CERTIFICATE OF ACCREDITATION

ANSI National Accreditation Board

11617 Coldwater Road, Fort Wayne, IN 46845 USA

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 17025:2017

and national standards

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 activities to which this accreditation applies

AC-2489.10
Certificate Number

ANAB Approval

Certificate Valid Through: 09/07/2021
Version No. 004 Issued: 05/01/2019

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. 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).

ANSI National Accreditation Board

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017 AND ANSI/NCSL Z540-1-1994 (R2002)

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CALIBRATION

Valid to: **September 7, 2021** 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	
	5 kHz to 10 kHz	0.7 % + 0.16 mA	
	2.2 A to 11 A		Fluke 5700A/EP with 5725
	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 65 Hz to 440 Hz	0.3 % + 0.026 A 0.83 % + 0.047 A	Fluke 5520A with 5500A/Coil
	150 A to 1000 A 45 Hz to 65 Hz 65 Hz to 440 Hz	0.35 % + 0.12 A 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 65 Hz to 440 Hz	0.57 % + 0.25 A 1 % + 0.25 A	Fluke 5520A with 5500A/Coil
	150 A to 1000 A 45 Hz to 65 Hz 65 Hz to 440 Hz	0.6 % + 0.9 A 1.3 % + 0.92 A	
AC Current – Measure [1]	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	0.4 % + 0.2 µA 0.15 % + 0.2 µA 0.062 % + 0.2 µA 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		Agilent 3458A /002
	10 Hz to 20 Hz	0.4 % + 2 µA	
	20 Hz to 45 Hz	0.15 % + 2 µA	
	45 Hz to 100 Hz	0.062 % + 2 µA	
	100 Hz to 5 kHz	0.034 % + 2 µA	
	10 mA to 100 mA		
	10 Hz to 20 Hz	0.4 % + 20 µA	
	20 Hz to 45 Hz	0.15 % + 20 µA	
	45 Hz to 100 Hz	0.061 % + 20 µA	
	100 Hz to 5 kHz	0.033 % + 20 µA	
	100 mA to 1 A		
	10 Hz to 20 Hz	0.40 % + 0.2 mA	
	20 Hz to 45 Hz	0.16 % + 0.2 mA	
	45 Hz to 100 Hz	0.085 % + 0.2 mA	
	100 Hz to 5 kHz	0.10 % + 0.2 mA	
	1 A to 20 A		Fluke Y5020
	50 Hz to 100 Hz	0.02%	
	100 Hz to 300 Hz	0.03%	
	300 Hz to 1 kHz	0.03%	
	1 kHz to 3 kHz	0.06%	
	3 kHz to 4 kHz	0.07%	
	4 kHz to 5 kHz	0.09%	
AC Resistance – Measure [1]	20 Ω to 100 kΩ		Gen Rad 1689
	1 kHz	0.039 % + 0.01 Ω	
	0.1 Ω to 15 Ω		Agilent 4284A
	50 Hz to 100 kHz	0.12%	
	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 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ	0.17% 0.12% 0.12% 0.05% 0.05% 0.13% 0.26%	Impedance Standards
	0 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 10 kΩ 10 kΩ to 100 kΩ 100 kΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1 GΩ	20 µΩ/Ω + 50 µΩ 15 µΩ/Ω + 0.50 mΩ 13 µΩ/Ω + 0.50 mΩ 12 µΩ/Ω + 5 mΩ 13 µΩ/Ω + 50 mΩ 19 µΩ/Ω + 2 Ω 62 µΩ/Ω + 100 Ω 0.059 % + 1 kΩ 0.58 % + 10 kΩ	HP3458A w/Resistors
	1 GΩ to 2 GΩ 2 GΩ to 20 GΩ 20 GΩ to 200 GΩ	1.7% + 100 kΩ 1.7% + 1 MΩ 1.8% + 10 MΩ	Keithley 617
Resistance - Measuring Equipment [1]	333 µΩ 1 mΩ 10 mΩ 100 mΩ	0.12% 0.06% 0.01% 0.01%	Guildline 9211
	1 Ω 10 kΩ	10 µΩ 54 mΩ	Fluke 742A
	1 GΩ 10 GΩ 100 GΩ 1 TΩ	0.20% 0.50% 0.55% 0.56%	IET HRRS-Q-8-100k-10kV

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	
	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	0.01%	Guildline 9211 with source
	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	
	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	
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	
	1 A to 10 A	0.01%	Guildline 9211 with meter
	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 150 A to 1000 A	0.50 % + 0.14 A 0.51 % + 0.5 A	Fluke 5520A with 5500A/Coil
DC Voltage – Measure [1]	0 mV 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 1 kV 1 kV to 5 kV 5 kV to 10 kV 10 kV to 20 kV 20 kV to 50 kV 50 kV to 70 kV 70 kV to 100 kV	10 µV/V + 0.5 µV 5.2 µV/V + 0.5 µV 7.9 µV/V + 30 µV 12 µV/V + 0.1 mV 15 µV/V + 0.1 mV 21 µV/V + 0.1 mV 0.04 % + 0.26 V 0.04 % + 1.7 V 0.065 % + 1.1 V 0.066 % + 10 V 0.067 % + 28 V 0.069 % + 81 V	3458A Opt 002 Vitrek 4700 / HVL-35 / HVL-70 / HVL-100
DC Voltage - Measuring Equipment [1]	0 V to 220 mV 220 mV to 2.2 V 2.2 V to 11 V 11 V to 22 V 22 V to 220 V 220 V to 1100 V	8.5 µV/V + 0.5 µV 5.1 µV/V + 0.7 µV 4.0 µV/V + 2.5 µV 4.0 µV/V + 4 µV 6.2 µV/V + 40 µV 7.6 µV/V + 500 µV	Fluke 5700A/EP Fluke 5700A/EP w/5725A
AC Voltage – Measure [1]	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 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	 1.8 % + 2.4 µV 3.5 % + 2.4 µV 9.3 % + 2.4 µV 23 % + 2.4 µV 0.97 % + 2 µV 3.5 % + 2 µV 9.3 % + 2 µV 23 % + 2 µV	R&S URE3

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		
	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	
	200 Hz to 450 Hz	0.47 % + 1.9 V	
	10 kV to 20 kV		Vitrek 4700 / HVL-35 / HVL-70 / HVL-100
	30 Hz to 70 Hz	0.16 % + 1.4 V	
	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		Vitrek 4700 / HVL-35 / HVL-70 / HVL-100
	30 Hz to 70 Hz	0.16 % + 11 V	
	70 Hz to 200 Hz	1.2 % + 11 V	
	200 Hz to 450 Hz	2.9 % + 21 V	
	50 kV to 70 kV		
	30 Hz to 70 Hz	0.16 % + 28 V	
	70 Hz to 200 Hz	1.2 % + 28 V	
AC Voltage Measuring Equipment [1]	0 mV to 2.2 mV		5700A/EP
	10 Hz to 20 Hz	0.16 % + 4 µV	
	20 Hz to 40 Hz	0.10 % + 4 µV	
	40 Hz to 20 kHz	0.078 % + 4 µV	
	20 kHz to 50 kHz	0.13 % + 4 µV	
	50 kHz to 100 kHz	0.17 % + 5 µV	
	100 kHz to 300 kHz	0.33 % + 10 µV	
	300 kHz to 500 kHz	0.47 % + 20 µV	
	500 kHz to 1 MHz	0.58 % + 20 µV	
	2.2 mV to 22 mV		
	10 Hz to 20 Hz	0.042 % + 4 µV	
	20 Hz to 40 Hz	0.03 % + 4 µV	
	40 Hz to 20 kHz	0.014 % + 4 µV	
	20 kHz to 50 kHz	0.03 % + 4 µV	
	50 kHz to 100 kHz	0.058 % + 5 µV	
	100 kHz to 300 kHz	0.12 % + 10 µV	
	300 kHz to 500 kHz	0.16 % + 20 µV	
	500 kHz to 1 MHz	0.27 % + 20 µV	
	22 mV to 220 mV		
	10 Hz to 20 Hz	0.028 % + 12 µV	
	20 Hz to 40 Hz	0.011 % + 7 µV	
	40 Hz to 20 kHz	0.008 % + 7 µV	
	20 kHz to 50 kHz	0.021 % + 7 µV	
	50 kHz to 100 kHz	0.047 % + 17 µV	
	100 kHz to 300 kHz	0.091 % + 20 µV	
	300 kHz to 500 kHz	0.14 % + 25 µV	
	500 kHz to 1 MHz	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		
	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		5700A/EP with 5725A
	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 10 pF to 100 pF 100 pF to 1 µF 1 µF to 100 µF 100 µF to 1 mF	0.47 % + 0.05 pF 0.058 % + 0.05 pF 0.024 % + 0.05 pF 0.04% 0.24%	GenRad 1689
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]			Ectron 1140A
Type J	-210 °C to -180 °C	0.13 °C	
	-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	
	1 000 °C to 1372 °C	0.09 °C	
Type T	-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	
	100 °C to 400 °C	0.08 °C	
Type E	-270 °C to -245 °C	2.1 °C	
	-245 °C to -195 °C	2 °C	
Type E	-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	
	890 °C to 1 000 °C	0.08 °C	
Type R	-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)			Fluke 5520A
DC Power	11 µW to 1.1 mW	0.02%	
	1.1 mW to 110 mW	0.03%	
0.33 mA to 330 mA	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%	

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 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	 0.1° 0.2° 0.4° 1.8° 3.6° 7.3°	Fluke 5520A
Frequency - Source and Measure In-Lab Field Service [1]	 10 MHz 10 MHz	 3.7×10^{-12} 3.8×10^{-9}	Fluke 910R HP 53132A Counter
AM Depth – Measure [1] 50 Hz to 10 kHz	5 % to 40 % 150 kHz to 10 MHz	(0.021*AM* + 0.014) %	Agilent 8902A with 11722A
	40 % to 99 % 150 kHz to 10 MHz	(0.021*AM* + 0.14) %	
20 Hz to <50 Hz	5 % to 40 % 150 kHz to 10 MHz	(0.031*AM* + 0.014) %	
	40 % to 99 % 150 kHz to 10 MHz	(0.031*AM* + 0.14) %	
50 Hz to 50 kHz	5 % to 40 % 10 MHz to 1.3 GHz	(0.011*AM* + 0.014) %	
	40 % to 99 % 10 MHz to 1.3 GHz	(0.011*AM* + 0.14) %	
50 Hz to 50 kHz	5 % to 40 % 1.3 GHz to 26.5 GHz	(0.016*AM* + 0.014) %	Agilent 8902A with 11722A, 11792A, and11793A
	40 % to 99 % 1.3 GHz to 26.5 GHz	(0.016*AM* + 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*AM* + 0.014) %	Agilent 8902A with 11722A, 11792A, and11793A
	40 % to 99 % 10 MHz to 26.5 GHz	(0.031*AM* + 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*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 100 MHz to 26.5 GHz	(0.011*FM* + 20) Hz	Agilent 8902A with 11722A, 11792A, and 11793A
	4 kHz to 40 kHz 100 MHz to 26.5 GHz	(0.011*FM* + 22) Hz	
	40 kHz to 400 kHz 100 MHz to 26.5 GHz	(0.011*FM* + 100) Hz	
20 Hz to <50 Hz	0 kHz to 4 kHz 100 MHz to 26.5 GHz	(0.05*FM* + 20) Hz	
	4 kHz to 40 kHz 100 MHz to 26.5 GHz	(0.05*FM* + 22) Hz	
	40 kHz to 400 kHz 100 MHz to 26.5 GHz	(0.05*FM* + 100) Hz	
>100 kHz to 200 kHz	0 kHz to 4 kHz 100 MHz to 26.5 GHz	(0.05*FM* + 100) Hz	
	4 kHz to 40 kHz 100 MHz to 26.5 GHz	(0.05*FM* + 100) Hz	
	40 kHz to 400 kHz 100 MHz to 26.5 GHz	(0.05*FM* + 100) Hz	
Phase Modulation – Measure [1] 200 Hz to 10 kHz	0 rad to < 4 rad 150 kHz to 10 MHz	(0.042*PM* + 0.03) rad	Agilent 8902A with 11722A
	4 rad to < 40 rad 150 kHz to 10 MHz	(0.042*PM* + 0.03) rad	
Phase Modulation – Measure [1] 200 Hz to 10 kHz	40 rad to 400 rad 150 kHz to 10 MHz	(0.042*PM* + 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	(0.036*PM* + 0.03) rad	Agilent 8902A with 11722A, 11792A, and 11793A
	4 rad to < 40 rad 10 MHz to 26.5 GHz	(0.036*PM* + 0.03) rad	
	40 rad to 400 rad 10 MHz to 26.5 GHz	(0.036*PM* + 0.1) rad	
Harmonic Distortion [1]	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 3.4 dB	Agilent 8563E
Total Harmonic Distortion [1]	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 [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 1 MHz to 3 MHz 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	3% 6% 12% 6% 3% 6% 12%	Agilent 334A
Total Harmonic Distortion [1] Input Voltage Range > 30 V 100 % to 0.3 % 0.10%	10 Hz to 300 kHz 300 kHz to 500 kHz 500 kHz to 3 MHz 20 Hz to 30 Hz 30 Hz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1.2 MHz	3% 6% 12% 12% 3% 6% 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 -20 dB to -40 dB -40 dB to -60 dB -60 dB to -80 dB	0.13 dB 0.15 dB 0.18 dB 0.22 dB	Agilent 8902A with 11722A, 11793A

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-) [2]	Reference Standard, Method and/or Equipment
Angle	0º to 85º	1.5”	Master Angle Blocks
	90º	1.9”	Master Square
Micrometers & Calipers – Outside, Inside, Depth [1]	0.05 in to 48 in	(8+ 8*L*) 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 + 4*L*) µin	Horizontal Comparator
Single Axis – Outside	0 in to 5 in	(6 + 8*L*) µin	Horizontal Comparator
Single Axis – Inside	0 in to 5 in	(22 + 3*L*) µin	Horizontal Comparator
Height Measuring Equipment [1]	0.4 in to 8 in 8 in to 48 in	(29 + 6*L*) µin (12 + 8*L*) µin	Gage Blocks
Plug Gages	0 in to 5 in	(6 + 8*L*) µin	Horizontal Comparator
Ring Gages	0 in to 5 in	(22 + 3*L*) µin	
Rulers	0 in to 12 in	840 µin	Optical Comparator
Thread 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
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%	
	260 lbf·in to 3 000 lbf·in	0.07%	Torque Arm with Weights
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	
	30 g to 50 g	0.12 mg	ASTM Class 1 & 2 Weights
	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 500 g to 1 kg 1 kg to 2 kg 2 kg to 3 kg 3 kg to 4 kg 4 kg to 5 kg 5 kg to 10 kg 10 kg to 20 kg	1.2 mg 2.5 mg 5.2 mg 7.7 mg 8.1 mg 12 mg 15 mg 53 mg	
	1 lb to 500 lb	0.01%	NIST Class F Weights
Absolute Pressure Measure & Measuring Equipment	25 to 500 psia 0 to 25 psia	0.006 7 % + 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	0.009% + 150 µin H_2O 0.002 in H_2O 0.009% + 150 µin H_2O	DHI PPC4-ui
Gage Pressure Measure & Measuring Equipment – Pneumatic	60 in H_2O to 72 in H_2O 72 in H_2O to 804 in H_2O	0.006 5 in H_2O 0.009% + 150 µin H_2O	DHI PPC4-ui
	-14.7 psig to 25 psig 25 psig to 500 psig	0.001 6 psig 0.0076%	Ruska 7250xi
	10 psig to 3000 psig 3000 psig to 30000 psig	0.38 psig 0.01%	Fluke RPM 4
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 °C to 420 °C	0.011 °C + 0.001 % 0.025 °C + 0.001 %	AccuMac AM1760 w/Black Stack

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 ºC	0.06 ºC	AccuMac AM1760 w/Hart 1575 & Hart Well
	140 °C to 600 ºC	0.03 ºC	
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