



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Educated Design & Development, Inc. (ED&D)
901 Sheldon Dr.
Cary, NC 27513

has been assessed by ANAB
and meets the requirements of international standard

ISO/IEC 17025:2005

while demonstrating technical competence in the field of

CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of calibrations to which this accreditation applies.

AC-1425
Certificate Number


ANAB Approval

Certificate Valid: 12/08/2017-12/20/2019
Version No. 004 Issued: 12/08/2017



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. 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).



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Educated Design & Development, Inc. (ED&D)

901 Sheldon Dr.

Cary, NC 27513

Bill Bisenius

919 469 9434

CALIBRATION

Valid to: December 20, 2019

Certificate Number: AC-1425

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage Measure	Up to 200 mV		Keithley 2001 Multimeter
	(20 to 50) Hz	0.53 mV	
	(50 to 100) Hz	0.19 mV	
	(0.1 to 2) kHz	0.13 mV	
	(2 to 10) kHz	0.13 mV	
	(10 to 30) kHz	0.13 mV	
	(30 to 50) kHz	0.15 mV	
	(50 to 100) kHz	0.63 mV	
	(100 to 200) kHz	1.6 mV	
	(0.2 to 1) MHz	4.2 mV	
	(1 to 2) MHz	10 mV	
	200 mV to 2 V		
	(20 to 50) Hz	5.3 mV	
	(50 to 100) Hz	1.9 mV	
	(0.1 to 2) kHz	1.3 mV	
	(2 to 10) kHz	1.3 mV	
	(10 to 30) kHz	1.3 mV	
	(30 to 50) kHz	1.5 mV	
	(50 to 100) kHz	6.3 mV	
	(100 to 200) kHz	16 mV	
(0.2 to 1) MHz	42 mV		
(1 to 2) MHz	0.1 V		



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage Measure	(2 to 20) V		Keithley 2001 Multimeter
	(20 to 50) Hz	53 mV	
	(50 to 100) Hz	19 mV	
	(0.1 to 2) kHz	15 mV	
	(2 to 10) kHz	20 mV	
	(10 to 30) kHz	27 mV	
	(30 to 50) kHz	29 mV	
	(50 to 100) kHz	63 mV	
	(100 to 200) kHz	0.16 V	
	(0.2 to 1) MHz	0.84 V	
	(1 to 2) MHz	1.4 V	
	(20 to 200) V		
	(20 to 50) Hz	0.53 V	
	(50 to 100) Hz	0.19 V	
	(0.1 to 2) kHz	0.15 V	
	(2 to 10) kHz	0.2 V	
	(10 to 30) kHz	0.27 V	
	(30 to 50) kHz	0.29 V	
	(50 to 100) kHz	0.63 V	
	(100 to 200) kHz	1.6 V	
(0.2 to 1) MHz	8.4 V		
(200 to 750) V			
(20 to 50) Hz	2.1 V		
(50 to 100) Hz	0.94 V		
(0.1 to 2) kHz	0.87 V		
(2 to 10) kHz	1.1 V		
(10 to 30) kHz	1.5 V		
(30 to 50) kHz	1.8 V		
(50 to 100) kHz	3.9 V		
	(2 to 20) kV		Vitrek 4620B High Voltage Meter
	60 Hz	29 V	
DC Voltage Measure	Up to 200 mV	5 μ V	Keithley 2001 Multimeter
	200mV to 2 V	27 μ V	
	(2 to 20) V	0.28 mV	
	(20 to 200) V	4.1 mV	
	(200 to 1 000) V	47 mV	
	(2 to 20) kV	29 V	Vitrek 4620B High Voltage Meter



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current Measure	Up to 200 μ A		Keithley 2001 Multimeter
	(20 to 50) Hz	0.73 μ A	
	(50 to 200) Hz	0.43 μ A	
	200 Hz to 1 kHz	0.83 μ A	
	(1 to 10) kHz	1 μ A	
	(20 to 200) mA		
	(20 to 50) Hz	0.63 mA	
	(50 to 200) Hz	0.33 mA	
	200 Hz to 1 kHz	0.27 mA	
	(1 to 10) kHz	0.33 mA	
	(10 to 30) kHz	1 mA	
	(30 to 50) kHz	2 mA	
	(50 to 100) kHz	6 mA	
	200 mA to 2 A		
	(20 to 50) Hz	7.3 mA	
	(50 to 200) Hz	4.3 mA	
	200 Hz to 1 kHz	6.3 mA	
(1 to 10) kHz	9.3 mA		
(10 to 30) kHz	30 mA		
(30 to 50) kHz	80 mA		
AC Current Measure	Up to 50 A		Keithley 2001 Multimeter, Current Shunt
	(50 to 60) Hz	0.22 A	
DC Current Measure	Up to 200 μ A	0.11 μ A	Keithley 2001 Multimeter
	200 μ A to 2 mA	0.84 μ A	
	(2 to 20) mA	8.4 μ A	
	(20 to 200) mA	0.1 mA	
	200 mA to 2 A	1.8 mA	
DC Current Measure	Up to 50 A	0.22 A	Keithley 2001 Multimeter, Current Shunt
Resistance Measure	Up to 20 Ω	1.6 m Ω	Keithley 2001 Multimeter
	(20 to 200) Ω	13 m Ω	
	200 Ω to 2 k Ω	0.11 Ω	
	(2 to 20) k Ω	1.1 Ω	
	(20 to 200) k Ω	19 Ω	
	200 k Ω to 2 M Ω	0.33 k Ω	
	(2 to 20) M Ω	1.9 k Ω	
	(20 to 200) M Ω	4 M Ω	
	200 M Ω 1 G Ω	40 M Ω	



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Hipot Testers	(500 to 5 000) V (0.025 to 20) mA	29 V 0.048 mA	Vitretek 4620B High Voltage Meter, Keithley 2001 Multimeter
Ground Continuity Testers	(0.01 to 0.2) Ω Up to 50A	1.6 m Ω 0.22 A	Resistor Array Keithley 2001 Multimeter Current Shunt
Leakage Current Testers	AC Current Up to 200 μ A 200 μ A to 2 mA (2 to 20) mA	0.212 μ A 0.022 mA 0.048 mA	Keithley 2001 Multimeter
	Resistance Measure Up to 2 k Ω	180 m Ω	Keithley 2001 Multimeter
	Frequency Measure Up to 1 MHz	(0.002F) Hz	Tektronix Scopemeter
	AC Voltage Measure Up to 400 mV	15 mV	Tektronix Scopemeter
Electrical Simulation of Thermocouple Indicating Devices ²	Type J (-300 to 0) $^{\circ}$ F (0 to 100) $^{\circ}$ F (100 to 2 000) $^{\circ}$ F	(1.2 - 0.004 7T) $^{\circ}$ F (1.2 + 0.001 1T) $^{\circ}$ F (1.3 + 0.000 6T) $^{\circ}$ F	Calibrator/Thermometer
	Type K (-300 to 0) $^{\circ}$ F (0 to 100) $^{\circ}$ F (100 to 1 000) $^{\circ}$ F (1 000 to 2 500) $^{\circ}$ F	(1.3 - 0.004 9T) $^{\circ}$ F (1.3 + 0.001 1T) $^{\circ}$ F (1.4 + 0.000 5T) $^{\circ}$ F (1.2 + 0.000 6T) $^{\circ}$ F	
	Type T (-300 to 0) $^{\circ}$ F (0 to 100) $^{\circ}$ F (100 to 1 000) $^{\circ}$ F	(1.3 - 0.005 6T) $^{\circ}$ F (1.3 + 0.000 6T) $^{\circ}$ F (1.3 + 0.000 4T) $^{\circ}$ F	
	Type E (-300 to 0) $^{\circ}$ F (0 to 100) $^{\circ}$ F (100 to 1 000) $^{\circ}$ F	(1.2 - 0.004 5T) $^{\circ}$ F (1.2 + 0.000 7T) $^{\circ}$ F (1.2 + 0.000 6T) $^{\circ}$ F	

Length – Dimensional metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Accessibility Probes			
Length	Up to 25.4 mm	3.2 μ m	Micrometer
Length	Up to 254 mm	6.5 μ m	Vision System
Length	Up to 150 mm	14 μ m	Caliper
Length	Up to 18 inch	0.59 mm	Steel Rule
Length	Up to 25 ft	0.58 mm	Tape Measure
Diameter	Up to 25.4 mm	3.2 μ m	Micrometer
Diameter	Up to 150 mm	14 μ m	Caliper
Diameter	Up to 254 mm	6.5 μ m	Vision System
Radius	Up to 100 mm	9.6 μ m	Vision System
Angle	Up to 360 °	0.025 °	Vision System
Length	Up to 25.4 mm	3.2 μ m	Micrometer
	Up to 150 mm	14 μ m	Caliper
	Up to 254 mm	6.5 μ m	Vision System
	Up to 18 inch	0.59 mm	Steel Rule
	Up to 25 ft	0.58 mm	Tape Measure
Diameter	Up to 25.4 mm	3.2 μ m	Micrometer
	Up to 150 mm	14 μ m	Caliper
	Up to 254 mm	6.5 μ m	Vision System
Radius	Up to 100 mm	9.6 μ m	Vision System
Angle	Up to 360 °	0.025 ° -0.26 °	Vision System
Creepage & Clearance Gauges	Up to 25.4 mm	3.2 μ m	Micrometer
Angle Meters	Up to 360 °	0.058 °	Angle Blocks
Digital Protractors		0.06 °	
Tirril Burners	Length Up to 150 mm	14 μ m	Caliper
Needle Flame Burner	Radius Up to 100 mm Length Up to 254 mm	9.6 μ m 6.5 μ m	Vision System
Glow Wire Elements	Radius Up to 100 mm	9.6 μ m	Vision System Micrometer
	Length Up to 254 mm	6.5 μ m	
	OD Up to 25.4 mm	3.2 μ m	
Flame Height Gauges	Length Up to 254 mm	6.5 μ m	Vision System Caliper
	Angle (0 to 360) °	0.025 °	
Choke Hazard Tester	Length Up to 254mm	6.5 μ m	Vision System Caliper
	Length Up to 150mm	14 μ m	



Mass

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Impact Balls	Mass Up to 2 000 g	0.2 g	Digital Scale
Impact Hammers ²	Up to 0.25 J (0.25 to 1.0) J (1.0 to 2.1) J	0.01 J (0.015 + 0.002E) J (0.046 + 0.002E) J	Impact Hammer Calibrator
Impact Hammer Calibrators	Up to 0.25 J (0.25 to 1.0) J (1.0 to 2.1) J	0.004 J 0.008 J 0.013 J	Steel rule and Digital Scale
Pressure Gauges	(-14 to 0) psig Up to 15 psig Up to 30 psig	0.0773 psi 0.089 psi 0.32 psi	Dwyer DPG-100 Dwyer DPG-102 Omega DPG1000B-30G
Force Gauges	Up to 50 N (50 to 1 000) N	0.058 N 0.13 N	Class F Weights
Force Measure	Up to 20 lb (20 to 45) lb	0.03 lb 0.09 lb	Digital Force Gauge
Ball Pressure Testers	Radius Up to 100 mm Force Up to 45 lb	9.6 µm 0.09 lb	Vision System Digital Force Gauge
Mass ²	Up to 4 000 g	(36 + 1.2W) mg	Digital Scale
Gas Flow	Up to 2 L/m	0.076 L/m	Omega FMA 1816
Volumetric Flow, Liquids ²	(0.1 To 2) L/m (0.3to 9) L/m (4.0 to 120) L/m (38 to 380) L/m	(0.11L + 0.09) L/m (0.062L + 0.4) L/m (1L + 0.83) L/m (0.031L + 1.2) L/m	Omega FTB601B Omega FTB602B Omega FTB606B Omega FTB694
IEC 60529 (IPX 3 and 4) Spray Nozzles	(9.5 to 10.5) L/m Length Up to 254 mm Length Up to 150 mm Angle (0 to 360) ° ID (14.7 to 15.3) mm Angle (0 to 45) °	0.19 L/m 6.5 µm 14 µm 0.025 ° 0.13 mm 0.59 °	Omega FTB606B Vision System Caliper Vision System Gauge Pins Vision System
IEC 60529 (IPX 5 and 6) Jet Nozzles	(11.9 to 13.1) L/m (95 to 105) L/m ID Up to 150 mm	0.39 L/m 1.5 L/m 14 µm	Omega FTB606B Omega FTB694B Caliper
IEC 60529 (IP 5X and 6X) Dust Chambers	Up to 2 L/m Air Pressure (-14 to 0) psig Time Up to 2 400 s	0.076 L/m 0.078 psi 0.31 s	Omega FMA 1816 Dwyer DPG-100 Stopwatch



Mass

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
IEC 60529 (IPX 3 and 4) Oscillating Spray Testers ²	Angle (0 to 360) ° Length Up to 150 mm Length Up to 25 ft Time Up to 2 400 s ID Up to 0.4 mm Flow (0.56 to 3.0) L/m Flow (0.56 to 9.0) L/m	0.26 ° 14 µm 0.58 mm 0.31 s 14 µm (0.006 2L + 0.4) L/m (0.009 4L + 0.49) L/m	Digital Protractor Caliper Tape Measure Stopwatch Gauge Pin Omega FTB602B Omega FTB602B
IEC 60529 (IPX 1 and 2) Drip Boxes ²	Length Up to 150 mm Flow (0.1 to 2) L/m	14 µm (0.025L + 0.026) L/m	Caliper Omega FTB601B
UL Compliant Rain Test Apparatus	Length Up to 25 ft Angle (0 to 90) ° Pressure (0 to 15) psig Pressure (0 to 30) psig	0.58 mm 0.26 ° 0.089 psi 0.32 psi	Tape Measure Digital Protractor Dwyer DPG-102 Omega DPG1000B
Turntables	Time Up to 2 400 s Load Up to 500 lb	0.31 s	Stopwatch Class F Weights
Copper Blocks	Angle (0 to 360) ° Length Up to 254 mm ID Up to 0.5 mm Mass Up to 200 g	0.025 ° 6.5 µm 3.2 µm 17 mg	Vision System Gauge Pin Digital Scale Micrometer
Tracking Testers	Angle (0 to 360) ° Length Up to 254 mm Length Up to 150 mm Diameter Up to 25.4 mm Voltage Up to 600 VAC Current Up to 2 AAC Force Up to 1.9 N Time Up to 2 400 s	0.025 ° 6.5 µm 14 µm 3.2 µm 1.5 mV/V 2.1 mA/A 2 mN 0.31 s	Vision System Caliper Micrometer Keithley 2001 Digital Scale Stopwatch
Glow Wire Testers	Force Up to 1.9 N Temp Up to 1 000 °C Time up to 2400 s	2 mN 3.7 °C 0.31 s	Digital Scale Silver foil Stopwatch
Manual Sharp Edge Testers	Up to 24 oz	0.11 oz	Class F Weights
Automated Sharp Edge Testers	Weight Up to 20 lb Time Up to 2400 s Diameter Up to 150 mm Surface Roughness (0.03 to 6.35) µm	0.03 lb 0.31 s 14 µm 0.19 µm	Digital Force Gauge Stopwatch Caliper Profilometer

Mass

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sharp Point Tester	Force Up to 20 lb Length Up to 254 mm Length Up to 150 mm	0.03 lb 6.5 μ m 14 μ m	Digital Force Gauge Vision System Caliper
Surface Roughness Measurement ²	0.03 μ m to 6.35 μ m	(0.18 + 0.015R) μ m	Profilometer
Tumbling Barrels	Length up to 150 mm Length up to 25 ft Angle up to 360 ° Time up to 2400 s	14 μ m 0.58 mm 0.26 ° 0.31 s	Digital Caliper Tape Measure Digital Protractor Digital Stopwatch
Cord Anchorage Torque Testers	Force up to 20 lb Length up to 254 mm Mass up to 200 g	0.03 lb 6.5 μ m 17 mg	Force Gauge Vision System Digital Scale
Socket Outlet Torque Balances	Length up to 254 mm Length up to 150 mm Length up to 25.4mm Mass up to 200 g	6.5 μ m 14 μ m 3.2 μ m 17 mg	Vision System Digital Caliper Micrometer Digital Scale
Iron Drop Testers	Force up to 20 lb Length up to 150 mm Time up to 2400 s Voltage up to 750 V Current up to 2A	0.03 lb 14 μ m 0.31 2.2 V 20 mA	Force Gauge Digital Caliper Digital Stopwatch Multimeter Multimeter

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Measure	(-200 to 300) °C	0.14 °C	PRT Thermometer
Humidity Measure	Up to 100 % RH	1.2 % RH	Digital Hygrometer
Environmental Chambers	Up to 100 % RH (-200 to 300) °C	1.2 % RH 0.14 °C	PRT Thermometer Digital Hygrometer

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency Measure ²	Up to 1 MHz	(0.002 <i>F</i>) Hz	Tektronix Scopemeter
Time Measure	Up to 2 400 s	0.31 s	Digital Stopwatch
	Above 2 400 s	0.71 s	
Stopwatches	Up to 2 400 s	0.31 s	Digital Stopwatch
	Above 2 400 s	0.71 s	

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, 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.
2. *E* = energy in joules, *F* = frequency in MHz, *L* = flow in liters per minute, *R* = roughness in micro meters, *T* = temperature in degrees Celsius, *W* = weight in grams.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1425.



Vice President

