



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

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CALIBRATION

Valid To: May 31, 2013

Certificate Number: 1332.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations and dimensional inspections<sup>1</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Gage Blocks <sup>4</sup>	Up to 12 in	$(3.2 + 0.5L) \mu\text{in}$	Pratt & Whitney Labmaster
Micrometers <sup>3,4</sup>	(0 to 12) in	$(33 + 1L) \mu\text{in}$	Gage blocks
Depth Micrometers <sup>3,4</sup>	(0 to 9) in	$(31 + 1L) \mu\text{in}$	Gage blocks
Calipers <sup>3,4</sup>	(0 to 40) in	$(47 + 1L) \mu\text{in}$	Gage blocks
Height Gages <sup>3,4</sup>	(0 to 40) in	$(53 + 1L) \mu\text{in}$	Gage blocks

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Thread Wires	Up to 80 TPI Up to 0.5 mm	13 μin 0.33 μm	Pratt & Whitney labmaster
Thread Plugs	Up to 3 in	71 μin	SIP 305M
Thread Rings – Functional Size <sup>4</sup>	(0.12 to 4) in	71 μin	Master setting plug
Master Thread Rings <sup>4</sup>	(0.12 to 8) in	(16 + 1.8L) μin	Pratt & Whitney labmaster
Indicators <sup>3</sup>	(0 to 1) in	49 μin	Micrometer head
Test Indicators <sup>3</sup>	(0 to 0.100) in	41 μin	Micrometer head
Gage Pins	(0.001 to 1) in  (0.001 to 1) in	11 μin  34 μin	Pratt & Whitney labmaster  Laser micrometer
Plug Gages <sup>4</sup>	(1.00 to 4) in.	(11 + 0.9L) μin	Pratt & Whitney labmaster
Surface Plate Flatness <sup>3,4</sup>	(18 × 36) in <sup>2</sup> to (36 × 72) in <sup>2</sup>	(28 + 1DL) μin	Electrical leveling system
Ring Gages – Classes XXX, XX, X, Y, Z & ZZ	(0.04 to 10) in	(5 + 0.5L) μin	Pratt & Whitney labmaster
Optical Comparators <sup>3</sup>	(0 to 30) in 10x to 100x	(78 + 3L) μin 86 μin	Glass master scale, gage blocks, Mu checker, magnification checker

## II. Dimensional Testing/Calibration<sup>8</sup>

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
One Dimensional Length <sup>4</sup> –	(0 to 6) in	(33 + 1L) μin	Digital micrometer
	(0 to 8) in	(120 + 6L) μin	Optical comparator
	(0 to 8) in	(47 + 1L) μin	Digital caliper
3 Dimensional <sup>4</sup> –	X Axis	(66 + 3.6L) μin	CMM
	Y Axis		
	Z Axis		
	X Axis	(60 + 5L) μin	Video metrology system
	Y Axis		
	Z Axis		

## III. Electrical – DC / Low Frequency

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
DC Voltage – Measure <sup>3,6</sup>	(0 to 100) mV	7 μV/V + 1 μV	HP 3458A with opt. 002
	100 mV to 1 V	6 μV/V + 3 μV	
	(1 to 10) V	6 μV/V + 5 μV	
	(10 to 100) V	8 μV/V + 30 μV	
	(100 to 1000) V	8 μV/V + 0.1 mV	
DC Voltage – Generate <sup>3,5</sup>	(0 to 330) mV	20 μV/V + 1 μV	Fluke 5520A
	330 mV to 3.3 V	11 μV/V + 2 μV	
	(3.3 to 33) V	12 μV/V + 20 μV	
	(33 to 330) V	18 μV/V + 0.15 mV	
	(330 to 1000) V	18 μV/V + 1.5 mV	
DC Current – Measure <sup>3,6</sup>	(10 to 100) μA	20 μA/A + 8 parts in 10 <sup>6</sup>	HP 3458A
	100 μA to 1 mA	20 μA/A + 5 parts in 10 <sup>6</sup>	
	(1 to 10) mA	20 μA/A + 5 parts in 10 <sup>6</sup>	
	(10 to 100) mA	35 μA/A + 5 parts in 10 <sup>6</sup>	
	100 mA to 1 A	0.011 % + 10 parts in 10 <sup>6</sup>	

Parameter/Equipment	Range	CMC <sup>2, 7</sup> ( $\pm$ )	Comments
DC Current – Generate <sup>3, 5</sup>	(0 to 330) $\mu$ A 330 $\mu$ 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) A	0.015 % + 0.02 $\mu$ A 0.01 % + 0.05 $\mu$ A 0.01 % + 0.25 $\mu$ A 0.01 % + 2.5 $\mu$ A 0.02 % + 40 $\mu$ A 0.038 % + 40 $\mu$ A 0.05 % + 0.5 mA 0.1 % + 0.75 mA	Fluke 5520A
Clamp-On	(20 to 150) A (150 to 550) A (550 to 1000) A	0.26 % + 0.05 A 0.26 % + 0.06 A 0.27 % + 0.06 A	Fluke 5520A with 50 turn coil
Resistance – Generate <sup>3, 5</sup>	(0 to 11) $\Omega$ (11 to 33) $\Omega$ (33 to 110) $\Omega$ (110 to 330) $\Omega$ 330 $\Omega$ to 1.1 k $\Omega$ (1.1 to 3.3) k $\Omega$ (3.3 to 11) k $\Omega$ (11 to 33) k $\Omega$ (33 to 110) k $\Omega$ (110 to 330) k $\Omega$ 330 k $\Omega$ to 1.1 M $\Omega$ (1.1 to 3.3) M $\Omega$ (3.3 to 11) M $\Omega$ (11 to 33) M $\Omega$ (33 to 110) M $\Omega$ (110 to 330) M $\Omega$ 330 M $\Omega$ to 1.1 G $\Omega$	40 $\mu\Omega/\Omega$ + 0.001 $\Omega$ 30 $\mu\Omega/\Omega$ + 0.0015 $\Omega$ 28 $\mu\Omega/\Omega$ + 0.0014 $\Omega$ 28 $\mu\Omega/\Omega$ + 0.002 $\Omega$ 28 $\mu\Omega/\Omega$ + 0.002 $\Omega$ 28 $\mu\Omega/\Omega$ + 0.02 $\Omega$ 28 $\mu\Omega/\Omega$ + 0.02 $\Omega$ 28 $\mu\Omega/\Omega$ + 0.2 $\Omega$ 28 $\mu\Omega/\Omega$ + 0.2 $\Omega$ 32 $\mu\Omega/\Omega$ + 2 $\Omega$ 32 $\mu\Omega/\Omega$ + 2 $\Omega$ 60 $\mu\Omega/\Omega$ + 30 $\Omega$ 0.013 % + 50 $\Omega$ 0.025 % + 2.5 k $\Omega$ 0.05 % + 3 k $\Omega$ 0.3 % + 0.1 M $\Omega$ 1.5 % + 0.5 M $\Omega$	Fluke 5520A
Resistance – Measure <sup>3, 6</sup>	Up to 10 $\Omega$ (10 to 100) $\Omega$ 100 $\Omega$ to 1 k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$ 100 M $\Omega$ to 1 G $\Omega$	15 $\mu\Omega/\Omega$ + 5 $\mu\Omega$ 12 $\mu\Omega/\Omega$ + 5 $\mu\Omega$ 10 $\mu\Omega/\Omega$ + 0.5 $\mu\Omega$ 10 $\mu\Omega/\Omega$ + 0.5 m $\Omega$ 10 $\mu\Omega/\Omega$ + 0.5 m $\Omega$ 15 $\mu\Omega/\Omega$ + 2 $\Omega$ 50 $\mu\Omega/\Omega$ + 10 $\Omega$ 0.05 % + 10 k $\Omega$ 0.5 % + 10 k $\Omega$	HP 3458A

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Voltage – Measure <sup>3,6</sup>			
(5 to 10) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.03 % + 3 μV 0.02 % + 1.1 μV 0.03 % + 1.1 μV 0.1 % + 1.1 μV 0.5 % + 1.1 μV 4 % + 2 μV	HP 3458A
(10 to 100) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	72 μV/V + 4 μV 72 μV/V + 2 μV 15 μV/V + 2 μV 0.03 % + 2 μV 0.08 % + 2 μV 0.3 % + 10 μV 1 % + 10 μV 1.5 % + 10 μV	
100 mV to 1 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	72 μV/V + 40 μV 72 μV/V + 20 μV 15 μV/V + 20 μV 0.03 % + 20 μV 0.08 % + 20 μV 0.3 % + 0.1 mV 1 % + 0.1 mV 1.5 % + 0.1 mV	
(1 to 10) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	72 μV/V + 0.4 mV 72 μV/V + 0.2 mV 15 μV/V + 0.2 mV 0.03 % + 0.2 mV 0.08 % + 0.2 mV 0.3 % + 1 mV 1 % + 1 mV 1.5 % + 1 mV	
(10 to 100) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.02 % + 4 mV 0.02 % + 2 mV 0.02 % + 2 mV 0.036 % + 2 mV 0.12 % + 2 mV 0.4 % + 10 mV 1.5 % + 10 mV	
(100 to 1000) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.04 % + 40 mV 0.04 % + 20 mV 0.06 % + 20 mV 0.12 % + 20 mV 0.3 % + 20 mV	

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Voltage – Generate <sup>3,5</sup>			
(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 0.015 % + 6 μV 0.02 % + 6 μV 0.1 % + 6 μV 0.35 % + 12 μV 0.8 % + 50 μV	Fluke 5520A
(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	0.05 % + 8 μV 0.015 % + 8 μV 0.016 % + 8 μV 0.035 % + 8 μV 0.08 % + 32 μV 0.2 % + 70 μV	
(0.33 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	0.03 % + 50 μV 0.015 % + 60 μV 0.019 % + 60 μV 0.03 % + 50 μV 0.07 % + 0.13 mV 0.24 % + 0.6 mV	
(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 % + 0.65 mV 0.015 % + 0.6 mV 0.024 % + 0.6 mV 0.035 % + 0.6 mV 0.09 % + 1.6 mV	
(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 0.02 % + 6 mV 0.025 % + 6 mV 0.03 % + 6 mV 0.2 % + 50 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.03 % + 10 mV 0.025 % + 10 mV 0.03 % + 10 mV	

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Current – Measure <sup>3,6</sup>			
(5 to 100) µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz	0.4 % + 30 nA 0.15 % + 30 nA 0.06 % + 30 nA 0.06 % + 30 nA	HP 3458A
100 µA to 1 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.4 % + 0.2 µA 0.15 % + 0.2 µA 0.06 % + 0.2 µA 0.03 % + 0.2 µA 0.06 % + 0.2 µA 0.4 % + 0.4 µA 0.55 % + 1.5 µA	
(1 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.4 % + 2 µA 0.15 % + 2 µA 0.06 % + 2 µA 0.03 % + 2 µA 0.06 % + 2 µA 0.4 % + 4 µA 0.55 % + 15 µA	
(10 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.4 % + 20 µA 0.15 % + 20 µA 0.06 % + 20 µA 0.03 % + 20 µA 0.06 % + 20 µA 0.4 % + 40 µA 0.55 % + 150 µA	
Fixed Point 1 A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.4 % + 0.2 mA 0.16 % + 0.2 mA 0.08 % + 0.2 mA 0.1 % + 0.2 mA 0.3 % + 0.2 mA 1 % + 0.4 mA	

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Current – Generate <sup>3,5</sup>			
(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 0.15 % + 0.1 µA 0.13 % + 0.1 µA 0.3 % + 0.15 µA 0.8 % + 0.2 µA 1.6 % + 0.4 µA	Fluke 5520A
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 0.13 % + 0.15 µA 0.1 % + 0.15 µA 0.2 % + 0.2 µA 0.5 % + 0.3 µA 1 % + 0.6 µA	
(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 0.09 % + 2 µA 0.04 % + 2 µA 0.08 % + 2 µA 0.2 % + 3 µA 0.4 % + 4 µA	
(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 0.09 % + 20 µA 0.04 % + 20 µA 0.1 % + 50 µA 0.2 % + 0.1 mA 0.4 % + 0.2 mA	
33 mA to 3 A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.18 % + 0.1 mA 0.06 % + 0.1 mA 0.6 % + 1 mA 2.5 % + 5 mA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.06 % + 2 mA 0.1 % + 2 mA 3 % + 2 mA	
(11 to 21) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.12 % + 5 mA 0.15 % + 5 mA 3 % + 5 mA	
(20 to 1000) A	(45 to 440) Hz	0.28 % + 50 mA	Fluke 5520 with 50 turn coil

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
Capacitance – Generate <sup>3,5</sup>  (0.19 to 0.4) nF (0.4 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF  (0.33 to 1.1) µF (1.1 to 3.3) µF (3.3 to 11) µF (11 to 33) µF (33 to 110) µF (110 to 330) µF  330 µF to 1.1 mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz  (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz Up to 80 Hz Up to 50 Hz  Up to 20 Hz Up to 6 Hz Up to 2 Hz Up to 0.6 Hz Up to 0.2 Hz	0.5 % + 0.01 nF 0.5 % + 0.01 nF 0.5 % + 0.01 nF 0.25 % + 0.01 nF 0.25 % + 0.1 nF 0.25 % + 0.1 nF 0.25 % + 0.3 nF  0.25 % + 1 nF 0.25 % + 3 nF 0.25 % + 10 nF 0.4 % + 30 nF 0.45 % + 0.1 µF 0.45 % + 0.3 µF  0.45 % + 1 µF 0.45 % + 3 µF 0.45 % + 10 µF 0.75 % + 30 µF 1.1 % + 0.1 mF	Fluke 5520A
Leveled Sine Wave <sup>5</sup> –  5 mV to 5.5 V  Absolute  Flatness	50 kHz reference  50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz  50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	2 % + 0.3 mV  3.5 % + 0.3 mV 4 % + 0.3 mV 6 % + 0.3 mV  1.5 % + 0.1 mV 2 % + 0.1 mV 4 % + 0.1 mV	Fluke 5520A with 1.1 GHZ option

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of RTD Indicators & Indicating Systems <sup>3,5</sup> –			
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 400) °C (400 to 630) °C (630 to 800) °C	0.05 °C 0.07 °C 0.1 °C 0.12 °C 0.23 °C	Fluke 5520A
Pt 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 400) °C (400 to 630) °C	0.05 °C 0.07 °C 0.1 °C 0.12 °C	
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to 100) °C (100 to 400) °C (400 to 600) °C (600 to 630) °C	0.25 °C 0.06 °C 0.09 °C 0.1 °C 0.23 °C	
Pt 385, 200 Ω	(-200 to 260) °C (260 to 600) °C (600 to 630) °C	0.05 °C 0.14 °C 0.16 °C	
Pt 385, 500 Ω	(-200 to 260) °C (260 to 600) °C (600 to 630) °C	0.06 °C 0.09 °C 0.11 °C	
Pt 385, 1000 Ω	(-200 to 0) °C (0 to 300) °C (300 to 600) °C (600 to 630) °C	0.03 °C 0.06 °C 0.07 °C 0.23 °C	
Ni 120, 120 Ω	(-80 to 100) °C (100 to 260) °C	0.08 °C 0.14 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.3 °C	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicators & Indicating Systems <sup>3,5</sup> –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C	0.45 °C 0.35 °C 0.31 °C 0.34 °C	Fluke 5520A
Type C	(0 to 150) °C (150 to 650) °C (650 to 1000) °C (1000 to 1800) °C (1800 to 2316) °C	0.31 °C 0.27 °C 0.32 °C 0.51 °C 0.85 °C	
Type E	(-250 to -100) °C (-100 to 650) °C (650 to 1000) °C	0.51 °C 0.17 °C 0.22 °C	
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1200) °C	0.28 °C 0.18 °C 0.24 °C	
Type K	(-200 to -100) °C (-100 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.34 °C 0.19 °C 0.27 °C 0.41 °C	
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.38 °C 0.27 °C 0.18 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 410) °C (410 to 1300) °C	0.41 °C 0.23 °C 0.3 °C 0.28 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.58 °C 0.36 °C 0.34 °C 0.41 °C	
Type S	(0 to 250) °C (250 to 1400) °C (1400 to 1767) °C	0.48 °C 0.38 °C 0.47 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.64 °C 0.21 °C 0.17 °C 0.15 °C	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicators & Indicating Systems <sup>3,5</sup> – (cont.)			
Type U	(-200 to 0) °C (0 to 600) °C	0.57 °C 0.28 °C	Fluke 5520A

IV. Mechanical

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Accelerometer	(10 to 99) Hz 100 Hz (101 to 920) Hz (921 to 5000) Hz (5001 to 10 000) Hz	2.6 % 2.6 % 2.6 % 2.6 % 2.6 %	Dual-Mode amplifier
Indirect Verification of Rockwell Hardness Testers <sup>3</sup> –	HRB: Low Medium High HRC: Low Medium High HR15N: Low Medium High HR30N: Low Medium High HR15T: Low Medium High HR30T: Low Medium High	1.0 HRB 0.7 HRB 0.6 HRB 0.4 HRC 0.3 HRC 0.4 HRC 0.6 HR15N 0.6 HR15N 0.3 HR15N 0.5 HR30N 0.6 HR30N 0.4 HR30N 0.5 HR15T 0.5 HR15T 0.4 HR15T 0.5 HR30T 0.6 HR30T 0.5 HR30T	ASTM E18

Parameter/Equipment	Range	CMC <sup>2,7</sup> ( $\pm$ )	Comments
Torque Wrenches <sup>3</sup>	(4 to 1000) in·lb (20 to 600) ft·lb	0.4 % 0.4 %	CDI Suretest 5000-ST
Torque Wrenches	(100 to 2000) ft·lb	0.4 %	Computest
Torque Transducer	0.5 in·oz to 2000 ft·lb	0.07 %	Arm and weights
Force – Compression <sup>3</sup>	Up to 50 000 lbf	0.47 %	Load cells
Force – Tension <sup>3</sup>	Up to 50 000 lbf	0.42 %	Load cells
Pressure	(0 to 10 000) psig	0.073 %	Fluke pressure calibrator

#### V. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2</sup> ( $\pm$ )	Comments
Frequency – Measuring Equipment <sup>3,5</sup>	10 Hz to 600 MHz	25 $\mu$ Hz/Hz + 5 $\mu$ Hz	Fluke 5520A
Time Marker in Oscilloscope Uncertainty –	(2 and 5) ns (1, 2, 5, 10, 20, 50) $\mu$ s (100, 200, and 500) $\mu$ s	2.5 $\mu$ s/s	Fluke 5520A with 1.1 GHz option  <i>t</i> = time in seconds
Cardinal points at:	(1, 2, 5, 10, 20, 50) ms (100, 200, 500) ms (1, 2 and 5) s	(25 + 1000 <i>t</i> ) $\mu$ s/s	Add 50 $\mu$ s/s for markers not at cardinal points.
Edge Rise Time Uncertainty –			Fluke 5520A with 1.1 GHz option
Into 50 $\Omega$	$\leq$ 300 ps	+ 0 ps -100 ps	

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- <sup>1</sup> This laboratory offers commercial calibration service and field calibration service.
- <sup>2</sup> 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.
- <sup>3</sup> 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
- <sup>4</sup> In the statement of CMC,  $L$  is the numerical value of the nominal length of the device measured in inches;  $D$  is the numerical value of the nominal diameter of the device measured in inches, and  $R$  is the numerical value of the resolution of the device in microinches.  $DL$  is the Diagonal of the plate in inches.
- <sup>5</sup> Based on using the standard at the temperature the Fluke 5520A was calibrated (tcal) within  $\pm 5$  °C and assuming the instrument is zeroed at least every seven days or when ambient temperature changes more than 5 °C. For resistance, a zero calibration is performed at least every 12 hours within  $\pm 1$  °C of use. For AC Current, best uncertainties are determined with LCOMP Off. The CMC is based upon 1-year specifications and using the standard at ambient temperature that is within  $\pm 5$  °C of tcal.
- <sup>6</sup> Based on using the standard at the temperature the HP 3458A was calibrated (tcal) within  $\pm 5$  °C and an auto-calibration (ACAL) was performed within the previous 24 hours ( $\pm 1$  °C of ambient temperature). The CMC is based upon 1-year specification and using the standard at ambient temperature that is within  $\pm 5$  °C of tcal.
- <sup>7</sup> In the statement of CMC, percentage (%) refers to percent of reading, unless otherwise noted.
- <sup>8</sup> This laboratory meets R205 – *Specific Requirements: Calibration Laboratory Accreditation Program* for the types of dimensional tests listed above and is considered equivalent to that of a calibration.



The American Association for Laboratory Accreditation

World Class Accreditation

# *Accredited Laboratory*

A2LA has accredited

## **INCAL TECHNOLOGIES, INC.**

*Saginaw, MI*

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/NCSL Z540-1-1994 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 9<sup>th</sup> day of September 2011.



  
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Peter Meyer

President & CEO  
For the Accreditation Council  
Certificate Number 1332.01  
Valid to May 31, 2013

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