



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

Advanced Technical Services NW, Inc.

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CALIBRATION

Valid to: June 10, 2012

Certificate Number: AC-1458

I. Electromagnetic - DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V 330 V to 1.02 kV	60 µV/V + 3 µV 50 µV/V + 5 µV 50 µV/V + 50 µV 55 µV/V + 500 µV 55 µV/V + 1.5 mV		
AC Voltage - Source	(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 (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 (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	3.5 mV/V + 20 µV 1.5 mV/V + 20 µV 2 mV/V + 20 µV 2.5 mV/V + 20 µV 3.5 mV/V + 33 µV 10 mV/V + 60 µV 2.5 mV/V + 50 µV 500 µV/V + 20 µV 1 mV/V + 20 µV 1.6 mV/V + 40 µV 2.4 mV/V + 170 µV 7 mV/V + 330 µV 1.5 mV/V + 250 µV 300 µV/V + 60 µV 800 µV/V + 60 µV 1.4 mV/V + 300 µV 2.4 mV/V + 1.7 mV 5 mV/V + 3.3 mV 1.5 mV/V + 2.5 mV 400 µV/V + 600 µV 800 µV/V + 2.6 mV 1.9 mV/V + 5 mV 2.4 mV/V + 17 mV	Fluke 5500A	SOP-LABE-03 Fluke 5500A Manual



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source (cont.)	(33 to 330) V 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz 330 V to 1.02 kV 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	500 µV/V + 6.6 mV 800 µV/V + 15 mV 900 µV/V + 33 mV 600 µV/V + 80 mV 2 mV/V + 100 mV 2 mV/V + 500 mV		
DC Current - Source	Up to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 2 A (2 to 10) A	130 µA/A + 50 nA 100 µA/A + 150 nA 100 µA/A + 3.3 µA 300 µA/A + 44 µA 600 µA/A + 330 µA		
AC Current - Source	(33 to 330) µA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (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 (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 (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 330 mA to 2.2 A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (2.2 to 11) A (45 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz	2.5 mA/A + 150 nA 1.25 mA/A + 150 nA 1.25 mA/A + 250 nA 4 mA/A + 150 nA 12.5 mA/A + 150 nA 2 mA/A + 300 nA 1 mA/A + 300 nA 1 mA/A + 300 nA 2 mA/A + 300 nA 6 mA/A + 300 nA 2 mA/A + 3 µA 1 mA/A + 3 µA 900 µA/A + 3 µA 2 mA/A + 3 µA 6 mA/A + 3 µA 2 mA/A + 30 µA 1 mA/A + 30 µA 900 µA/A + 30 µA 2 mA/A + 30 µA 6 mA/A + 30 µA 2 mA/A + 300 µA 1 mA/A + 300 µA 7.5 mA/A + 300 µA 600 µA/A + 3 mA 1 mA/A + 3 mA 3.3 mA/A + 3 mA	Fluke 5500A	SOP-LABE-03 Fluke 5500A Manual



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Frequency - Source	(0.01 Hz to 10 kHz (10 to 100) kHz)	25 µHz/Hz + 1 mHz 25 µHz/Hz + 15 mHz	Fluke 5500A	SOP-LABE-03 Fluke 5500A Manual
Resistance - Source	Up to 11 Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω 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 330 kΩ 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	120 µΩ/Ω + 6 mΩ 120 µΩ/Ω + 10 mΩ 90 µΩ/Ω + 10 mΩ 90 µΩ/Ω + 10 mΩ 90 µΩ/Ω + 60 mΩ 90 µΩ/Ω + 60 mΩ 90 µΩ/Ω + 600 mΩ 90 µΩ/Ω + 600 mΩ 110 µΩ/Ω + 6 Ω 120 µΩ/Ω + 6 Ω 150 µΩ/Ω + 55 Ω 150 µΩ/Ω + 55 Ω 600 µΩ/Ω + 550 Ω 1 mΩ/Ω + 550 Ω 5 mΩ/Ω + 5.5 kΩ 5 mΩ/Ω + 16.5 kΩ		

II. Mechanical

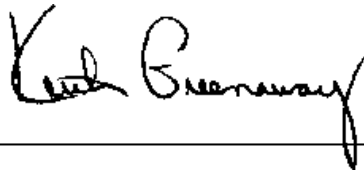
PARAMETER/ EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Force (Tension)* Load Cells	Up to 750 lbf (75 to 100 000) lbf	0.00016F lbf 0.0025F lbf	Class F Weights Load Cell	SOP-FIELD-12 Rev New/ ASTM E4
Force (Compression)* Load Cells	(25 to 60 000) lbf (36 650 to 400 000) lbf	0.00088F lbf 0.0026F lbf	Load Cell	
Pressure	Up to 3 000 psi	(0.8 + 1.005R) psi	Pressure Calibrator	SOP-FIELD-15

III. Dimensional

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Gage Blocks	(0.01 to 4) in	$(2.4 + 2.6L) \mu\text{in}$	Pratt & Whitney Universal Measuring Machine and Gage Blocks	SOP-LABM-04 Rev B / Pratt & Whitney Manual
Calipers	Up to 60 in	$(566 + 14.2L) \mu\text{in}$	Gage Blocks	SOP-LABM-17
Micrometers	Up to 20 in	$(19 + L + 0.56R) \mu\text{in}$	Gage Blocks	SOP-LABM-08
Indicators - Dial and Digital	Up to 2 in	$(3.1 + 1.2R) \mu\text{in}$	Pratt & Whitney Universal Measuring Machine and Gage Blocks	SOP-LABM-10, SOP-LABM-11

Notes:

1. Calibration and Measurement Capabilities (CMC) (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of $k=2$.
2. This laboratory offers calibration services in its laboratory and on-site at customer-designated locations. 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.
3. Parameters identified with an asterisk (*) are available for on-site calibration.
4. CMCs for Electromagnetic - DC/Low Frequency do not include estimated contributions to uncertainty from a "best available" unit under test.
5. The use of (F) refers to applied force.
6. The use of (R) refers to the Resolution of the unit under test.
7. The term (L) stands for the applied Length.
8. This scope is part of and must be included with the Certificate of Accreditation No.AC-1458.



Vice President