



THE AMERICAN ASSOCIATION FOR  
LABORATORY ACCREDITATION

## ACCREDITED LABORATORY

A2LA has accredited

### **ALABAMA SCALE & INSTRUMENT, INC** **Mobile, AL**

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 18 June 2005*).

Presented this 15<sup>th</sup> day of December 2006.

A handwritten signature in black ink, appearing to read "Peter Meyer", written over a horizontal line.

President  
For the Accreditation Council  
Certificate Number 1876.01  
Valid to February 28, 2009



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

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

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CALIBRATION

Valid until: February 28, 2009

Certificate Number: 1876.01

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

I. Time and Frequency

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> ( $\pm$ )	Comments
Digital/Mechanical Tachometer	(40 to 99 999) rpm	0.1 % $\pm$ 1 LSD	Direct reflective pickup tachometer
Timers	15 s to 24 hr	The greater of 0.05 % full scale (fs) or 1 LSD	Reference stopwatch
Stopwatches	15 s to 24 hr	0.01 % fs + 0.5 s	NISTIME 32

II. Dimensional

Parameter/Equipment	Range	Best Uncertainty <sup>2,4</sup> ( $\pm$ )	Comments
Calipers, Verniers and Linear Scales	(0 to 36) in	(290 + 140L) $\mu$ in	Gage blocks, rod standards
Height Gages	(0 to 36) in	(110 + 140L) $\mu$ in	Gage blocks
Dial and Test Indicators	(0 to 2) in	160 $\mu$ in	Gage blocks

Parameter/Equipment	Range	Best Uncertainty <sup>2, 4</sup> ( $\pm$ )	Comments
Micrometers – Outside Inside Depth	(0 to 36) in (0 to 36) in (0 to 36) in	(58 + 140L) $\mu$ in (72 + 140L) $\mu$ in (34 + 140L) $\mu$ in	Gage blocks, rod standards
Pin Gages	(0.011 to 1.00) in	84 $\mu$ in	Digital micrometer
Rules and Tapes	(0 to 360) in	(0.0034 + 0.009L) in	Gage blocks, linear standards
Surface Plates – Repeatability Only	18 in $\times$ 24 in to 72 in $\times$ 96 in	50 $\mu$ in	Repeat-o-meter

### III. Mechanical

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> ( $\pm$ )	Comments
Indirect Verification of Rockwell Hardness Testers	HRB: (30 to 100)  HRC: (20 to 68)	1.2 HRB  1.2 HRC	Indirect verification method per ASTM E18
Scales & Balances <sup>3</sup>	1 mg to 32 kg (0.005 to 400 000) lb	0.5 LSVD	Verification with Class 1, 4 & F weights
Pressure Gages, Transducers, and Transmitters	(-14.5 to 300) psi (300 to 5 000) psi	0.14 psi 1.5 psi	Pressure comparison

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> (±)	Comments
Torque Wrenches	(4 to 50) in•lb (30 to 400) in•lb (80 to 100) in•lb (20 to 250) ft•lb (200 to 2 000) ft•lb	0.15 in•lb 1.2 in•lb 2.9 in•lb 0.73 ft•lb 5.8 ft•lb	Digital torque calibrator
Torque Analyzers and Transducers	5 in•lb to 2000 ft•lb	0.3 % of applied load	Torque arms with Class 4 & F weights, including specific arms
Force – Tension and Compression	(1 to 1000) lbs  (1000 to 100 000) lbs	0.029 % rdg  2.31 lbs	Class 4 & F weights and deadweights  Load cell comparison

#### IV. Fluid Quantities

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> (±)	Comments
Flow Indicators (Water)	(1 to 100) gpm	2.9 %	Gravimetric determination

#### V. Electrical

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> (±)	Comments
DC Voltage Measuring Equipment <sup>5</sup>	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (30 to 330) V (100 to 1 000) V	0.075 % 0.067 % 0.013 % 0.041 % 0.29 %	Fluke 5500A

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> (±)	Comments
DC Voltage – Measure  Fixed Points	(20 to 30) kV  100 mV 1 V 10 V 100 V 1000 V 10 kV 40 kV	1 %  50 μV/V + 0.35 μV 40 μV/V + 0.7 μV 35 μV/V + 0.5 μV 45 μV/V + 0.6 μV 45 μV/V + 0.1 μV 1.5 % 2 %	Agilent 34401A
DC Current Measuring Equipment <sup>5</sup>	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA 330 mA to 2.2 A (2.2 to 11) A	0.018 % 0.015 % 0.015 % 0.064 % 0.13 %	Fluke 5500A
DC Current – Measure, Fixed Points	10 mA 100 mA 1 A 3 A	0.05 % rdg + 0.02 % rng 0.05 % rdg + 0.005 % rng 0.1 % rdg + 0.01 % rng 0.12 % rdg + 0.02 % rng	Agilent 34401A
Resistance Measuring Equipment <sup>5</sup>	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ (0.33 to 1.1) MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ	0.098 % 0.067 % 0.026 % 0.016 % 0.017 % 0.013 % 0.017 % 0.02 % 0.019 % 0.016 % 0.023 % 0.02 % 0.075 % 0.12 % 0.59 % 0.59 %	Fluke 5500A
Resistance – Measure  Fixed Points	1 kΩ to 1 MΩ  100 Ω 10 MΩ 100 MΩ	0.01 % rdg + 0.001 % rng  0.01 % rdg + 0.004 % rng 0.04 % rdg + 0.001 % rng 0.8 % rdg + 0.01 % rng	Agilent 34401A

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> (±)	Comments
Capacitance Measuring Equipment <sup>5</sup>	(0.33 to 0.5) nF	2.9 %	Fluke 5500A
	(0.5 to 1.1) nF	1.7 %	
	(1.1 to 3.3) nF	0.93 %	
	(3.3 to 11) nF	0.69 %	
	(11 to 33) nF	0.64 %	
	(33 to 110) nF	0.4 %	
	(110 to 330) nF	0.4 %	
	(0.33 to 1.1) μF	0.4 %	
	(1.1 to 3.3) μF	0.51 %	
	(3.3 to 11) μF	0.51 %	
	(11 to 33) μF	0.57 %	
	(33 to 110) μF	0.69 %	
	(110 to 330) μF	0.91 %	
(0.33 to 1.1) mF	1.2 %		

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
AC Voltage Measuring Equipment <sup>5</sup> –	(1 to 33) mV	(10 to 45) Hz	Fluke 5500A
		45 Hz to 10 kHz	
		(10 to 20) kHz	
		(20 to 50) kHz	
		(50 to 100) kHz	
		(100 to 500) kHz	
	(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	
	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	

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
AC Voltage Measuring Equipment <sup>5</sup> – (cont)			Fluke 5500A
(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	0.34 % 0.086 % 0.32 % 0.62 % 0.99 %	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.096 % 0.093 % 0.1 %	
(330 to 1020) V	45 Hz to 1 kHz	0.059 %	
AC Voltage – Measure			Agilent 34401A
(1 to 100) 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	1 % rdg + 0.04 % rng 0.35 % rdg + 0.04 % rng 0.06 % rdg + 0.04 % rng 0.12 % rdg + 0.05 % rng 0.6 % rdg + 0.08 % rng 4 % rdg + 0.5 % rng	
AC Voltage – Measure (cont)			Agilent 34401A
(1 to 750) V	(3 to 5) Hz (5 to 10) Hz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1 % rdg + 0.03 % rng 0.35 % rdg + 0.03 % rng 0.06 % rdg + 0.03 % rng 0.12 % rdg + 0.05 % rng 0.6 % rdg + 0.08 % rng 4 % rdg + 0.5 % rng	
(1 to 25) kV	DC to 300 kHz	1 %	

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
AC Current Measuring Equipment <sup>5</sup> –			Fluke 5500A
(0 to 330) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.29 % 0.15 % 0.15 % 0.47 % 1.4 %	
330 µA to 3.3 mA	(10 to 20) Hz 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.24 % 0.12 % 0.24 % 0.7 %	
(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	0.24 % 0.12 % 0.11 % 0.23 % 0.7 %	
(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	0.23 % 0.12 % 0.11 % 0.23 % 0.7 %	
330 mA to 2.2 A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.24 % 0.12 % 0.93 %	
(2.2 to 1) A	(45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	0.25 % 0.26 % 0.45 %	
(11 to 500) A	(50 to 440) Hz	0.45 %	Fluke 5500A plus coil, clamp-on only

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
AC Current – Measure			Agilent 34401A
(0 to 1) A	(3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz	1 % rdg + 0.04 % rng 0.3 % rdg + 0.04 % rng 0.1 % rdg + 0.04 % rng	
(1 to 3) A	(3 to 5) Hz (5 to 10) Hz 10 Hz to 5 kHz	1 % rdg + 0.06 % rng 0.35 % rdg + 0.06 % rng 0.15 % rdg + 0.06 % rng	

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicating Systems <sup>5</sup> –			Fluke 5500A
Type J	-210 °C to 150 °C 150 °C to 1200 °C	1.6 °C 3.6 °C	
Type K	-200 °C to -100 °C -100 °C to 120 °C 120 °C to 1372 °C	1.6 °C 1.5 °C 4.8 °C	
Type R	0 °C to 400 °C 400 °C to 1000 °C 1000 °C to 1767 °C	2.5 °C 2.9 °C 2.5 °C	
Type S	0 °C to 1000 °C 1000 °C to 1400 °C 1400 °C to 1767 °C	2.5 °C 3.0 °C 2.4 °C	
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	2.5 °C 2.4 °C 2.9 °C 2.4 °C	

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> (±)	Comments
Electrical Calibration of RTD Measuring Equipment <sup>5</sup> –			Fluke 5500A
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	0.14 °C 0.14 °C 0.15 °C 0.16 °C 0.17 °C 0.19 °C 0.37 °C	
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	0.13 °C 0.13 °C 0.13 °C 0.14 °C 0.15 °C 0.15 °C 0.27 °C 0.37 °C	

## VI. Thermodynamics

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> (±)	Comments
Digital Thermometers and Temperature Controllers	0 °C to 400 °C	0.5 °C	Digital calibrator (RTD probe, dry block calibrator)
Relative Humidity	10 % to 95 %	5.6 %	Psychrometer, digital RH meter, saturated salts
Chart Recorders and Data Loggers	0 °C to 400 °C (0 to 5 000) psi	2 % f.s.	Temperature and pressure calibration; applies only to chart recorders and data loggers with remote sensors

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<sup>1</sup> This laboratory offers commercial calibration services and on-site calibration services.

<sup>2</sup> “Best Uncertainty” 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 of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer’s device, to the environment (if the calibration is performed in the field) and to influences from the circumstances of the specific calibration.

<sup>3</sup> The uncertainty of scale verification is highly dependent on local conditions such as the resolution of the scale. Any statement of best uncertainty would therefore be misleading. The class of the best weights used by the laboratory is shown in the Comments column.

<sup>4</sup> In the statement of best uncertainty,  $L$  is the length in inches.

<sup>5</sup> Fluke 5500A best uncertainties are based upon the temperature the standard was calibrated ( $t_{cal} \pm 5$  °C) and assuming the instrument is zeroed at least every seven days or when the 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 the LCOMP off. Best uncertainties are also based upon 1-year floor specifications.