



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994 & ANSI/NCSL Z540.3-2006

ELEMENT U.S. SPACE & DEFENSE
1536 East Valencia Drive
Fullerton, CA 92831
Vanessa Garcia Phone: (714) 879-6110
E-mail: vanessa.garcia@elementdefense.com

CALIBRATION

Valid To: March 31, 2026

Certificate Number: 214.25

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations^{1,4}:

I. Dimensional

Parameter/Equipment	Range	CMC ² (±)	Comments
Dial Indicators	Up to 4 in	23 µin	Gage Blocks
Digital/Dial Calipers – Inside, Outside, Depth	Up to 6 in	49 µin	Gage Blocks
Micrometers	Up to 6 in	49 µin	Gage Blocks

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
DC Voltage – Generate	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (30 to 330) V (100 to 1020) V	0.0060 % rdg + 3 µV 0.0050 % rdg + 5 µV 0.0050 % rdg + 50 µV 0.0055 % rdg + 500 µV 0.0055 % rdg + 1500 µV	Fluke 5500A
DC Voltage – Measure	(0 to 100) mV (0.1 to 1) V (1 to 10) V	0.0091 % rdg + 0.0035 % rng 0.0081 % rdg + 0.0007 % rng 0.0076 % rdg + 0.0005 % rng	Agilent 34461A

Parameter/Equipment	Range	CMC ^{2,3} (\pm)	Comments
DC Voltage – Measure (cont)	(10 to 100) V (100 to 1000) V	0.0087 % rdg + 0.0006 rng 0.0086 % rdg + 0.001 rng	Agilent 34461A
DC Current – Generate	(0 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 2.2) A (2.2 to 11) A	0.013 % rdg + 0.05 μ A 0.010 % rdg + 0.25 μ A 0.010 % rdg + 3.3 μ A 0.030 % rdg + 44 μ A 0.061 % rdg + 330 μ A	Fluke 5500A
Clamp-On Meters	(10 to 550) A	0.2 % rdg + 0.5 A	Fluke 5500A with 5500A/coil
DC Current – Measure	(0 to 10) mA (10 to 100) mA (0.1 to 1) A (0 to 3) A (3 to 5) A (5 to 10) A	0.050 % rdg + 0.02 % rng 0.051 % rdg + 0.005 % rng 0.10 % rdg + 0.01 % rng 0.20 % rdg + 0.02 % rng 0.30 % rdg + 10 lsd 0.30 % rdg + 2 lsd	Agilent 34461A Fluke 289
Resistance – Generate	(1.0 to 10.99) Ω (11 to 32.99) Ω (33 to 109.9) Ω (109.9 to 329.99) Ω (0.33 to 1.099) k Ω (1.1 to 3.299) k Ω (3.3 to 10.9) k Ω (11 to 32.99) k Ω (33 to 109.99) k Ω (110 to 329.99) k Ω (0.33 to 1.099) M Ω (1.1 to 3.299) M Ω (3.3 to 10.99) M Ω (11 to 32.99) M Ω (33 to 110) M Ω	0.016 % rdg + 0.008 Ω 0.013 % rdg + 0.015 Ω 0.0091 % rdg + 0.015 Ω 0.0091 % rdg + 0.015 Ω 0.0091 % rdg + 0.06 Ω 0.010 % rdg + 0.06 Ω 0.0092 % rdg + 0.6 Ω 0.0092 % rdg + 0.6 Ω 0.011 % rdg + 6 Ω 0.012 % rdg + 6 Ω 0.015 % rdg + 55 Ω 0.015 % rdg + 55 Ω 0.060 % rdg + 550 Ω 0.10 % rdg + 5.5 k Ω 0.050 % rdg + 5.5 k Ω	Fluke 5500A (2 wire)
Resistance – Measure	(0 to 100) Ω (0.1 to 1) k Ω (1 to 10) k Ω (10 to 100) k Ω (0.1 to 1) M Ω (1 to 10) M Ω (10 to 100) M Ω	0.014 % rdg + 0.004 % rng 0.014 % rdg + 0.001 % rng 0.014 % rdg + 0.001 % rng 0.014 % rdg + 0.001 % rng 0.014 % rdg + 0.001 % rng 0.041 % rdg + 0.001 % rng 0.82 % rdg + 0.01 % rng	Agilent 34461A (2 wire)

Parameter/Range	Frequency	CMC ^{2,3} (±)	Comments
AC Voltage – Generate			
(0 to 32.99) mV	45 Hz (0.045 to 1) kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz	0.35 % rdg + 20 µV 0.15 % rdg + 20 µV 0.15 % rdg + 20 µV 0.20 % rdg + 20 µV 0.25 % rdg + 20 µV	Fluke 5500A
(33 to 329.99) mV	45 Hz (0.045 to 1) kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz	0.25 % rdg + 20 µV 0.050 % rdg + 20 µV 0.050 % rdg + 20 µV 0.10 % rdg + 20 µV 0.16 % rdg + 40 µV	
(0.33 to 3.299) V	45 Hz (0.045 to 1) kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz	0.15 % rdg + 250 µV 0.030 % rdg + 60 µV 0.030 % rdg + 60 µV 0.080 % rdg + 60 µV 0.14 % rdg + 300 µV	
(3.3 to 32.99) V	45 Hz (0.045 to 1) kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz	0.15 % rdg + 2500 µV 0.040 % rdg + 600 µV 0.040 % rdg + 600 µV 0.10 % rdg + 2600 µV 0.19 % rdg + 5000 µV	
(33 to 329.99) V	45 Hz (0.045 to 1) kHz (1 to 10) kHz (10 to 18) kHz	0.050 % rdg + 6.6 mV 0.051 % rdg + 6.6 mV 0.081 % rdg + 15 mV 0.091 % rdg + 33 mV	
(330 to 1020) V	45 Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 8) kHz	0.051 % rdg + 80 mV 0.050 % rdg + 80 mV 0.20 % rdg + 100 mV 0.20 % rdg + 500 mV	
AC Current – Generate			
(29 to 329) µA	45 Hz 1 kHz 5 kHz 10 kHz	0.13 % rdg + 0.25 µA 0.13 % rdg + 0.25 µA 0.40 % rdg + 0.15 µA 1.3 % rdg + 0.15 µA	Fluke 5500A
(0.33 to 3.29) mA	45 Hz 1 kHz 5 kHz 10 kHz	0.10 % rdg + 0.3 µA 0.10 % rdg + 0.3 µA 0.20 % rdg + 0.3 µA 0.61 % rdg + 0.3 µA	

Parameter/Range	Frequency	CMC ^{2,3} (±)	Comments
AC Current – Generate (cont)			
(3.3 to 32.9) mA	45 Hz 1 kHz 5 kHz 10 kHz	0.10 % rdg + 3 µA 0.092 % rdg + 3 µA 0.20 % rdg + 3 µA 0.60 % rdg + 3 µA	Fluke 5500A
(33 to 329.9) mA	45 Hz 1 kHz 5 kHz 10 kHz	0.10 % rdg + 30 µA 0.092 % rdg + 30 µA 0.20 % rdg + 30 µA 0.60 % rdg + 30 µA	
(0.33 to 2.19) A	45 Hz 1 kHz 5 kHz	0.20 % rdg + 300 µA 0.11 % rdg + 300 µA 0.76 % rdg + 300 µA	
(2.2 to 11) A	45 Hz 500 Hz 1 kHz	0.064 % rdg + 2000 µA 0.10 % rdg + 2000 µA 0.33 % rdg + 2000 µA	
Clamp-On Meters (10 to 550) A	(50/60) Hz	0.54 % rdg + 0.1 A	
AC Voltage – Measure			
(0 to 100) mV	45 Hz to 20 kHz (20 to 50) kHz	0.92 % rdg + 0.04 % rng 0.17 % rdg + 0.04 % rng	Agilent 34461A
(0.1 to 1) V	45 Hz to 20 kHz (20 to 50) kHz	0.091 % rdg + 0.03 % rng 0.16 % rdg + 0.05 % rng	
(1 to 10) V	45 Hz to 20 kHz (20 to 50) kHz	0.091 % rdg + 0.03 % rng 0.15 % rdg + 0.05 % rng	
(10 to 100) V	45 Hz to 20 kHz (20 to 50) kHz	0.091 % rdg + 0.03 % rng 0.15 % rdg + 0.05 % rng	
(100 to 750) V	45 Hz to 1 kHz	0.10 % rdg + 0.03 % rng	
AC Current – Measure			
(0 to 1) A	(45 Hz to 5) kHz	0.11 % rdg + 0.04 % rng	Agilent 34461A
(1 to 3) A	(45 Hz to 5) kHz	0.28 % rdg + 0.06 % rng	

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Capacitance – Generate	400 pF (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	0.74 % rdg + 0.01 nF 0.54 % rdg + 0.01 nF 0.52 % rdg + 0.01 nF 0.51 % rdg + 0.01 nF 0.26 % rdg + 0.1 nF 0.26 % rdg + 0.1 nF 0.26 % rdg + 0.3 nF 0.26 % rdg + 1 nF 0.36 % rdg + 3 nF 0.36 % rdg + 10 nF 0.42 % rdg + 30 nF 0.54 % rdg + 100 nF	Fluke 5500A
Electrical Simulation of Thermocouples –			
Type E	(-230 to 1000) °C	0.26 °C	Fluke 5500A
Type J	(-200 to 760) °C	0.18 °C	
Type K	(-190 to 0) °C (0 to 100) °C (100 to 500) °C (500 to 1000) °C (1000 to 1370) °C		
Type T	(-200 to 400) °C	0.23 °C	

III. Electrical – RF/Microwave

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
LISN's –			
Impedance (Ω)	9 kHz to 400 MHz	4.2 % of rdg.	HP 8753D/3577A
Correction Factor (dB)			
Insertion Loss	9 kHz to 400 MHz	0.22 dB	ANSI C63.4 DO 160 D, E, F, G Mil Std 461 D, E, F, G
Isolation (dB)	9 kHz to 400 MHz	0.55 dB	CISPR 16.1.2
Phase (°)	9 kHz to 400 MHz	3.1°	

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Current Probe/ Injection Probe – Insertion Loss (dB)	9 kHz to 3 GHz	0.55 dB	HP 8753D/3577A ANSI C63.4 DO 160 D, E, F, G Mil Std 461 D, E, F, G
Attenuator/Cable/ Termination – VSWR (Linear)	9 kHz to 3 GHz	0.32 dB	HP 8753D/3577A

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Force – Measuring Equipment Compression Tension	(0 to 300) lbf (0 to 2000) lbf (0 to 300) lbf (0 to 2000) lbf	0.012 % FS 0.037 % FS 0.015 % FS 0.034 % FS	P-9683 load cell P-9682 load cell P-9683 load cell P-9682 load cell
Pressure – Measuring Equipment Nitrogen	(0 to 20) psia (0 to 100) psia (0 to 30) in.Hg (0 to 200) psig (0 to 500) psig (0 to 1000) psig (0 to 2000) psig (0 to 5000) psig	0.034 % of rng 0.026 % of rng 0.062 % of rng 0.033 % of rng 0.026 % of rng 0.027 % of rng 0.037 % of rng 0.029 % of rng	Pressure standard
Hydraulic	(0 to 10 000) lb	0.035 % of rng	Mansfield & Green T-100

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Scales & Balances	(5 to 500) mg	3.9 µg	Class S1
	(1 to 100) g	46 µg	Class S1
	(100 to 500) g	3.6 mg	NBS-C
	(500 to 5000) g	2.7 mg	Class 1
	(1 to 10) lb	0.000 051 lb	NBS-C
	(10 to 160) lb	0.0049 lb	NBS-C
Torque – Wrenches & Drivers	(> 25 to 50) lbf.in	0.29 % of rdg	Proto Tool J6472
	(> 50 to 100) lbf.in	0.24 % of rdg	
	(> 100 to 150) lbf.in	0.12 % of rdg	
	(> 150 to 200) lbf.in	0.18 % of rdg	
	(> 200 to 250) lbf.in	0.18 % of rdg	
	(> 25 to 50) lbf.ft	0.53 % of rdg	Proto Tool J6476
	(> 50 to 100) lbf.ft	0.33 % of rdg	
	(> 100 to 150) lbf.ft	0.46 % of rdg	
	(> 150 to 200) lbf.ft	0.80 % of rdg	
	(> 200 to 250) lbf.ft	0.94 % of rdg	

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Temperature – Measure			
Type E	(-230 to 1000) °C	0.16 °C	Omega HHCT-2
Type J	(-200 to 760) °C	0.16 °C	
Type K	(-190 to 0) °C	0.20 °C	
	(0 to 100) °C	0.16 °C	
	(100 to 500) °C	0.16 °C	
	(500 to 1000) °C	0.16 °C	
	(1000 to 1370) °C	0.20 °C	
Type T	(-200 to 400) °C	0.16 °C	

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Humidity – Measuring Equipment, Fixed Points	0.5 % RH	0.32 % RH	Humidity standard: EA00-SCS
	10% RH	0.32 % RH	EA10-SCS
	35 % RH	0.42 % RH	EA35-SCS
	50% RH	0.60 % RH	EA50-SCS
	80 % RH	0.71 % RH	EA80-SCS
	95 % RH	0.81 % RH	EA95-SCS
Humidity – Measure	(0 to 100) % RH	0.56 % RH	Rotronic HP22

VI. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,3} (±)	Comments
Timers & Stop Watches	(6 to 24) Hours	1.2 µHz/Hz	HP 5335A HP 3325A
Frequency – Measuring Equipment	DC to 20 MHz	0.66 µs/s	HP 3325A
	(20 to 250) MHz	0.45 % of rdg	TEK SG 503
	(0.25 to 1) GHz	0.67 % of rdg	TEK SG 504
Frequency – Measure	DC to 200 MHz	1.2 µHz/Hz	HP 5335A

¹ This laboratory offers commercial calibration service.

² Calibration and Measurement Capability Uncertainty (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 of nearly ideal measuring equipment. CMCs 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 The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

⁴ This scope meets A2LA's *P112 Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

ELEMENT U.S. SPACE & DEFENSE

Fullerton, CA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and the requirements of ANSI/NCSL Z540.3-2006 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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).



Presented this 6th day of May 2024.

A blue ink signature of Mr. Trace McInturff.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 214.25
Valid to March 31, 2026

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