



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005,
ANSI/NCSL Z540-1-1994, & ANSI/NCSL Z540.3-1-2006

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CALIBRATION

Valid To: January 31, 2013

Certificate Number: 2540.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Chemical

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
pH ³ – Measuring Equipment, Fixed Points	4.01 pH 7.00 pH 10.00 pH	0.04 pH 0.04 pH 0.04 pH	pH solutions
Conductivity Measuring Equipment ³ , Fixed Points	447 µS 1443 µS 15 000 µS	1.2 µS 1.2 µS 1.2 µS	Conductivity solutions
Gas Detection Equipment ³ –			
Carbon Monoxide Indicators	0.01 % CO	6 %	Standard gases
Propane LEL Indicators	50 % LEL	6 %	
H2S (Hydrogen Sulfide)	0.0025 % H ₂ S	6 %	
O2 (Oxygen)	18 % O ₂	6 %	
Isobutylene	0.01 % Isobutylene	6 %	
CO ₂	5 % CO ₂	6 %	

II. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (±)	Comments
Micrometers and Calipers ³	Up to 12 in (12 to 40) in	(54 + 13L + 0.6R) μin (130 + 13L + 0.6R) μin	Gage blocks
Steel Rules ³	Up to 48 in	3000 μin	Glass ruler
Ring Gages ³ – Plain Threaded	Up to 16 in Up to 16 in	170 μin 160 μin	Fowler Labconcept
Plug Gages ³ – Plain, Cylindrical	Up to 5 in	47 μin	Fowler Labconcept
Thread Plugs ³ – Pitch Diameter	Up to 16 in	130 μin	Fowler Labconcept
Surface Plates, Granite ³ – Flatness	(12 × 12) in to (72 × 144) in	200 μin	Planekator
Coating Thickness Gages ³ – Eddy Current & Magnetic Induction, Fixed Point Coating Thickness Shims	1031 μm 511 μm 246 μm 178 μm 125 μm 50.2 μm 23.4 μm 12.5 μm (10 to 5000) μm	1.7 % 1.7 % 1.7 % 1.7 % 1.7 % 1.7 % 1.7 % 1.7 % 45 μm	Coating thickness standards Fowler Labconcept
Dial Indicators ³	Up to 4 in	40 μin	Universal calibrator

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5} (\pm)	Comments
DC Voltage ³ – Generate	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1000) V	20 μ V/V + 1 μ V + 0.6R 12 μ V/V + 2 μ V + 0.6R 13 μ V/V + 20 μ V + 0.6R 44 μ V/V + 150 μ V + 0.6R 82 μ V/V + 1.5 mV + 0.6R	Fluke 5520A SC1100
DC Voltage ³ – Measure	Up to 200 mV 200 mV to 20 V (20 to 200) V (200 to 1000) V 1000 V to 10 kV (10 to 40) kV	6.7 μ V/V + 0.5 μ V 3.4 μ V/V + 0.2 μ V 7.5 μ V/V + 0.2 μ V 7.5 μ V/V + 0.5 μ V 0.015 % + 0.6R 3.0 % + 0.6R	Fluke 8508A opt 001 Fluke 80E Fluke 80k40HV probe
DC Current ³ – Generate	Up to 330 μ A 330 μ A to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (11 to 20.5) A (20.5 to 1000) A	0.047 % + 0.02 μ A + 0.6R 160 μ A/A + 0.05 μ A + 0.6R 184 μ A/A + 0.25 μ A + 0.6R 176 μ A/A + 2.5 μ A + 0.6R 0.04 % + 40 μ A + 0.6R 0.055 % + 410 μ A + 0.6R 0.05 % + 500 μ A + 0.6R 0.10 % + 750 μ A + 0.6R 0.25 % + 0.6R	Fluke 5520A SC1100 Fluke 5520A SC 1100 w/50 turn coil
DC Current ³ – Measure	Up to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A 2 A to 20 A (20 to 1000) A	12 μ A/A + 2 μ A 13 μ A/A + 2 μ A 36 μ A/A + 4 μ A 0.017 % + 8 μ A 0.038 % + 20 μ A 0.25 % + 0.6R	Fluke 8508A opt 001 Fluke 5520A SC 1100 w/50 turn coil
Resistance ³ – Measure	Up to 2 Ω (2 to 20) Ω 20 Ω to 200 k Ω 200 k Ω to 2 M Ω (2 to 20) M Ω (20 to 200) M Ω 200 M Ω to 2 G Ω	15 $\mu\Omega/\Omega$ + 2 $\mu\Omega$ 9 $\mu\Omega/\Omega$ + 0.7 $\mu\Omega$ 7.5 $\mu\Omega/\Omega$ + 0.25 $\mu\Omega$ 8.5 $\mu\Omega/\Omega$ + 0.5 $\mu\Omega$ 15 $\mu\Omega/\Omega$ + 5 $\mu\Omega$ 60 $\mu\Omega/\Omega$ + 50 $\mu\Omega$ 0.053 % + 500 $\mu\Omega$	Fluke 8508A opt 001

Parameter/Range	Frequency	CMC ^{2,4,5} (±)	Comments
AC Voltage ³ – Generate			
(1 to 33) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.08 % + 6 μV + 0.6R 0.015 % + 6 μV + 0.6R 0.02 % + 6 μV + 0.6R 0.1 % + 6 μV + 0.6R 0.35 % + 12 μV + 0.6R 0.8 % + 50 μV + 0.6R	Fluke 5520A SC1100
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.025 % + 8 μV + 0.6R 0.014 % + 8 μV + 0.6R 0.015 % + 8 μV + 0.6R 0.03 % + 8 μV + 0.6R 0.06 % + 32 μV + 0.6R 0.16 % + 70 μV + 0.6R	
330 mV to 3.3 V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.025 % + 50 μV + 0.6R 0.014 % + 60 μV + 0.6R 0.016 % + 60 μV + 0.6R 0.025 % + 50 μV + 0.6R 0.055 % + 130 μV + 0.6R 0.2 % + 600 μV + 0.6R	
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.03 % + 650 μV + 0.6R 0.015 % + 600 μV + 0.6R 0.024 % + 600 μV + 0.6R 0.035 % + 600 μV + 0.6R 0.09 % + 1.6 mV + 0.6R	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.019 % + 2 mV + 0.6R 0.02 % + 6 mV + 0.6R 0.025 % + 6 mV + 0.6R 0.03 % + 6 mV + 0.6R 0.2 % + 50 mV + 0.6R	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.025 % + 10 mV + 0.6R 0.02 % + 10 mV + 0.6R 0.025 % + 10 mV + 0.6R	

Parameter/Range	Frequency	CMC ^{2,4,5} (±)	Comments
AC Voltage ³ – Measure			
Up to 200 mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.016 % + 70 μV 0.013 % + 20 μV 0.011 % + 20 μV 0.011 % + 10 μV 0.011 % + 20 μV 0.031 % + 40 μV 0.071 % + 100 μV	Fluke 8508A Opt 001
200 mV to 200 V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 3000) kHz 300 kHz to 1 MHz	0.014 % + 60 μV 0.011 % + 10 μV 85 μV/V + 10 μV 65 μV/V + 10 μV 85 μV/V + 10 μV 0.021 % + 20 μV 0.051 % + 100 μV 0.3 % of reading + 0.1 % of full scale 1 % of reading + 1 % of full scale	
(200 to 1000) V	(1 to 10) Hz 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 100) kHz	0.014 % + 70 μV 0.011 % + 20 μV 95 μV/V + 20 μV 0.021 % + 40 μV 0.051 % + 200 μV	

Parameter/Range	Frequency	CMC ^{2, 4, 5} (±)	Comments	
AC Current ³ – Generate				
(29 to 330) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.2 % + 0.1 µA + 0.6R 0.15 % + 0.1 µA + 0.6R 0.13 % + 0.1 µA + 0.6R 0.3 % + 0.15 µA + 0.6R 0.8 % + 0.2 µA + 0.6R 1.6 % + 0.4 µA + 0.6R	Fluke 5520A SC 1100	
330 µA to 3.3 mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.2 % + 0.15 µA + 0.6R 0.13 % + 0.15 µA + 0.6R 0.1 % + 0.15 µA + 0.6R 0.2 % + 0.2 µA + 0.6R 0.5 % + 0.3 µA + 0.6R 1.0 % + 0.6 µA + 0.6R		
(3.3 to 33) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.18 % + 2 µA + 0.6R 0.09 % + 2 µA + 0.6R 0.04 % + 2 µA + 0.6R 0.08 % + 2 µA + 0.6R 0.2 % + 3 µA + 0.6R 0.4 % + 4 µA + 0.6R		
(33 to 330) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.18 % + 20 µA + 0.6R 0.09 % + 20 µA + 0.6R 0.04 % + 20 µA + 0.6R 0.1 % + 50 µA + 0.6R 0.2 % + 100 µA + 0.6R 0.4 % + 200 µA + 0.6R		
330 mA to 1.1 A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.18 % + 100 µA + 0.6R 0.05 % + 100 µA + 0.6R 0.6 % + 1 mA + 0.6R 2.5 % + 5 mA + 0.6R		
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.18 % + 100 µA + 0.6R 0.06 % + 100 µA + 0.6R 0.6 % + 1 mA + 0.6R 2.5 % + 5 mA + 0.6R		
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.06 % + 2 mA + 0.6R 0.1 % + 2 mA + 0.6R 3 % + 2 mA + 0.6R		
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.12 % + 5 mA + 0.6R 0.15 % + 5 mA + 0.6R 3 % + 5 mA + 0.6R		
(20 to 1000) A	(45 to 65) Hz	0.25 % + 0.6R		Fluke 5520A SC 1100 w/50 turn coil

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
Oscilloscopes ³ –			Fluke 5520A SC1100
Amplitude DC DC Signal 50 Ohm Load	(0 to ± 6.6) V	0.29 % + 40 μV + 0.6R	
1 M Ohm Load	(0 to ± 130) V	0.06 % + 40 μV + 0.6R	
Amplitude-Square Wave (Peak to Peak)			
50 Ohm Load	± 1 mV to ± 6.6 V	0.29 % + 40 μV + 0.6R	
1 M Ohm Load	± 1 mV to ± 130 V	0.12 % + 40 μV + 0.6R	
Time Marker (into 50 Ohm)	5 s to 50 ms 20 ms to 1 ns	(26 + 1000t) μs/s	t = time in Seconds
Edge Spec (Rise Time)	<300 ps	+0 ps /-141 ps	
Bandwidth – Leveled Sine Wave (into 50 Ohm Load)	50 Hz reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	2.1 % + 300 μV + 0.6R 3.5 % + 300 μV + 0.6R 4.2 % + 300 μV + 0.6R 6 % + 300 μV + 0.6R 7 % + 300 μV + 0.6R	Fluke 5520A SC1100
Electrical Calibration of Thermocouple Indicating Devices ³ –			
Type B	600 °C to 800 °C 800 °C to 1000 °C 1000 °C to 1550 °C 1550 °C to 1820 °C	0.44 °C + 0.6R 0.35 °C + 0.6R 0.42 °C + 0.6R 0.38 °C + 0.6R	Fluke 5520A SC1100
Type C	0 °C to 150 °C 150 °C to 650 °C 650 °C to 1000 °C 1000 °C to 1800 °C 1800 °C to 2316 °C	0.58 °C + 0.6R 0.56 °C + 0.6R 0.55 °C + 0.6R 0.82 °C + 0.6R 1.20 °C + 0.6R	
Type E	-250 °C to -100 °C -100 °C to -25 °C -25 °C to 350 °C 350 °C to 650 °C 650 °C to 1000 °C	0.52 °C + 0.6R 0.31 °C + 0.6R 0.16 °C + 0.6R 0.17 °C + 0.6R 0.22 °C + 0.6R	

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Electrical Calibration of Thermocouple Indicating Devices ³ – (cont)			
Type J	-210 °C to -100 °C -100 °C to -30 °C -30 °C to 150 °C 150 °C to 760 °C 760 °C to 1200 °C	0.37 °C + 0.6R 0.22 °C + 0.6R 0.19 °C + 0.6R 0.26 °C + 0.6R 0.25 °C + 0.6R	Fluke 5520A SC1100
Type K	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.40 °C + 0.6R 0.21 °C + 0.6R 0.18 °C + 0.6R 0.28 °C + 0.6R 0.43 °C + 0.6R	
Type N	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 410 °C 410 °C to 1300 °C	0.44 °C + 0.6R 0.25 °C + 0.6R 0.21 °C + 0.6R 0.20 °C + 0.6R 0.29 °C + 0.6R	
Type R	0 °C to 250 °C 250 °C to 400 °C 400 °C to 1000 °C 1000 °C to 1767 °C	0.67 °C + 0.6R 0.54 °C + 0.6R 0.46 °C + 0.6R 0.60 °C + 0.6R	
Type S	0 °C to 250 °C 250 °C to 1000 °C 1000 °C to 1400 °C 1400 °C to 1767 °C	0.90 °C + 0.6R 0.55 °C + 0.6R 0.45 °C + 0.6R 0.67 °C + 0.6R	
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	0.74 °C + 0.6R 0.45 °C + 0.6R 0.50 °C + 0.6R 0.49 °C + 0.6R	
Type U	-200 °C to 0 °C 0 °C to 600 °C	0.76 °C + 0.6R 0.42 °C + 0.6R	

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Electrical Calibration of RTD Indicators ³ –			
Pt 385, 100 Ω	-200 °C to -80 °C -80 °C to 0 °C 0 °C to 100 °C 100 °C to 300 °C 300 °C to 400 °C 400 °C to 630 °C 630 °C to 800 °C	0.05 °C + 0.6R 0.05 °C + 0.6R 0.07 °C + 0.6R 0.09 °C + 0.6R 0.1 °C + 0.6R 0.12 °C + 0.6R 0.21 °C + 0.6R	Fluke 5520A SC1100
PT 385, 200 Ω	-200 °C to -80 °C -80 °C to 0 °C 0 °C to 100 °C 100 °C to 260 °C 260 °C to 300 °C 300 °C to 400 °C 400 °C to 600 °C 600 °C to 630 °C	0.04 °C + 0.6R 0.04 °C + 0.6R 0.04 °C + 0.6R 0.05 °C + 0.6R 0.11 °C + 0.6R 0.12 °C + 0.6R 0.12 °C + 0.6R 0.14 °C + 0.6R	
Pt 385, 500 Ω	-200 °C to -80 °C -80 °C to 0 °C 0 °C to 100 °C 100 °C to 260 °C 260 °C to 300 °C 300 °C to 400 °C 400 °C to 600 °C 600 °C to 630 °C	0.04 °C + 0.6R 0.05 °C + 0.6R 0.05 °C + 0.6R 0.06 °C + 0.6R 0.08 °C + 0.6R 0.08 °C + 0.6R 0.09 °C + 0.6R 0.11 °C + 0.6R	
Pt 385, 1000 Ω	-200 °C to -80 °C -80 °C to 0 °C 0 °C to 100 °C 100 °C to 260 °C 260 °C to 300 °C 300 °C to 400 °C 400 °C to 600 °C 600 °C to 630 °C	0.03 °C + 0.6R 0.03 °C + 0.6R 0.04 °C + 0.6R 0.05 °C + 0.6R 0.06 °C + 0.6R 0.07 °C + 0.6R 0.07 °C + 0.6R 0.23 °C + 0.6R	
Pt 3916, 100 Ω	-200 °C to -190 °C -190 °C to -80 °C -80 °C to 0 °C 0 °C to 100 °C 100 °C to 260 °C 260 °C to 300 °C 300 °C to 400 °C 400 °C to 600 °C 600 °C to 630 °C	0.25 °C + 0.6R 0.04 °C + 0.6R 0.05 °C + 0.6R 0.06 °C + 0.6R 0.07 °C + 0.6R 0.08 °C + 0.6R 0.09 °C + 0.6R 0.1 °C + 0.6R 0.23 °C + 0.6R	

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Electrical Calibration of RTD Indicators ³ – (cont)			
Pt 3926, 100 Ω	-200 °C to -80 °C -80 °C to 0 °C 0 °C to 100 °C 100 °C to 300 °C 300 °C to 400 °C 400 °C to 630 °C	0.04 °C + 0.6R 0.05 °C + 0.6R 0.07 °C + 0.6R 0.08 °C + 0.6R 0.09 °C + 0.6R 0.1 °C + 0.6R	Fluke 5520A SC1100
PtNi 385, 120 Ω	-80 °C to 0 °C 0 °C to 100 °C 100 °C to 260 °C	0.06 °C + 0.6R 0.07 °C + 0.6R 0.13 °C + 0.6R	
Cu 427, 10 Ω	-100 °C to 260 °C	0.3 °C + 0.6R	

IV. Fluid Quantities

Parameter/Equipment	Range	CMC ² (±)	Comments
Air/Nitrogen Flow ³	(0.01 to 1000) LPM	0.6 % of indicated value	CME FCS
Liquid Flow ³	(0.1 to 250) GPM	0.11 % of indicated value	FT-32 turbine flow system
Air Velocity ³ – Measuring Equipment	(25 to 100) ft/min (100 to 6000) ft/min	3.5 ft/min 4.2 ft/min	TSI 8345 air velocity meter

V. Mechanical

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
Pressure and Vacuum Gauges –			
Pneumatic	(0.2 to 1000) psia/psig	12 μpsi/psi + 0.6R	Ruska 2465
Hydraulic	(100 to 50 000) psig	0.03 % + 0.6R	DHI 5306

Parameter/Equipment	Range	CMC ^{2, 4, 5} (\pm)	Comments		
Pressure and Vacuum Gauges ³ – Hydraulic & Pneumatic (On-Site)	(0 to 900) mmHg	0.29 mmHg + 0.6R	MTF-4000 with DAI0900		
	(15 to 30) psig (30 to 300) psig (300 to 500) psig	0.016 psig + 0.6R 0.17 psi + 0.6R 0.13 psi + 0.6R	Fluke 744 w/700PD5 Fluke 744 w/700P27 MTF-4000 with DGI0500		
	(500 to 3000) psig	0.89 psi + 0.6R	MTF-4000 with GGI3000		
	(3000 to 10 000) psig	8.3 psi + 0.6R	Fluke 744 w/700P		
Scales and Balances ³ – Metric	(1 to 500) mg	0.012 mg + 0.6R	ASTM class 1 weights		
	(1 to 5) g	0.039 mg + 0.6R			
	10 g	0.058 mg + 0.6R			
	(20, 30) g	0.085 mg + 0.6R			
	50 g	0.14 mg + 0.6R			
	100 g	0.29 mg + 0.6R			
	200 g	0.58 mg + 0.6R			
	300 g	1.8 mg + 0.6R			
	500 g	2.9 mg + 0.6R			
	1 kg	5.8 mg + 0.6R			
	English	2 kg	12 mg + 0.6R	ASTM class 2 weights	
		5 kg	29 mg + 0.6R		
		10 kg	1.2 g + 0.6R		
		20 kg	2.3 g + 0.6R		
		5 lb	0.0093 oz + 0.6R		ASTM class F weights
		10 lb	0.019 oz + 0.6R		
		20 lb	0.038 oz + 0.6R		
		50 lb	0.094 oz + 0.6R		
		(50 to 1000) lb	1.7 oz + 0.6R		
Force ³ – Measuring Equipment		Compression	(0 to 500) lb		0.12 % + 0.6R
	(500 to 5000) lb		1 lb + 0.6R		
	(5000 to 20 000) lb		8.1 lb + 0.6R		
	Tension	(0 to 500) lb	0.012 % + 0.6R		
		(500 to 5000) lb	1 lb + 0.6R		
		(5000 to 20 000) lb	13 lb + 0.6R		
(20 000 to 100 000) lb	40 lb + 0.6R	Masterline crane scale Rinstrum TLWS-100K			

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
Optical Rotational Speed, RPM ³ – Measure & Generate	(60 to 100 000) rpm	0.015 % + 0.6R	Racal Dana 1992 w/ various generators
Rotational Speed, RPM ³ – Measure & Generate	(0 to 36 960) rpm	0.015 %+ 0.6R	Quantum Dynamics N-11-FCS/3
Torque Transducers ³	20 in·oz to 100 in·lbs 100 in·lbs to 125 ft·lbs (125 to 2000) ft·lbs	0.04 % + 0.6R 0.06 % + 0.6R 0.08 % + 0.6R	Various torque arms and weights
Torque Devices ³	(0.5 to 400) in·oz (25 to 50) in·lb (50 to 150) in·lb (150 to 400) in·lb (400 to 1000) in·lb (80 to 250) ft·lb (250 to 1000) ft·lb	0.58 % 0.58 % 0.58 % 0.28 % 0.28 % 0.58 % 1.2 %	CDI TTS-250 CDI 1000PF

VI. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Relative Humidity ³ – Measure	(10 to 90) % RH (90 to 98) % RH	1.3 % RH 2.4 % RH	Vaisala HMI-41 w/HMP-46
Temperature ³ – Measuring Equipment	-99 °C to 630 °C	0.025 % + 0.1 °C	Hart Scientific 5309
Measure	-200 °C to 950 °C	0.06 °C	Hart Scientific 1521 w/5623-6A, PRT and 5624 PRT

Parameter/Equipment	Range	CMC ² (±)	Comments
Infrared Devices ^{3,7}	Ambient to 100 °C 100 °C to 500 °C	0.6 °C 0.9 °C	Fluke 9132

VII. Time and Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Frequency ³	(0 to 160) MHz 40 MHz to 1.3 GHz	3.2 µHz/Hz 5.9 µHz/Hz	Racal Dana 1992

¹ This laboratory offers commercial calibration service and field calibration service, where noted.

² Calibration and Measurement Capability (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. Calibration and Measurement Capabilities represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³ Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴ R is the resolution of the unit under test.

⁵ In the statement of Calibration and Measurement Capability expressed as percentages are percentages of the reading/output, unless otherwise noted.

⁶ In the statement of Calibration and Measurement Capability, L is the numerical value of the nominal length of the device measured in inches.

⁷ Target emissivity is not calibrated and assumed to be 0.95 (± 0.02 from 8 to 14 µM) for blackbody.



World Class Accreditation

The American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

ANGEL'S INSTRUMENTATION INC.

Chesapeake, VA


for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSLI Z540-1-1994 and the requirements of ANSI/NCSLI Z540.3-2006 and any additional program requirements in the field of calibration. 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 8 January 2009).

Presented this 31st day of May 2011.





President & CEO
For the Accreditation Council
Certificate Number 2540.01
Valid to January 31, 2013

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.