



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Transcat – Denver
3521 Lewiston St, Suite 12
Aurora, CO 80011

has been assessed by ANAB
and meets the requirements of international standard

ISO/IEC 17025:2005

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

while demonstrating technical competence in the field of

CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of calibrations to which this accreditation applies.

AC-2489.10
Certificate Number


ANAB Approval

Certificate Valid: 11/07/2018-09/07/2019
Version No. 003 Issued: 11/07/2018



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 AND
ANSI/NCSL Z540-1-1994 (R2002)**

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CALIBRATION

Valid to: **September 7, 2019**

Certificate Number: **AC-2489.10**

Acoustics and Vibration

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Acceleration	5 Hz to 9 Hz	1.7%	Standard Accelerometer
	10 Hz to 99 Hz	1.2%	
	100 Hz	0.75%	
	101 Hz to 920 Hz	1%	
	921 Hz to 5 000 Hz	1.4%	
	5 001 Hz to 10 kHz	1.8%	
	10 kHz to 15 kHz	2.2%	
	15 kHz to 20 kHz	2.8%	

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Sinewave Flatness ¹	0.3 V to 3 V		Thermal Converter/HP3458A
	10 Hz to 1 MHz	0.06%	
	1 MHz to 10 MHz	0.1%	
	10 MHz to 30 MHz	0.18%	
	30 MHz to 50 M Hz	0.41%	
	50 MHz to 80 MHz	0.71%	
	80 MHz to 100 MHz	0.84%	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
ACI Measuring Equipment ¹	0 µA to 220 µA		Fluke 5700A/EP
	10 Hz to 20 Hz	0.031 % + 16 nA	
	20 Hz to 40 Hz	0.019 % + 10 nA	
	40 Hz to 1 kHz	0.015 % + 8 nA	
	1 kHz to 5 kHz	0.03 % + 12 nA	
	5 kHz to 10 kHz	0.11 % + 65 nA	
	0.22 mA to 2.2 mA		
	10 Hz to 20 Hz	0.03 % + 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 % + 0.4 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 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	0.015 % + 2.5 µA		
1 kHz to 5 kHz	0.021 % + 3.5 µA		
5 kHz to 10 kHz	0.12 % + 10 µA		
ACI Measuring Equipment ¹	0.22 A to 2.2 A		Fluke 5700A/EP
	20 Hz to 1 kHz	0.027 % + 35 µA	
	1 kHz to 5 kHz	0.046 % + 80 µA	Fluke 5700A/EP with 5725
	5 kHz to 10 kHz	0.7 % + 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	0.036 % + 0.75 mA		



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Extended Frequency Ranges ¹	29 μA to 330 μA 10 kHz to 30 kHz	1.2 % + 0.4 μA	Fluke 5520A
	0.33 mA to 3.3 mA 10 kHz to 30 kHz	0.78 % + 0.6 μA	
	3.3 mA to 33 mA 10 kHz to 30 kHz	0.31 % + 4 μA	
	33 mA to 330 mA 10 kHz to 30 kHz	0.31 % + 0.2 mA	
Clamp-on Ammeter Toroidal Type ¹ Transformer Type	20 A to 150 A 45 Hz to 65 Hz	0.3 % + 0.026 A	Fluke 5520A with 5500A/Coil
	65 Hz to 440 Hz	0.83 % + 0.047 A	
	150 A to 1000 A 45 Hz to 65 Hz	0.35 % + 0.12 A	
	65 Hz to 440 Hz	1.1 % + 0.22 A	
Clamp-on Ammeter Non-Toroidal Type ¹ Hall Effect Sensor	20 A to 150 A 45 Hz to 65 Hz	0.57 % + 0.25 A	Fluke 5520A with 5500A/Coil
	65 Hz to 440 Hz	1 % + 0.25 A	
	150 A to 1000 A 45 Hz to 65 Hz	0.6 % + 0.9 A	
	65 Hz to 440 Hz	1.3 % + 0.92 A	
AC Current – Measure ¹	0 μA to 100 μA 10 Hz to 20 Hz	0.4 % + 30 nA	Agilent 3458A /002
	20 Hz to 45 Hz	0.15 % + 30 nA	
	45 Hz to 100 Hz	0.063 % + 30 nA	
	100 Hz to 1 kHz	0.063 % + 30 nA	
	100 μA to 1 mA 10 Hz to 20 Hz	0.4 % + 0.2 μA	
	20 Hz to 45 Hz	0.15 % + 0.2 μA	
	45 Hz to 100 Hz	0.062 % + 0.2 μA	
	100 Hz to 5 kHz	0.034 % + 0.2 μA	

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
AC Current – Measure ¹	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	0.4 % + 2 μA 0.15 % + 2 μA 0.062 % + 2 μA 0.034 % + 2 μA	Agilent 3458A /002
	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	0.4 % + 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 % + 0.2 mA 0.16 % + 0.2 mA 0.085 % + 0.2 mA 0.10 % + 0.2 mA	
	1 A to 20 A 50 Hz to 100 Hz 100 Hz to 300 Hz 300 Hz to 1 kHz 1 kHz to 3 kHz 3 kHz to 4 kHz 4 kHz to 5 kHz	0.02% 0.03% 0.03% 0.06% 0.07% 0.09%	
AC Resistance – Measure ¹	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	0.06%	
	420 Ω to 32 kΩ 100 Hz to 10 kHz	0.06%	
	32 kΩ to 320 kΩ 100 Hz to 100 kHz	0.06%	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
AC Resistance – Measure ¹	320 kΩ to 10 MΩ 100 Hz to 100 kHz	0.12%	
AC Resistance-Measuring Equipment	0.1 Ω	0.17%	Impedance Standards
	1 Ω	0.12%	
	10 Ω	0.12%	
	100 Ω	0.05%	
	1 kΩ	0.05%	
	10 kΩ	0.13%	
	100 kΩ	0.26%	
	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 mΩ	
	10 kΩ to 100 kΩ	13 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		
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		
Resistance - Measuring Equipment ¹	333 μΩ	0.12%	Guildline 9211
	1 mΩ	0.06%	
	10 mΩ	0.01%	
	100 mΩ	0.01%	
	1 Ω	10 μΩ	Fluke 742A
	10 kΩ	54 mΩ	
	1 GΩ	0.20%	
10 GΩ	0.50%	IET HRRS-Q-8-100k-10kV	
100 GΩ	0.55%		
1 TΩ	0.56%		



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
DC Current – Measuring Equipment ¹	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 2 µA	0.029 % + 100 pA	
DC Current – Measuring Equipment ¹	2 µA 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	Fluke 5700A/EP w/5725A
	220 mA to 2.2 A	0.02 % + 12 µA	
	2.2 A to 11 A	0.04 % + 0.48 mA	
	11 A to 20.5 A	0.082 % + 0.75 mA	
	1 A to 10 A	0.01%	Fluke 5520A
	10 A to 100 A	0.06%	
	100 A to 300 A	0.12%	
DC Current – Measure ¹	0 to 2 pA	2.1 % + 6.6 fA	Keithley 617
	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	HP 3458A Opt 002
	20 nA to 200nA	0.3 % + 10 pA	
	200 nA to 1 µA	26 µA/A + 0.4 pA	
	1 µA to 10 µA	26 µA/A + 0.1 nA	
DC Current – Measure ¹	10 µA to 100 µA	28 µA/A + 0.8 nA	HP 3458A Opt 002
	100 µA to 1 mA	29 µA/A + 5 nA	
	1 mA to 10 mA	29 µA/A + 50 nA	
	10 mA to 100 mA	47 µA/A + 0.5 µA	
	100 mA to 1 A	0.11 % + 10 µA	Guildline 9211 with meter
	1 A to 10 A	0.01%	
	10 A to 100 A	0.06%	
	100 A to 300 A	0.12%	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Clamp-on Ammeter Non-Toroidal Type ¹ Hall Effect Sensor	20 A to 150 A	0.50 % + 0.14 A	Fluke 5520A with 5500A/Coil
	150 A to 1000 A	0.51 % + 0.5 A	
DC Voltage – Measure ¹	0 mV to 100 mV	10 μV/V + 0.5 μV	3458A Opt 002
	100 mV to 10 V	5.2 μV/V + 0.5 μV	
	10 V to 100 V	7.9 μV/V + 30 μV	
	100 V to 500 V	12 μV/V + 0.1 mV	
	500 V to 800 V	15 μV/V + 0.1 mV	
	800 V to 1 kV	21 μV/V + 0.1 mV	
	1 kV to 5 kV	0.04 % + 0.26 V	Vitrek 4700 / HVL-35 / HVL-70 / HVL-100
	5 kV to 10 kV	0.04 % + 1.7 V	
	10 kV to 20 kV	0.065 % + 1.1 V	
	20 kV to 50 kV	0.066 % + 10 V	
	50 kV to 70 kV	0.067 % + 28 V	
	70 kV to 100 kV	0.069 % + 81 V	
DC Voltage - Measuring Equipment ¹	0 V to 220 mV	8.5 μV/V + 0.5 μV	Fluke 5700A/EP
	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	Fluke 5700A/EP w/5725A
	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		
AC Voltage – Measure ¹	0 mV to 1 mV		R&S URE3
	0.1 MHz to 1 MHz	1.8 % + 2.4 μV	
	1 MHz to 3 MHz	3.5 % + 2.4 μV	
	3 MHz to 10 MHz	9.3 % + 2.4 μV	
	10 MHz to 20 MHz	23 % + 2.4 μV	
	1 mV to 3 mV		
	0.1 MHz to 1 MHz	0.97 % + 2 μV	
	1 MHz to 3 MHz	3.5 % + 2 μV	
	3 MHz to 10 MHz	9.3 % + 2 μV	
	10 MHz to 20 MHz	23 % + 2 μV	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
AC Voltage – Measure ¹	3 mV to 100 mV		R & S URE3
	0.1 MHz to 1 MHz	0.91 % + 3 μV	
	1 MHz to 3 MHz	1.8 % + 3 μV	
	3 MHz to 10 MHz	2.9 % + 3 μV	
	10 MHz to 20 MHz	6.9 % + 3 μV	
	20 MHz to 30 MHz	14 % + 3 μV	
AC Voltage – Measure ¹	0 mV to 10 mV		Agilent 3458A/002
	1 Hz to 40 Hz	0.039 % + 3 μV	
	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	0.0095 % + 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	0.009 8 % + 40 μV	
	40 Hz to 1 kHz	0.009 4 % + 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		

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
AC Voltage – Measure ¹	1 V to 10 V		Agilent 3458A/002
	1 Hz to 40 Hz	0.009 5 % + 0.4 mV	
	40 Hz to 1 kHz	0.009 5 % + 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		
100 kHz to 300 kHz	0.46 % + 10 mV		
300 kHz to 1 MHz	1.7 % + 10 mV		
100 V to 700 V		Vitrek 4700	
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		
(0.7 to 5) kV (10 to 200) Hz	0.14 % + 0.34 V	Vitrek 4700	
(0 to 5) kV (200 to 450) Hz	0.47 % + 0.34 V		
5 kV to 10 kV			
10 Hz to 200 Hz	0.16 % + 1.9 V	Vitrek 4700 / HVL-35 / HVL-70 / HVL-100	
200 Hz to 450 Hz	0.47 % + 1.9 V		
10 kV to 20 kV			
30 Hz to 70 Hz	0.16 % + 1.4 V	Vitrek 4700 / HVL-35 / HVL-70 / HVL-100	
70 Hz to 200 Hz	1.2 % 1.4 V		
200 Hz to 450 Hz	2.9 % + 1.8 V		



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
AC Voltage – Measure ¹	20 kV to 50 kV 30 Hz to 70 Hz 70 Hz to 200 Hz 200 Hz to 450 Hz	0.16 % + 11 V 1.2 % + 11 V 2.9 % + 21 V	Vitretek 4700 / HVL-35 / HVL-70 / HVL-100
	50 kV to 70 kV 30 Hz to 70 Hz 70 Hz to 200 Hz	0.16 % + 28 V 1.2 % + 28 V	
AC Voltage Measuring Equipment ¹	0 mV to 2.2 mV 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.16 % + 4 μV 0.10 % + 4 μV 0.078 % + 4 μV 0.13 % + 4 μV 0.17 % + 5 μV 0.33 % + 10 μV 0.47 % + 20 μV 0.58 % + 20 μV	5700A/EP
	2.2 mV to 22 mV 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.042 % + 4 μV 0.03 % + 4 μV 0.014 % + 4 μV 0.03 % + 4 μV 0.058 % + 5 μV 0.12 % + 10 μV 0.16 % + 20 μV 0.27 % + 20 μV	
	22 mV to 220 mV 10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.028 % + 12 μV 0.011 % + 7 μV 0.008 % + 7 μV 0.021 % + 7 μV 0.047 % + 17 μV 0.091 % + 20 μV 0.14 % + 25 μV 0.28 % + 45 μV	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
AC Voltage Measuring Equipment ¹	220 mV to 2.2 V		5700A/EP
	10 Hz to 20 Hz	0.027 % + 40 μV	
	20 Hz to 40 Hz	0.011 % + 15 μV	
	40 Hz to 20 kHz	0.004 8 % + 8 μV	
	20 kHz to 50 kHz	0.008 4 % + 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 % + 0.2 mV	
	500 kHz to 1 MHz	0.18 % + 0.3 mV	
	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	0.004 9 % + 50 μV	
	20 kHz to 50 kHz	0.008 3 % + 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	0.11 % + 2 mV		
500 kHz to 1 MHz	0.17 % + 3.2 mV		
22 V to 220 V		5700A/EP with 5725A	
10 Hz to 20 Hz	0.028 % + 4 mV		
20 Hz to 40 Hz	0.01 % + 1.5 mV		
40 Hz to 20 kHz	0.005 6 % + 0.6 mV		
20 kHz to 50 kHz	0.009 3 % + 1 mV		
50 kHz to 100 kHz	0.016 % + 2.5 mV		
100 kHz to 300 kHz	0.09 % + 16 mV		
300 kHz to 500 kHz	0.44 % + 40 mV		
500 kHz to 1 MHz	0.8 % + 80 mV		
220 V to 750 V			
30 kHz to 50 kHz	0.061 % + 11 mV		
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	0.067 % + 11 mV		



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Capacitance – Measure ¹ 1 kHz	Up to 10 pF	0.47 % + 0.05 pF	GenRad 1689
	10 pF to 100 pF	0.058 % + 0.05 pF	
	100 pF to 1 μF	0.024 % + 0.05 pF	
	1 μF to 100 μF	0.04%	
	100 μF to 1 mF	0.24%	
Capacitance – Measure ¹	10 nF to 100 μF 100 Hz to 120 Hz	0.06%	Agilent 4284A
	100 μF to 12 mF 100 Hz to 120 Hz	0.12%	
	10 nF to 10 μF 400 Hz	0.06%	
	10 μF to 80 pF 10 kHz	0.12%	
	80 pF to 1 μF 10 kHz	0.06%	
	12 pF to 90 pF 100 kHz	0.12%	
	90 pF to 100 nF 100 kHz	0.06%	
	100 nF to 100 μF 100 kHz	0.12%	
	10 pF to 90 pF 1 MHz	0.12%	
	90 pF to 10 nF 1 MHz	0.06%	
Capacitance - Measuring Equipment ¹	0.1 nF to 0.5 nF 1 kHz	0.59 pF	Arco SS32
	0.5 nF to 1.4 μF 1 kHz	0.12 % + 0.018 pF	
	1 pF 1 kHz to 1 MHz	0.06%	HP16381A
	10 pF 1 kHz to 1 MHz	0.004%	HP16382A



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Capacitance - Measuring Equipment ¹	100 pF 1 kHz to 1 MHz	0.004%	HP16383A
	1000 pF 1 kHz to 1 MHz	0.007%	HP16384A
	10 nF 120 Hz to 100 kHz	0.007%	HP 16385A
	100 nF 120 Hz to 100 kHz	0.007%	HP 16386A
	1 μF 120 Hz to 100 kHz	0.007%	HP 16387A
	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	0.2 % + 7.8 pF	
	11 nF to 110 nF 10 Hz to 1 kHz	0.2 % + 78 pF	
	110 nF to 330 nF 10 Hz to 1 kHz	0.2 % + 0.23 nF	
	0.33 μF to 1.1 μF 10 Hz to 600 Hz	0.2 % + 0.78 nF	
	1.1 μF to 3.3 μF 10 Hz to 300 Hz	0.2 % + 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	0.37 % + 0.23 μF	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Capacitance - Measuring Equipment ¹	0.33 mF to 1.1 mF DC to 20 Hz	0.37 % + 0.78 μF	5520A
	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	
Inductance – Measure ¹	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	
	5 μH to 5 mH 400 Hz	0.12%	Agilent 4284A
	5 mH to 10 H 400 Hz	0.06%	
	120 μH to 20 mH 100 Hz to 120 Hz	0.12%	
	20 mH to 10 H 100 Hz to 120 Hz	0.06%	
	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	0.06%		
Inductance – Measuring Equipment ¹	100 mH 1 kHz	0.14%	Standard Inductor



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Electrical Calibration of Thermocouple Devices ¹ Type J	-210 °C to -180 °C	0.13 °C	Ectron 1140A
	-180 °C to -120 °C	0.11 °C	
	-120 °C to -50 °C	0.09 °C	
	-50 °C to 990 °C	0.08 °C	
	990 °C to 1 200 °C	0.08 °C	
Type K	-270 °C to -255 °C	2.3 °C	
	-255 °C to -195 °C	0.73 °C	
	-195 °C to -115 °C	0.14 °C	
	-115 °C to -55 °C	0.10 °C	
	-55 °C to 1 000 °C	0.08 °C	
Type T	1 000 °C to 1372 °C	0.09 °C	
	-270 °C to -250 °C	1.8 °C	
	-255 °C to -240 °C	0.52 °C	
	-240 °C to -210 °C	0.32 °C	
	-210 °C to -150 °C	0.19 °C	
	-150 °C to -40 °C	0.13 °C	
	-40 °C to 100 °C	0.09 °C	
Type E	100 °C to 400 °C	0.08 °C	
	-270 °C to -245 °C	2.1 °C	
Type E	-245 °C to -195 °C	2 °C	
	-195 °C to -155 °C	1.1 °C	
	-155 °C to -90 °C	0.93 °C	
	-90 °C to 0 °C	0.08 °C	
	0 °C to 15 °C	0.08 °C	
	15 °C to 890 °C	0.07 °C	
Type R	890 °C to 1 000 °C	0.08 °C	
	-50 °C to -30 °C	0.68 °C	
	-30 °C to 45 °C	0.58 °C	
	45 °C to 160 °C	0.42 °C	
	160 °C to 380 °C	0.31 °C	
	380 °C to 775 °C	0.28 °C	
	775 °C to 1 768.1 °C	0.23 °C	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Type S	-50 °C to -30 °C	0.65 °C	Ectron 1140A
	-30 °C to 45 °C	0.59 °C	
	45 °C to 105 °C	0.42 °C	
	105 °C to 310 °C	0.33 °C	
	310 °C to 615 °C	0.31 °C	
	615 °C to 1 768.1 °C	0.27 °C	
Type N	-270 °C to -260 °C	5.1 °C	
	-260 °C to -200 °C	1.1 °C	
	-200 °C to -140 °C	0.25 °C	
	-140 °C to -70 °C	0.16 °C	
Type N	-70 °C to 25 °C	0.13 °C	
	25 °C to 160 °C	0.11 °C	
	160 °C to 1 300 °C	0.1 °C	
Type B	250 °C to 350 °C	1.0 °C	
	350 °C to 450 °C	0.77 °C	
	450 °C to 580 °C	0.61 °C	
	580 °C to 750 °C	0.47 °C	
	750 °C to 1 000 °C	0.39 °C	
	1 000 °C to 1 820 °C	0.31 °C	

Electrical - RF/Microwave

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Power – Measuring Equipment (for current range listed below) DC Power 0.33 mA to 330 mA	11 μW to 1.1 mW	0.02%	Fluke 5520A
	1.1 mW to 110 mW	0.03%	
	0.11W to 110 W	0.02%	
0.33 A to 3 A	110 W to 330 W	0.02%	
	11 W to 110 mW	0.04%	
	0.11 W to 990 W	0.05%	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
3 A to 20.5 A	1 W to 3 kW	0.009 6 %	Fluke 5520A
	0.099 W to 0.99 W	0.09%	
	0.99 W to 6.8 kW	0.07%	
	6.8 W to 20.5 kW	0.04%	
AC Power ³ (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	0.08%	
9 mA to 33 mA	0.3 mW to 10 mW 10 Hz to 65 Hz	0.09%	
	10 mW to 33 W 10 Hz to 65 Hz	0.08%	
33 mA to 90 mA	1 mW to 30 mW 10 Hz to 65 Hz	0.07%	
	30 mW to 90 W 10 Hz to 65 Hz	0.06%	
90 mA to 330 mA	3 mW to 100 mW 10 Hz to 65 Hz	0.09%	
	100 mW to 300 W 10 Hz to 65 Hz	0.08%	
0.33 A to 0.9 A	11 mW to 300 mW 10 Hz to 65 Hz	0.07%	
	300 mW to 900 W 10 Hz to 65 Hz	0.08%	
0.9 A to 2.2 A	30 mW to 720 mW 10 Hz to 65 Hz	0.09%	
0.9 A to 2.2 A	720 mW to 2 kW 10 Hz to 65 Hz	0.08%	
2.2 A to 4.5 A	80 mW to 1.4 W 10 Hz to 65 Hz	0.09%	
	1.4 W to 4.5 kW 10 Hz to 65 Hz	0.18%	



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Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
4.5 A to 20.5 A	150 mW to 6.7 W 10 Hz to 65 Hz	0.17%	Fluke 5520A
	6.7 W to 20 kW 10 Hz to 65 Hz	0.17%	
Phase Meters - Measuring Equipment ¹	0° to 179.99° 10 Hz to 65 Hz	0.1°	Fluke 5520A
	65 Hz to 500 Hz	0.2°	
	500 Hz to 1 kHz	0.4°	
	1 kHz to 5 kHz	1.8°	
	5 kHz to 10 kHz 10 kHz to 30 kHz	3.6° 7.3°	
Frequency - Source and Measure In-Lab Field Service ¹	10 MHz	3.7×10^{-12}	Fluke 910R
	10 MHz	3.8×10^{-9}	HP 53132A Counter
AM Depth – Measure ¹ 50 Hz to 10 kHz	5 % to 40 % 150 kHz to 10 MHz	$(0.021AM + 0.014) \%$	Agilent 8902A with 11722A
	40 % to 99 % 150 kHz to 10 MHz	$(0.021AM + 0.14) \%$	
20 Hz to <50 Hz	5 % to 40 % 150 kHz to 10 MHz	$(0.031AM + 0.014) \%$	
	40 % to 99 % 150 kHz to 10 MHz	$(0.031AM + 0.14) \%$	
50 Hz to 50 kHz	5 % to 40 % 10 MHz to 1.3 GHz	$(0.011AM + 0.014) \%$	
	40 % to 99 % 10 MHz to 1.3 GHz	$(0.011AM + 0.14) \%$	
50 Hz to 50 kHz	5 % to 40 % 1.3 GHz to 26.5 GHz	$(0.016AM + 0.014) \%$	Agilent 8902A with 11722A, 11792A, and 11793A
	40 % to 99 % 1.3 GHz to 26.5 GHz	$(0.016AM + 0.14) \%$	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
(20 Hz to 50 Hz) or (50 kHz to 100 kHz)	5 % to 40 % 10 MHz to 26.5 GHz	(0.031 <i>AM</i> + 0.014) %	Agilent 8902A with 11722A, 11792A, and 11793A
	40 % to 99 % 10 MHz to 26.5 GHz	(0.031 <i>AM</i> + 0.14) %	
FM Modulation – Measure ¹ 20 Hz to 10 kHz	0 kHz to 4 kHz 250 kHz to 10 MHz 4 kHz to 40 kHz 40 kHz to 400 kHz	(0.021 <i>FM</i> + 20) Hz (0.021 <i>FM</i> + 22) Hz (0.021 <i>FM</i> + 100) Hz	Agilent 8902A with 11722A
50 Hz to 100 kHz	0 kHz to 4 kHz 100 MHz to 26.5 GHz	(0.011 <i>FM</i> + 20) Hz	Agilent 8902A with 11722A, 11792A, and 11793A
	4 kHz to 40 kHz 100 MHz to 26.5 GHz	(0.011 <i>FM</i> + 22) Hz	
	40 kHz to 400 kHz 100 MHz to 26.5 GHz	(0.011 <i>FM</i> + 100) Hz	
20 Hz to <50 Hz	0 kHz to 4 kHz 100 MHz to 26.5 GHz	(0.05 <i>FM</i> + 20) Hz	
	4 kHz to 40 kHz 100 MHz to 26.5 GHz	(0.05 <i>FM</i> + 22) Hz	
	40 kHz to 400 kHz 100 MHz to 26.5 GHz	(0.05 <i>FM</i> + 100) Hz	
>100 kHz to 200 kHz	0 kHz to 4 kHz 100 MHz to 26.5 GHz	(0.05 <i>FM</i> + 100) Hz	
	4 kHz to 40 kHz 100 MHz to 26.5 GHz	(0.05 <i>FM</i> + 100) Hz	
	40 kHz to 400 kHz 100 MHz to 26.5 GHz	(0.05 <i>FM</i> + 100) Hz	
Phase Modulation – Measure ¹ 200 Hz to 10 kHz	0 rad to < 4 rad 150 kHz to 10 MHz	(0.042 <i>PM</i> + 0.03) rad	Agilent 8902A with 11722A
	4 rad to < 40 rad 150 kHz to 10 MHz	(0.042 <i>PM</i> + 0.03) rad	
Phase Modulation – Measure ¹ 200 Hz to 10 kHz	40 rad to 400 rad 150 kHz to 10 MHz	(0.042 <i>PM</i> + 0.1) rad	



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
200 Hz to 20 kHz	0 rad to < 4 rad 10 MHz to 26.5 GHz	(0.036PM + 0.03) rad	Agilent 8902A with 11722A, 11792A, and 11793A
	4 rad to < 40 rad 10 MHz to 26.5 GHz	(0.036PM + 0.03) rad	
	40 rad to 400 rad 10 MHz to 26.5 GHz	(0.036PM + 0.1) rad	
Harmonic Distortion ¹	0 dBc to -80 dBc 30 Hz to 6.5 GHz	1.7 dB	Agilent 8563E
	6.5 GHz to 22 GHz	2.6 dB	
	22 GHz to 26.5 GHz	3.4 dB	
Total Harmonic Distortion ¹	0 dB to -80 dB 20 Hz to 20 kHz	1.2 dB	Agilent 8903B
	20 kHz to 100 kHz	2.3 dB	
AM Total Harmonic Distortion ¹	0 dB to -80 dB 20 Hz to 100 kHz	2.7 dB	
Total Harmonic Distortion ¹ Input Voltage Range 5 Hz to 1.2 MHz < 30 V 100 % to 0.3 %	10 Hz to 1 MHz	3%	Agilent 334A
	1 MHz to 3 MHz	6%	
	10 Hz to 20 Hz	12%	
	20 Hz to 30 Hz	6%	
	30 Hz to 300 kHz	3%	
	300 kHz to 500 kHz	6%	
	500 kHz to 1.2 MHz	12%	
Total Harmonic Distortion ¹ Input Voltage Range > 30 V 100 % to 0.3 % 0.10%	10 Hz to 300 kHz	3%	Agilent 334A
	300 kHz to 500 kHz	6%	
	500 kHz to 3 MHz	12%	
	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%	
Rise time (Generate) ¹	≥ 14 ps	2.4 ps	Pulser



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Rise Time (Measure)	≥ 17 ps	3.9 ps	Sampling System
Absolute RF Power ¹ 50 MHz	1 mW Reference	0.63 % (0.03 dB)	Agilent 478A- H75, 432A, and 3458A
100 kHz to 2.6 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	0.12 dB 0.12 dB 0.12 dB 0.12 dB 0.15 dB	Agilent 8902A with 11722A
2.6 GHz to 12 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	0.13 dB 0.13 dB 0.13 dB 0.13 dB 0.14 dB	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	0.13 dB 0.13 dB 0.13 dB 0.13 dB 0.15 dB	
18 GHz to 26.5 GHz	5 dBm to 0 dBm 0 dBm to -10 dBm -10 dBm to -20 dBm	0.16 dB 0.15 dB 0.15 dB	
Reflection (VSWR) ¹ 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 ¹ 2.5 MHz 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	0.12 dB 0.14 dB 0.18 dB 0.23 dB 0.34 dB 0.37 dB	Agilent 8902A with 11722A, 11793A



Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Relative Tuned RF Power ¹ 18 GHz to 26 GHz	0 dB to -20 dB	0.13 dB	Agilent 8902A with 11722A, 11793A
	-20 dB to -40 dB	0.15 dB	
	-40 dB to -60 dB	0.18 dB	
	-60 dB to -80 dB	0.22 dB	

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Angle	0° to 85°	1.5"	Master Angle Blocks
	90°	1.9"	Master Square
Micrometers & Calipers – Outside, Inside, Depth ¹	0.05 in to 48 in	(8 + 8L) μin	Comparison to Gage Blocks
Anvil Flatness ¹	0 in to 1 in	4.5 μin	Optical Flats
Digital & Dial Indicators ¹	0 in to 0.05 in	28 μin	Dial Indicator Calibrator
	0.05 in to 5 in	(44 + 4L) μin	Horizontal Comparator
Single Axis – Outside	0 in to 5 in	(6 + 8L) μin	Horizontal Comparator
Single Axis – Inside	0 in to 5 in	(22 + 3L) μin	Horizontal Comparator
Height Measuring Equipment ¹	0.4 in to 8 in	(29 + 6L) μin	Gage Blocks
	8 in to 48 in	(12 + 8L) μin	
Plug Gages	0 in to 5 in	(6 + 8L) μin	Horizontal Comparator
Ring Gages	0 in to 5 in	(22 + 3L) μin	
Rulers	0 in to 12 in	840 μin	Optical Comparator
Thread Plug – Outer Pitch Diameter	0 in to 1 in	79 μin	ULM w/Thread Wires
	1 in to 3 in	84 μin	
	3 in to 5 in	94 μin	
Thread Ring – Inner Pitch Diameter	0 in to 2 in	140 μin	Master Plug Gages



Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Force Measuring Equipment	1 lbf to 200 lbf	0.06%	Deadweight
Torque – Measure ¹	0.5 ozf·in to 15 ozf·in	0.83%	Wheel w/ weight Torque Calibrator
	15 ozf·in to 200 ozf·in	0.4%	
	4 lbf·in to 80 lbf·in	0.43%	
	80 lbf·in to 1 000 lbf·in	0.4%	
	20 lbf·ft to 2 000 lbf·ft	0.4%	
	1 000 lbf·ft to 5 000 lbf·ft	1%	
Torque – Measuring Equipment Wrenches, Transducers	0.5 ozf·in to 16 ozf·in	0.83%	Torque Wheel with Weights
	1 lbf·in to 40 lbf·in	0.08%	
	40 lbf·in to 260 lbf·in	0.07%	Torque Arm with Weights
	260 lbf·in to 3 000 lbf·in	0.07%	
Torque Multipliers	150 Nm to 2 700 Nm	1.1%	Torque Calibration System
	110 lbf·ft to 2000 lbf·ft	1.1%	
	2700 Nm to 4000 Nm	1.3%	
	2000 lbf·ft to 3000 lbf·ft	1.3%	
	4 000 Nm to 27 000 Nm	1.4%	
	3000 lbf·ft to 20000 lbf·ft	1.4%	
Hydraulic Devices	150 Nm to 2700 Nm	1.1%	Torque Calibration System
	110 lbf·ft to 2 000 lbf·ft	1.1%	
	2 700 Nm to 4 000 Nm	1.3%	
	2 000 lbf·ft to 3 000 lbf·ft	1.3%	
	4 000 Nm to 27 000 Nm	1.3%	
	3 000 lbf·ft to 20 000 lbf·ft	1.3%	
Balances & Scales ¹	5 mg to 500 mg	0.02 mg	ASTM Class 1 & 2 Weights
	500 mg to 5 g	0.04 mg	
	5 g to 10 g	0.08 mg	
	10 g to 20 g	0.08 mg	
	20 g to 30 g	0.08 mg	ASTM Class 1 & 2 Weights
	30 g to 50 g	0.12 mg	
	50 g to 100 g	0.25 mg	
	100 g to 200 g	0.5 mg	



Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Balances & Scales ¹	200 g to 500 g	1.2 mg	NIST Class F Weights
	500 g to 1 kg	2.5 mg	
1 kg to 2 kg	5.2 mg		
2 kg to 3 kg	7.7 mg		
3 kg to 4 kg	8.1 mg		
4 kg to 5 kg	12 mg		
5 kg to 10 kg	15 mg		
10 kg to 20 kg	53 mg		
1 lb to 500 lb	0.01%		
Absolute Pressure Measure & Measuring Equipment	25 to 500 psia 0 to 25 psia	0.006 7 % + 0.001 psia 0.0019 psia	
Gage Pressure Measure & Measuring Equipment – Pneumatic	-36 in H ₂ O to -22 in H ₂ O -22 in H ₂ O to 22 in H ₂ O 22 in H ₂ O to 60 in H ₂ O	0.009% + 150 μin H ₂ O 0.002 in H ₂ O 0.009% + 150 μin H ₂ O	DHI PPC4-ui
Gage Pressure Measure & Measuring Equipment – Pneumatic	60 in H ₂ O to 72 in H ₂ O	0.006 5 in H ₂ O	DHI PPC4-ui
	72 in H ₂ O to 804 in H ₂ O	0.009% + 150 μin H ₂ O	
	-14.7 psig to 25 psig	0.001 6 psig	Ruska 7250xi
	25 psig to 500 psig	0.0076%	
10 psig to 3000 psig	0.38 psig		Fluke RPM 4
3000 psig to 30000 psig	0.01%		
Pressure Measuring Equipment – Hydraulic	5 psig to 15 000 psig	0.02%	Fluke P3125-PSI

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Humidity Measuring Equipment	10 % to 90 %	1.3%	Vaisala HMI70/HMP76 with Source
Humidity – Measure ¹	10 % to 90 %	1.3%	Vaisala HMI70/HMP76
Temperature – Measure ¹	-195 °C to 0 °C	0.011 °C + 0.001 %	AccuMac AM1760 w/Black Stack
	0 °C to 420 °C	0.025 °C + 0.001 %	



Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) ²	Reference Standard, Method and/or Equipment
Temperature – Measure ¹	420 °C to 660 °C	0.037 °C + 0.001 %	AccuMac AM1760 w/ Hart 1575
	-195 °C to 0 °C	0.01 °C + 0.001 %	
	0 °C to 420 °C	0.02 °C + 0.001 %	
	420 °C to 660 °C	0.031 °C + 0.001 %	
Temperature – Measuring Equipment ¹	-25 °C to 140 °C	0.06 °C	AccuMac AM1760 w/Hart 1575 & Hart Well
	140 °C to 600 °C	0.03 °C	
Infrared Temperature – Measuring Equipment	-15 °C to 0 °C	0.8 °C	Hart Black Body
	0 °C to 50 °C	0.65 °C	
	50 °C to 100 °C	0.71 °C	
	100 °C to 120 °C	0.76 °C	
	120 °C to 200 °C	0.94 °C	
	200 °C to 350 °C	1.6 °C	
	350 °C to 500 °C	2.1 °C	

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. Values listed with percent (%) are percent of reading or generated value unless otherwise noted.
3. 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.
4. Where AM, FM, and PM is the value of the respective modulation measured. AM uncertainty is expressed in percent of modulation depth.
5. L = length in inches.
6. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2489.10.

Vice President