38	37	37	37	42	46
2 mA	46	31	31	28	28	28	28	31	39
10 mA	110	53	33	31	31	31	30	32	55
20 mA	130	54	33	31	31	31	32	34	63
100 mA	130	53	33	31	31	31	31	40	73
200 mA	120	57	33	31	31	31	31	36	73
1A	110	57	37	35	36	35	38	50	180
2A	110	60	37	35	36	41	38	52	120
10A	160	85	64	63	63	63	63	83	150
20A	230	150	120	110	120	120	140	150	260
50A	176	86	66	66	65	72	76		
100A	168	81	72	62	62	85			

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (*k*=2) Note 3,5	Remarks
AC Current – Measuring Equipment Field calibrations Available Note 4	0 µA to 220 µA	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.03 % + 16 nA 0.02 % + 10 nA 0.015 % + 8 nA 0.03 % + 12 nA 0.11 % + 65 nA	Fluke 5720A
	0.22 mA to 2.2 mA	10 Hz to 20 Hz	0.03 % + 40 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
		20 Hz to 40 Hz	0.018 % + 35 nA	
		40 Hz to 1 kHz	0.014 % + 35 nA	
		1 kHz to 5 kHz	0.02 % + 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	0.018 % + 350 nA	
		40 Hz to 1 kHz	0.014 % + 350 nA	
		1 kHz to 5 kHz	0.02 % + 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	0.7 % + 160 µA	
	2.2 A to 11 A	40 Hz to 1 kHz	0.05 % + 170 µA	Fluke 5720A+5725A
		1 kHz to 5 kHz	0.10 % + 380 µA	
		5 kHz to 10 kHz	0.36 % + 750 µA	
	11 A to 20 A	10 Hz to 100 Hz	0.097 % + 2.0 mA	Fluke 5520A
		100 Hz to 1 kHz	0.12 % + 5.0 mA	
		1 kHz to 5 kHz	2.3 % + 5.0 mA	
	20 A to 100 A	10 Hz to 1 kHz	0.12 %	Ohms Lab Shunt with Current Source
Extended Frequency Ranges	29 µA to 330 µA	10 kHz to 30 kHz	1.2 % + 0.4 µA	Fluke 5520A
	0.33 mA to 3.3 mA		0.78 % + 0.6 µA	
	3.3 mA to 33 mA		0.31 % + 4.0 µA	
	33 mA to 330 mA		0.31 % + 0.20 mA	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (k=2) Note 3,5	Remarks
Clamp-on Ammeter Toroidal Type	20 A to 150 A	45 Hz to 65 Hz	0.30 % + 26 mA	Fluke 5520A
Field calibrations Available Note 4	20 A to 150 A	65 Hz to 440 Hz	0.83 % + 47 mA	
	150 A to 1000 A	45 Hz to 65 Hz	0.35 % + 0.12 A	
	150 A to 1000 A	65 Hz to 440 Hz	1.1 % + 0.22 A	
Clamp-on Ammeter Non-Toroidal Type	20 A to 150 A	45 Hz to 65 Hz	0.57 % + 0.25 A	Fluke 5520A
Field calibrations Available Note 4	20 A to 150 A	65 Hz to 440 Hz	1.0 % + 0.25 A	
	150 A to 1000 A	45 Hz to 65 Hz	0.60 % + 0.9 A	
	150 A to 1000 A	65 Hz to 440 Hz	1.3 % + 0.92 A	
AC Current – Measure	0 µA to 100 µA	10 Hz to 20 Hz	0.46 % + 30 nA	Agilent 3458A opt 2
Field calibrations Available Note 4		20 Hz to 45 Hz	0.18 % + 30 nA	
		45 Hz to 5 kHz	0.072 % + 30 nA	
	0.1 mA to 1 mA	10 Hz to 20 Hz	0.46 % + 0.20 µA	
		20 Hz to 45 Hz	0.17 % + 0.20 µA	
		45 Hz to 100 Hz	0.071 % + 0.20 µA	
		100 Hz to 5 kHz	0.037 % + 0.20 µA	
	1 mA to 10 mA	10 Hz to 20 Hz	0.46 % + 2 µA	
		20 Hz to 45 Hz	0.17 % + 2 µA	
		45 Hz to 100 Hz	0.071 % + 2 µA	
		100 Hz to 5 kHz	0.038 % + 2 µA	
	10 mA to 100 mA	10 Hz to 20 Hz	0.46 % + 20 µA	
		20 Hz to 45 Hz	0.17 % + 20 µA	
		45 Hz to 100 Hz	0.071 % + 20 µA	
		100 Hz to 5 kHz	0.037 % + 20 µA	
	0.1 A to 1 A	10 Hz to 20 Hz	0.46 % + 0.20 mA	
		20 Hz to 45 Hz	0.19 % + 0.20 mA	
		45 Hz to 100 Hz	0.097 % + 0.20 mA	
		100 Hz to 5 kHz	0.12 % + 0.20 mA	
	1 A to 5 A	3 Hz to 10 kHz	0.19 % + 1.6 mA	Fluke 8846

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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 A to 10 A	3 Hz to 10 kHz	0.16 % + 3 mA	Fluke 8846
	10 A to 100 A	10 Hz to 1 kHz	0.12 %	Ohm Labs Shunt
Impedance Field calibrations Available Note 4	1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ	10 Hz to 1 MHz	0.059 % 0.059 % 0.059 % 0.059 % 0.062 % 0.19 %	Quadtech 7600 LCR Meter

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	0 Ω (floor)	0.63 nΩ	Standard Resistors with Current Source and DMM
	100 μΩ to < 1 mΩ	6.3 μΩ/Ω	
	1 mΩ to < 10 mΩ	3.0 μΩ/Ω	
	10 mΩ to < 100 mΩ	2.3 μΩ/Ω	
	0.1 Ω to < 1 Ω	2.3 μΩ/Ω	
	1 Ω to < 10 Ω	0.18 μΩ/Ω	Standard Resistors with MI 6242B Bridge
	10 Ω to < 100 Ω	0.29 μΩ/Ω	
	100 Ω to < 1 kΩ	0.28 μΩ/Ω	
	1 kΩ to < 10 kΩ	0.44 μΩ/Ω	
	10 kΩ to < 100 kΩ	0.19 μΩ/Ω	
	100 kΩ to < 1 MΩ	1.7 μΩ/Ω	
	1 MΩ to < 10 MΩ	5.7 μΩ/Ω	
	10 MΩ to < 100 MΩ	11 μΩ/Ω	Standard Resistor
	100 MΩ to < 1 GΩ	29 μΩ/Ω	
	1 GΩ to < 20 GΩ	140 μΩ/Ω	Standard Resistors with 8508 (Double Substitution)

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
DC Resistance – Measure	100 MΩ Source	24 μΩ/Ω	Standard Resistor
	1 GΩ Source	38 μΩ/Ω	
Resistance Ratio	1 Ω to 1 kΩ	0.2 μΩ/Ω	MI 6242B Bridge
DC Resistance – Measuring Equipment and Measure Field calibrations Available Note 4	10 mΩ to 10 Ω	18 μΩ/Ω + 50 μΩ	HP3458A with Decade Resistor
	10 Ω to 100 Ω	15 μΩ/Ω + 500 μΩ	
	100 Ω to 1 kΩ	12 μΩ/Ω + 500 μΩ	
	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	590 μΩ/Ω + 1 kΩ	
	100 MΩ to 1 GΩ	0.58 % + 10 kΩ	
DC Resistance – 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	0.25 %	
	1 GΩ to 10 GΩ	0.41 %	
	10 GΩ to 100 GΩ	0.84 %	
	100 GΩ to 1 TΩ	2.5 %	
DC Current – Measuring Equipment and Measure	0 A (floor)	0.40 nA	Standard Shunts with Current Source
	100 nA to < 1 μ A	17 μA/A	
	1 μA to < 10 μA	8.3 μA/A	
	10 μA to < 100 μA	7.9 μA/A	
	100 μA to < 1 mA	4.5 μA/A	
	1 mA to < 10 mA	2.0 μA/A	
	10 mA to < 100 mA	1.9 μA/A	
	100 mA to < 1 A	2.2 μA/A	
	1 A to < 10 A	3.3 μA/A	
	10 A to < 20 A	6.9 μA/A	
	20 A	61 μA/A	
	> 20 A to 100 A	78 μA/A	

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
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 + 0.8 nA 26 µA/A + 5.0 nA 26 µA/A + 50 nA 43 µA/A + 0.5 µA 0.13 mA/A + 10 µA	HP3458A with Current Source
	1 A to 20 A 20 A to 100 A	44 µA/A + 1.8 mA 120µA/A	Shunt w/3458A and current source
Clamp-on Ammeter Non-Toroidal Type Field calibrations Available Note 4	20 A to 150 A 150 A to 1000 A	0.51 % + 0.14 A 0.51 % + 0.50 A	5520A w/5500A Coil
DC VOLTAGE (20/E06)			
DC Voltage – Fixed Points Measuring Equipment and Measure	0 V (floor) 1 mV 10 mV 100 mV 1 V 10 V 19 V 100 V 1000 V 20 mV to < 50 mV 50 mV to < 100 mV 100 mV to ≤ 1 kV	59 nV 120 µV/V 22 µV/V 0.80 µV/V 0.29 µV/V 0.20 µV/V 0.48 µV/V 0.28 µV/V 0.54 µV/V 13 µV/V + 0.059 µV 7.3 µV/V + 0.059 µV 0.61 µV/V + 0.059 µV	Ratio Metric with Zener Reference
DC Voltage – Measuring Equipment and Measure Field calibrations Available Note 4	0 V 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 1100 V	7.1 µV/V + 0.5 µV 5 µV/V + 0.5 µV 7.6 µV/V + 30 µV 11 µV/V + 100 µV 16 µV/V + 100 µV 21 µV/V + 100 µV	HP3458A opt 2 with 5720A

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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
	> 1.1 kV to 5 kV > 5 kV to 120 kV	110 mV/kV 96 mV/kV	High Voltage Divider Comparison

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

Measured Parameter or Device Calibrated	Remarks
LOW FREQUENCY AC VOLTAGE (20/E09)	
AC Voltage – Measure	Fluke 792A

	Uncertainty (*k*=2) in µV/V [Note 3]												
	Frequency Range												
Range	10 Hz	20 Hz	40 Hz	100 Hz	1 kHz	10 kHz	20 kHz	50 kHz	100 kHz	300 kHz	500 kHz	800 kHz	1 MHz
2 mV	630	890	930	920	370	840	840	430	1000	1200	2100	2400	2500
6 mV	330	310	330	210	270	260	280	340	530	760	930	610	660
10 mV	140	190	110	240	190	190	170	220	290	240	650	390	490
20 mV	82	73	63	120	73	84	62	150	210	300	460	350	400
60 mV	100	66	52	45	37	47	52	70	140	270	350	410	430
100 mV	38	35	22	32	30	34	31	41	76	160	200	280	210
200 mV	42	24	38	23	19	25	18	45	87	130	120	260	210
600 mV	30	39	17	11	12	11	12	22	31	96	90	86	110
1 V	86	35	18	9.2	9.4	11	7.7	18	10	70	95	95	75
2 V	25	20	18	8	6.9	6.5	7.1	15	11	96	95	76	76
6 V	33	21	18	8.9	6.8	8.2	7	21	12	92	93	78	78
10 V	20	32	18	10	8.3	8.3	9.3	10	11	70	99	110	130
20 V	37	21	19	8.9	8.5	8.9	10	11	15	85	91	78	82
60 V	37	23	19	11	11	12	11	33	16	73			
100 V	86	35	19	15	14	15	11	31	16				
200 V	44	24	19	18	12	12	13	17	21				
600 V	96	47	27	23	16	16	17	46	51				
1000 V	54	21	22	22	19	18	20	49	52				

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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 – Measure Field calibrations Available [Note 4]	0 mV to 10 mV	1 Hz to 40 Hz	0.039 % + 3 µV	Agilent 3458A opt 2
		40 Hz to 1 kHz	0.028 % + 1 µV	
		1 kHz to 20 kHz	0.038 % + 1 µV	
		20 kHz to 50 kHz	0.15 % + 1 µV	
		50 kHz to 100 kHz	0.59 % + 1 µV	
		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	1.2 % + 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 % + 100 µV	
		300 kHz to 1 MHz	1.2 % + 100 µV	
	1 V to 10 V	1 Hz to 40 Hz	0.0095 % + 0.4 mV	
		40 Hz to 1 kHz	0.0095 % + 0.2 mV	
		1 kHz to 20 kHz	0.017 % + 0.2 mV	
		20 kHz to 50 kHz	0.036 % + 0.2 mV	
		50 kHz to 100 kHz	0.093 % + 0.2 mV	
		100 kHz to 300 kHz	0.35 % + 1 mV	
		300 kHz to 1 MHz	1.2 % + 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	

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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	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	
AC Voltage – Measuring Equipment and Measure	700 V to 2 kV	60 Hz	0.05 % + 1.6 V	High Voltage Divider Comparison
	2 kV to 10 kV	60 Hz	0.11 % + 0.4 V	
	10 kV to 80 kV	60 Hz	0.12 %	
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 5720A
		20 Hz to 40 Hz	0.1 % + 4 µV	
		40 Hz to 20 kHz	0.077% + 4 µV	
		20 kHz to 50 kHz	0.12 % + 4.5 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	0.031 % + 4 µV	
		40 Hz to 20 kHz	0.015 % + 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 % + 12 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	0.011 % + 7 µV	
		40 Hz to 20 kHz	0.0083 % + 7 µV	
		20 kHz to 50 kHz	0.021 % + 7 µV	
		50 kHz to 100 kHz	0.047 % + 17 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
		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	0.01 % + 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	0.1 % + 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	0.01 % + 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	0.10 % + 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	0.01 % + 1.5 mV	
		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	0.085 % + 16 mV	
		300 kHz to 500 kHz	0.44 % + 40 mV	
		500 kHz to 1 MHz	0.8 % + 40 mV	
	220 V to 1100 V	40 Hz to 1 kHz	0.011 % + 4 mV	Fluke 5720A/5725A
		1 kHz to 30 kHz	0.017 % + 6 mV	
	220 V to 750 V	30 kHz to 50 kHz	0.061 % + 11 mV	
		50 kHz to 100 kHz	0.23 % + 45 mV	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3	Remarks
LOW FREQUENCY CAPACITANCE (20/E10)			
Capacitance – Measure: 10 Hz to 1 MHz	1.1 µF to 10 mF	0.06 % + 30 aF	Quadtech 7600 LCR Bridge
	0.33 mF	0.048 %	Time/Charge Method with HP3458A
	0.8 mF	0.027 %	
	1 mF	0.024 %	
	1.2 mF	0.023 %	
	3 mF	0.018 %	
	3.3 mF	0.017 %	
	8 mF	0.016 %	
	10 mF	0.016 %	
	12 mF	0.016 %	
	30 mF	0.015 %	
	80 mF	0.014 %	
	100 mF	0.014 %	

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (*k*=2) Note 3,5	Remarks
Capacitance – Measuring Equipment Field calibrations Available Note 4	0.19 nF to 3.3 nF	10 Hz to 10 kHz	0.39 % + 7.8 pF	Fluke 5520A
	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	0.20 % + 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	0.31 % + 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	

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
LOW FREQUENCY INDUCTANCE (20/E11)			
Inductance – Source Field calibrations Available Note 4	100 mH	0.07 %	Fixed Inductors with Quadtech 7600
Inductance – Measure: 1 kHz Field calibrations Available Note 4	10 µH to 100 H	0.07 %	Quadtech 7600

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (*k*=2) Note 3,5	Remarks
LF POWER/ENERGY (20/E12)				
Power – Measuring Equipment AC Power Note 8 (PF = 1)				Fluke 5520A
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 %	

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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
	6.7 W to 20 kW	10 Hz to 65 Hz	0.17 %	
PHASE METERS (20/E15)				
AC Phase – Measure	0° to 360°	1 Hz to 1 kHz > 1 kHz to 50 kHz > 50 kHz to 200 kHz	0.0020° 0.0041° 0.010°	Clark-Hess 5002 Bridge Set
AC Phase – Generate:				
50 mV to 100 V	0° to 360°	1 Hz to 1 kHz > 1 kHz to 6.25 kHz > 6.25 kHz to 50 kHz > 50 kHz to 200 kHz	0.013° 0.017° 0.021° 0.050°	Clark-Hess 5500-2 Phase Standard
100 V to 120 V	0° to 360°	1 Hz to 1 kHz > 1 kHz to 6.25 kHz > 6.25 kHz to 50 kHz > 50 kHz to 200 kHz	0.017° 0.026° 0.037° 0.095°	

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)			
Frequency – Source and Measure Note 9	10 MHz	5.8 x 10^{-10} Hz	Rubidium Frequency Standard
OSCILLATOR CHARACHTERISTICS (20/F03)			
Total Harmonic Distortion: CW, Modulation	5 Hz to 500 kHz 500 kHz to 1 MHz	1.4 dB 2.3 dB	Krohn-Hite 6900B
Harmonic Distortion	100 kHz to 2.9 GHz 2.9 GHz to 6.5 GHz 6.5 GHz to 13.2 GHz	1.7 dB 1.9 dB 2.6 dB	Spectrum Analyzer

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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
	13.2 GHz to 22 GHz 22 GHz to 26.5 GHz	2.9 dB 3.7 dB	
PULSE WAVEFORM (20/F04)			
Rise time (Generate)	≥ 14 ps	2 ps	Pulser
Rise time (Measure)	28 ps to 300 ps 300 ps to 5 ns 5 ns to 100 ns 100 ns	14 % 4.7 % 1.4 % 0.73 %	Sampling System
MECHANICAL			
MASS DETERMINATION (20/M08)			
Mass – Metric Field calibrations Available Note 4	8 kg 7 kg 6 kg 5 kg 4 kg 2 kg 1 kg 500 g 200 g 100 g 50 g 20 g 10 g 5 g 2 g 1 g 500 mg 200 mg 100 mg 50 mg 20 mg 10 mg 5 mg	18 mg 16 mg 15 mg 13 mg 12 mg 10 mg 1.6 mg 1.0 mg 0.39 mg 0.35 mg 0.11 mg 0.16 mg 0.14 mg 0.13 mg 0.16 mg 0.083 mg 0.078 mg 0.076 mg 0.065 mg 0.064 mg 0.073 mg 0.084 mg 0.097 mg	Echelon III

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Measured Parameter or Device Calibrated	Range	Uncertainty (*k*=2) Note 3,5	Remarks
	2 mg 1 mg	0.064 mg 0.064 mg	
TORQUE (20/M15)			
Torque Measure Field calibrations Available Note 4	2 lbf-in to 811 lbf-ft	1.0 %	Torque Calibrator
WEIGHING INSTRUMENTS (20/M16)			
Balance and Scale Calibration Field calibrations Available Note 4	114 kg 64 kg 32 kg 16 kg 8 kg 7 kg 6 kg 5 kg 4 kg 2 kg 1 kg 500 g 200 g 100 g 50 g 20 g 10 g 5 g 2 g 1 g 500 mg 200 mg 100 mg 50 mg 20 mg 10 mg 5 mg	0.60 g 0.45 g 0.21 g 98 mg 18 mg 16 mg 15 mg 13 mg 12 mg 10 mg 1.6 mg 1.0 mg 0.39 mg 0.35 mg 0.11 mg 0.16 mg 0.14 mg 0.13 mg 0.16 mg 0.083 mg 0.078 mg 0.076 mg 0.065 mg 0.064 mg 0.073 mg 0.084 mg 0.097 mg	ASTM Class 1 and Class 2 Mass Standards

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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 mg 1 mg	0.064 mg 0.064 mg	

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty (*k*=2) Note 3	Remarks
ELECTROMAGNETICS – RF/MICROWAVE				
RF/MICROWAVE POWER (20/R17)				
RF Power Field calibrations Available Note 4	+30 dBm to -20 dBm	100 kHz to 2.6 GHz 2.6 GHz to 26.5 GHz	0.11 dBm 0.16 dBm	Measuring Receiver
	-20 dBm to -40 dBm	9 kHz to 6 GHz	0.18 dBm	Power Meter w/ sensor
Sine Flatness (RF)		9 kHz to 6GHz	0.073 dB	Agilent E4418B w/ E9304A
SCATTERING PARAMETERS (20/R18)				
Attenuation	0 dB to -10 dB -10 dB to -20 dB -20 dB to -30 dB -30 dB to -40 dB -40 dB to -50 dB -50 dB to -60 dB -60 dB to -70 dB -70 dB to -80 dB -80 dB to -90 dB -90 dB to -100 dB -100 dB to -110 dB -110 dB to -120 dB	2.5 MHz to 26.5 GHz	0.02 dB 0.021 dB 0.025 dB 0.029 dB 0.034 dB 0.039 dB 0.043 dB 0.052 dB 0.056 dB 0.06 dB 0.12 dB 0.18 dB	Agilent 8902 with 11793A sensor

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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
THERMODYNAMIC			
HUMIDITY (20/T02)			
Humidity – Measure Field calibrations Available Note 4	0 % RH to 90 % RH 90 % RH to 100 % RH	2.2 % RH 2.7 % RH	Vaisala M170 & HMP76
LABORATORY THERMOMETERS (20/T03)			
Measuring Equipment	-25 ºC to 25 ºC 25 ºC to 150 ºC 150ºC to 200 ºC 200°C to 300°C 300°C to 420°C 420° to 660°C 0° to 50°C -200 ºC to 0 ºC 0 ºC to 420 ºC 420 ºC to 660 ºC	0.020 ºC 0.027 °C 0.033 °C 0.040 °C 0.01 % + 0.44 °C 0.021 % 0.007 °C 0.017 ºC 0.024 ºC 0.031 ºC	PRT with Liquid Baths PRT with Metrology Well Liquid Bath with RTD PRT and Hart 1560
Measure Field calibrations Available Note 4			
PRESSURE (20/T05)			
Absolute Pressure Source – Pneumatic	0.2 psi to 1.45 psi 1.45 psi to 50 psi 50 psi to 1000 psi	0.0013 % + 0.29 mpsi 0.0015 % + 14 µpsi 0.0019 %	Ruska 2465 DHI FPG 7601
Gage Pressure Source – Pneumatic	-14.7 psi to -0.2 psi -60 inH_2O to +60 inH_2O 0.2 psi to 100 psi 100 psi to 1000 psi	0.0013 % + 8 µpsi 0.0028 % + 22 µinH_2O 0.0013 % + 8 µpsi 0.0019 %	Ruska 2465 DHI FPG 8601 Ruska 2465
Gage Pressure Source – Hydraulic	72.5 psi to 7250 psi 200 psi to 20 000 psi 725 psi to 43 500 psi 43 500 psi to 72 500 psi	0.0020 % + 2.9 mpsi 0.0035 % + 7.3 mpsi 0.0047 % + 15 mpsi 0.0055 %	DHI PG7000

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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
Determination of Piston Area	0.2 psi to 100 psi	0.0011 %	Ruska 2465
	100 psi to 1000 psi	0.0017 %	
	72.5 psi to 7250 psi	0.0017 %	DHI PG7000 (Gas to 6 kpsi)
	200 psi to 20 000 psi	0.0026 %	
	725 psi to 72 500 psi	0.0051 %	
Pressure Source Pneumatic Field calibrations Available Note 4	-14.7 psi to -0.2 psi	0.0013% + 8 µpsi	Ruska 2465 gauge mode
	0.2 psi to 100 psi	0.0013% + 8 µpsi	
	0.2 psi to 100 psi	0.0011% + 0.29 mpsi	Ruska 2465 absolute mode
	100 psi to 1000 psi	0.0019 %	Ruska 2465 gauge or absolute
Hydraulic Field calibrations Available Note 4	50 psi to 15 000 psi	0.011 % + 0.17 psi	Ametek T-150
THERMOCOUPLES & PYROMETER INDICATORS (20/T08)			
Isothermal Block Verification Field calibrations Available Note 4	Ambient (~ 23 ºC)	0.04 ºC	Thermocouple Half Junction
Electrical Simulation of Thermocouples			
Type J	-210 °C to 1200 °C	0.1°C	Thermocouple Half Junction
Type K	-270 °C to 1372 °C	0.1°C	
Type T	-270 °C to 400 °C	0.1°C	
Type E	-270 °C to 1000 °C	0.1°C	
Type R	0 °C to 250 °C	0.58°C	Fluke 5520A
	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	

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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 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	
Type B	410 °C to 1300 °C	0.29 °C	
	600 °C to 800 °C	0.45 ºC	
	800 °C to 1000 °C	0.35 ºC	
	1000 °C to 1550 °C	0.32 ºC	
	1550 °C to 1820 °C	0.35 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:** Uncertainty values of derivatives of 10 MHz will differ due to resolution, noise and gating errors.

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