



CERTIFICATE OF ACCREDITATION

ANSI National Accreditation Board

11617 Coldwater Road, Fort Wayne, IN 46845 USA

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 17025:2017

while demonstrating technical competence in the field of

CALIBRATION

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

AC-1425

Certificate Number



ANAB Approval

Certificate Valid Through: 12/20/2021
Version No. 008 Issued: 12/19/2019



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. 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 17025:2017

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

901 Sheldon Dr.

Cary, NC 27513

Bill Bisenius

919 469 9434

CALIBRATION

Valid to: **December 20, 2021**

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



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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	
	200 μ A to 2 mA		
	(20 to 50) Hz	6.3 μ A	
	(50 to 200) Hz	3.3 μ A	
	200 Hz to 1 kHz	2.7 μ A	
	(1 to 10) kHz	2.7 μ A	
	(10 to 30) kHz	5.3 μ A	
	(30 to 50) kHz	6.3 μ A	
	(50 to 100) kHz	10 μ A	
	(2 to 20) mA		
	(20 to 50) Hz	63 μ A	
	(50 to 200) Hz	33 μ A	
	200 Hz to 1 kHz	27 μ A	
	(1 to 10) kHz	27 μ A	
	(10 to 30) kHz	53 μ A	
	(30 to 50) kHz	63 μ A	
	(50 to 100) kHz	103 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	0.33mA	
	(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		
	Up to 50 A		Keithley 2001 Multimeter, Current Shunt
	(50 to 60) Hz	0.22 A	



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current Measure	Up to 200 μ A 200 μ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A	0.11 μ A 0.84 μ A 8.4 μ A 0.1 mA 1.8 mA	Keithley 2001 Multimeter
	Up to 50 A	0.22 A	Keithley 2001 Multimeter, Current Shunt
Resistance Measure	Up to 20 Ω (20 to 200) Ω 200 Ω to 2 k Ω (2 to 20) k Ω (20 to 200) k Ω 200 k Ω to 2 M Ω (2 to 20) M Ω (20 to 200) M Ω 200 M Ω 1 G Ω	1.6 m Ω 13 m Ω 0.11 Ω 1.1 Ω 19 Ω 0.33 k Ω 1.9 k Ω 4 M Ω 40 M Ω	Keithley 2001 Multimeter
Hipot Testers	(0.5 to 5) kV (0.025 to 20) mA	0.03 kV 0.05 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	0.21 μ A 0.01 mA 0.05 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 (0 to 1 200) $^{\circ}$ C	0.6 $^{\circ}$ C	Calibrator/Thermometer
	Type K (0 to 1 372) $^{\circ}$ C	0.66 $^{\circ}$ C	
	Type T (0 to 400) $^{\circ}$ C	0.67 $^{\circ}$ C	
	Type E (0 to 1 000) $^{\circ}$ C	0.57 $^{\circ}$ C	



Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Hot Winding Resistance Tester	(0.02 to 20) Ω 200 Ω 2 000 Ω 20 000 Ω 200 000 Ω	0.002 Ω 0.013 Ω 0.11 Ω 1.1 Ω 19 Ω	Keithley 2001 Multimeter
	(20 to 100) $^{\circ}\text{C}$	0.66 $^{\circ}\text{C}$	Omega CL3515R Temperature Calibrator

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 μm	Micrometer
Length	Up to 254 mm	6.5 μm	Vision System
Length	Up to 150 mm	14 μm	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 μm	Micrometer
Diameter	Up to 150 mm	14 μm	Caliper
Diameter	Up to 254 mm	6.5 μm	Vision System
Radius	Up to 100 mm	9.6 μm	Vision System
Angle	Up to 360 $^{\circ}$	0.025 $^{\circ}$	Vision System
Length	Up to 25.4 mm	3.2 μm	Digital Micrometer
	Up to 150 mm	14 μm	Digital Caliper
	Up to 254 mm	6.5 μm	Vision System
	Up to 18 inch	0.59 mm	Steel Rule
	Up to 24 inch	0.085 mm	Digital Caliper
	Up to 25 ft	0.58 mm	Tape Measure
Diameter	Up to 25.4 mm	3.2 μm	Micrometer
	Up to 150 mm	14 μm	Caliper
	Up to 254 mm	6.5 μm	Vision System
Radius	Up to 100 mm	9.6 μm	Vision System
Angle	Up to 360 $^{\circ}$	0.025 $^{\circ}$	Vision System
		0.26 $^{\circ}$	
Micrometers	Up to 25.4 mm	3.1 μm	Gage Blocks
Calipers	Up to 150 mm	36 μm	Gage Blocks



Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Creepage & Clearance Gauges	Up to 25.4 mm	3.2 μm	Micrometer
Angle Meters Digital Protractors	Up to 360 °	0.058 ° 0.06 °	Angle Blocks
Tirril Burners	Length Up to 150 mm	14 μm	Caliper
Needle Flame Burner	Radius Up to 100 mm Length Up to 254 mm	9.6 μm 6.5 μm	Vision System
Glow Wire Elements	Radius Up to 100 mm Length Up to 254 mm OD Up to 25.4 mm	9.6 μm 6.5 μm 3.2 μm	Vision System Micrometer
Flame Height Gauges	Length Up to 254 mm Angle (0 to 360) °	6.5 μm 0.025 °	Vision System Caliper
Choke Hazard Tester	Length Up to 254 mm Length Up to 150 mm	6.5 μm 14 μm	Vision System Caliper

Mass and Mass Related

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

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
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
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

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Tracking Testers	Angle (0 to 360) °	0.025 °	Vision System
	Length Up to 254 mm	6.5 µm	Caliper
	Length Up to 150 mm	14 µm	
	Diameter Up to 25.4 mm	3.2 µm	Micrometer
	Voltage Up to 600 VAC	1.5 mV/V	Keithley 2001
	Current Up to 2 AAC	2.1 mA/A	
	Force Up to 1.9 N	2 mN	
Time Up to 2 400 s	0.31 s	Digital Scale	
Glow Wire Testers	Force Up to 1.9 N	2 mN	Digital Scale
	Temp Up to 1 000 °C	3.7 °C	Silver foil
	Time up to 2400 s	0.31 s	Stopwatch
Manual Sharp Edge Testers	Up to 24 oz	0.11 oz	Class F Weights
Automated Sharp Edge Testers	Weight Up to 20 lb	0.03 lb	Digital Force Gauge
	Time Up to 2400 s	0.31 s	
	Diameter Up to 150 mm	14 µm	Stopwatch
	Surface Roughness (0.03 to 6.35) µm	0.19 µm	Caliper
Sharp Point Tester	Force Up to 20 lb	0.03 lb	Digital Force Gauge
	Length Up to 254 mm	6.5 µm	Vision System
	Length Up to 150 mm	14 µm	Caliper
Surface Roughness Measurement ²	(0.03 to 6.35) µm	(0.18 + 0.015R) µm	Profilometer
Tumbling Barrels	Length up to 150 mm	14 µm	Digital Caliper
	Length up to 25 ft	0.58 mm	Tape Measure
	Angle up to 360 °	0.26 °	Digital Protractor
	Time up to 2400 s	0.31 s	Digital Stopwatch
Cord Anchorage Torque Testers	Force up to 20 lb	0.03 lb	Force Gauge
	Length up to 254 mm	6.5 µm	Vision System
	Mass up to 200 g	17 mg	Digital Scale
Socket Outlet Torque Balances	Length up to 254 mm	6.5 µm	Vision System
	Length up to 150 mm	14 µm	Digital Caliper
	Length up to 25.4mm	3.2 µm	Micrometer
	Mass up to 200 g	17 mg	Digital Scale
	Iron Drop Testers	Force up to 20 lb	0.03 lb
Length up to 150 mm		14 µm	Digital Caliper
Time up to 2 400 s		0.31	Digital Stopwatch
Voltage up to 750 V		2.2 V	Multimeter
Current up to 2A		20 mA	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	(0.002F) Hz	Tektronix Scopemeter
Time Measure	Up to 2 400 s Above 2 400 s	0.31 s 0.71 s	Digital Stopwatch
Stopwatches	Up to 2 400 s Above 2 400 s	0.31 s 0.71 s	Digital Stopwatch

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

