



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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

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CALIBRATION

Valid to: December 20, 2013

Certificate Number: AC-1425

I. Mechanical

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Accessibility Probes Length Length Diameter Radius Angle	Up to 254 mm Up to 150 mm Up to 25.4 mm Up to 100 mm Up to 360°	12.5 µm 14.0 µm 3.2 µm 11.5 µm 0.11°	Optical Comparator Caliper Micrometer Optical Comparator Optical Comparator	Laboratory Developed & Product Safety Standards including UL, CSA, IEC, & EN
Length	Up to 25.4 mm Up to 150 mm Up to 254 mm Up to 18 inch Up to 25 ft	3.2 µm 14.0 µm 12.5 µm 0.5945 mm 0.5782 mm	Micrometer Caliper Optical Comparator Steel Rule Tape Measure	OEM sourced procedures
Diameter	Up to 25.4 mm	3.2 µm 14.0 µm 12.5 µm	Micrometer Caliper Optical Comparator	OEM sourced procedures
Radius	Up to 100 mm	11.5 µm	Optical Comparator	OEM sourced procedures
Angle	Up to 360°	0.11° 0.26°	Optical Comparator Digital Protractor	OEM sourced procedures
Creepage & Clearance Gauges	Up to 25.4 mm	3.2 µm	Micrometer	W5.4.1-30
Angle Meters	Up to 360 degree	0.633 °	Digital Protractor	W5.4.1-64



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Impact Balls	Mass up to 2 000g	202.72 mg	Digital Scale	OEM sourced procedures
Impact Hammers	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	IEC 60068-2-75 and W.5.4.1-31
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	IEC 60068-2-75 and W.5.4.1-32
Pressure Gauges	(-14 to 0) psig Up to 15 psig Up to 30 psig	0.0773 psig 0.0886 psig 0.32 psig	Dwyer DPG-100 Dwyer DPG-102 Omega DPG1000B-30G	OEM
Force Gauges	Up to 50 N Up to 1 000 N	0.058 N 0.13 N	Class F Weights	W5.4.1-40
Force Measure	Up to 20 lb 20 to 45 lb	0.03 lb 0.09 lb	Digital Force Gauge	OEM
Ball Pressure Testers	Radius up to 100 mm Force up to 45 lb	11.5 µm 0.09 lb	Optical Comparator Digital Force Gauge	W5.4.1-21
Mass	Up to 200 g Up to 2 000 g	17.33 mg 202.72 mg	Digital Scale	OEM
Gas Flow	Up to 2 L/m	0.076 L/m	Omega FMA 1816	OEM
Volumetric Flow, Liquids	(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 + 0.4001) L/m (1.01L + 0.831) L/m (0.031L + 1.16) L/m	Omega FTB601B Omega FTB602B Omega FTB606B Omega FTB694	OEM
IEC 60529 (IPX 3 and 4) Spray Nozzles	(9.5 to 10.5) L/m Length up to 254mm Length up to 150mm Angle 0 to 360 ° ID (14.7 to15.3) mm Angle 0 to 45 °	0.187 L/m 12.5 µm 14.0 µm 0.11 ° 0.1276 mm 0.588 °	Omega FTB606B Optical Comparator Caliper Optical Comparator Gauge Pins Optical Comparator	W5.4.1-35
IEC 60529 (IPX 5 and 6) Jet Nozzles	(11.9 to 13.1) L/m (95 to 105) L/m ID Up to 150mm	0.393 L/m 1.541 L/m 14.0 µm	Omega FTB606B Omega FTB694B Caliper	W5.4.1-36

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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 0.0773 psig 0.31 s	Omega FMA 1816 Dwyer DPG-100 Stopwatch	W5.4.1-44
IEC 60529 (IPX 3 and 4) Oscillating Spray Testers	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° 14.0 µm 0.58 mm 0.31 s 14.0 µm (0.0062L + 0.4001) L/m (0.0094L + 0.4852) L/m	Digital Protractor Caliper Tape Measure Stopwatch Gauge Pin Omega FTB602B Omega FTB602B	W5.4.1-42
IEC 60529 (IPX 1 and 2) Drip Boxes	Length Up to 150 mm Flow (0.1 to 2) L/m	14.0 µm (0.025L + 0.026) L/m	Caliper Omega FTB601B	W5.4.1-43
UL Compliant Rain Test Apparatus	Length Up to 25 ft Angle (0 to 90) ° Pressure (0 to 15) psig Pressure (0 to 30) psig	0.5838 mm 0.26 ° 0.0886 psig 0.32 psig	Tape Measure Digital Protractor Dwyer DPG-102 Omega DPG1000B	W5.4.1-45
Turntables	Time up to 2 400 s Load up to 500 lb	0.31 s	Stopwatch Class F Weights	W5.4.1-46
Tirril Burners	Length Up to 150 mm	14.0 µm	Caliper	W5.4.1-48
Needle Flame Burner	Radius Up to 100 mm Length Up to 254 mm	11.5 µm 12.5 µm	Optical Comparator	W5.4.1-49
Copper Blocks	Angle (0 to 360) ° Length Up to 254 mm ID Up to 0.5 mm Mass Up to 200 g	0.11° 12.5 µm 3.2 µm 17.33 mg	Optical Comparator Gauge Pin Digital Scale Micrometer	W5.4.1-50
Tracking Testers	Angle (0 to 360) ° Length Up to 254 mm Length Up to 150 mm Diameter Up to 25.4 mm Voltage 0 to 600 VAC Current 0 to 2AAC Force Up to 1.9 N Time Up to 2 400 s	0.11° 12.5 µm 14.0 µm 3.2 µm 1.5 mV/V 2.1 mA/A 1.98 mN 0.31 s	Optical Comparator Caliper Micrometer Keithley 2001 Digital Scale Stopwatch	W5.4.1-51
Glow Wire Testers	Force Up to 1.9 N Temp Up to 1 000 °C Time up to 2400 s	1.98 mN 3.65 °C 0.31 s	Digital Scale Silver foil Stopwatch Caliper	W5.4.1-52

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Glow Wire Elements	Radius Up to 100 mm Length Up to 254 mm OD Up to 25.4 mm	11.5 µm 12.5 µm 3.2 µm	Optical Comparator Micrometer	W5.4.1-53
Manual Sharp Edge Testers	Up to 24 oz	0.11 oz	Class F Weights	W5.4.1-64
Flame Height Gauges	Length Up to 254 mm Angle (0 to 360) °	12.5 µm 0.11°	Optical Comparator Caliper	W5.4.1-63
Choke Hazard Tester	Length up to 254mm Length up to 150mm	12.5 µm 14.0 µm	Optical Comparator Caliper	W5.4.1-68
Automated Sharp Edge Testers	Weight up to 20 lb Time up to 2400 s Diameter up to 150mm	0.03 lb 0.31 s 14.0 µm	Digital Force Gauge Stopwatch Caliper	W5.4.1-66
Sharp Point Tester	Force up to 20 lb Length up to 254mm Length up to 150mm	0.03 lb 12.5 µm 14.0 µm	Digital Force Gauge Optical Comparator Caliper	W5.4.1-67

II. Electromagnetic – DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage Measure	Up to 200 mV (20 to 50) Hz (50 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (100 to 200) kHz (0.2 to 1) MHz (1 to 2) MHz Up to 2 V (20 to 50) Hz (50 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (100 to 200) kHz (0.2 to 1) MHz (1 to 2) MHz Up to 20 V (20 to 50) Hz (50 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (100 to 200) kHz (0.2 to 1) MHz (1 to 2) MHz Up to 200 V (20 to 50) Hz (50 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz (100 to 200) kHz (0.2 to 1) MHz	530 μV 190 μV 130 μV 130 μV 130 μV 150 μV 630 μV 1.55 mV 4.2 mV 10.4 mV 5.3 mV 1.9 mV 1.3 mV 1.3 mV 1.3 mV 1.5 mV 6.3 mV 15.5 mV 42 mV 104 mV 53 mV 19 mV 15 mV 20 mV 27 mV 29 mV 63 mV 155 mV 840 mV 1.44 V 530 mV 190 mV 150 mV 200 mV 270 mV 290 mV 630 mV 1.55 V 8.4 V	Keithley 2001	OEM



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage Measure (Cont.)	Up to 750 V (20 to 50) Hz (50 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz	2.1375 V 0.9375 V 0.8675 V 1.0875 V 1.4625 V 1.7625 V 3.8625 V	Keithley 2001 Vitrek 4620B	OEM
	Up to 20 000 V 60 Hz	29 V		
DC Voltage Measure	Up to 200 mV 200mV to 2 V (2 to 20) V (20 to 200) V (200 to 1 000) V Up to 20 000 V	5 µV 27 µV 280 µV 4.1 mV 47 mV 29 V	Keithley 2001 Vitrek 4620B	OEM



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)	
AC Current Measure	Up to 200 µA (20 to 50) Hz (50 to 200)Hz 200 Hz to 1 kHz (1 to 10) kHz	0.73 µA 0.43 µA 0.83 µA 1.03 µA	Keithley 2001	OEM	
	Up to 2 mA (20 to 50) Hz (50 to 200)Hz 200 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz	6.3 µA 3.3 µA 2.7 µA 2.7 µA 5.3 µA 6.3 µA 10.3 µA			
	Up to 20 mA (20 to 50) Hz (50 to 200)Hz 200 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz	63 µA 33 µA 27 µA 27 µA 53 µA 63 µA 103 µA			
	Up to 200 mA (20 to 50) Hz (50 to 200)Hz 200 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz (30 to 50) kHz (50 to 100) kHz	0.63 mA 0.33 mA 0.27 mA 0.33mA 1.03 mA 2.03 mA 6.03 mA			
	Up to 2A (20 to 50) Hz (50 to 200)Hz 200 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz (30 to 50) kHz	7.3 mA 4.3 mA 6.3 mA 9.3 mA 30.3 mA 80.3 mA			
	Up to 50A 50 to 60 Hz	0.219 A			Keithley 2001, Current Shunt



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DC Current Measure	Up to 200 µA 200 µA to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A Up to 50 A	0.105 µA 0.84 µA 8.4 µA 104 µA 1.84 mA 0.219 A	Keithley 2001 Keithley 2001, Current Shunt	OEM
Resistance Measure	Up to 20 Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ 1 GΩ	1.58 mΩ 12.6 mΩ 108 mΩ 1.08 Ω 18.9 Ω 329 Ω 1.89 kΩ 4.02 MΩ 40.1 MΩ	Keithley 2001	OEM
Frequency Measure	Up to 1 MHz	(0.002F) Hz	Tektronix Scopemeter	OEM
Hipot Testers	(500 to 5 000) V (0.025 to 20) mA	29 V 0.048 mA	Vitretek 4620B Keithley 2001	W5.4.1-33
Ground Continuity Testers	0.01 to 0.2 Ω Up to 50A	1.57 mΩ 0.219 A	Resistor Array Keithley 2001 , Current Shunt	W5.4.1-56
Leakage Current Testers	AC Current Up to 200 µA Up to 2 mA Up to 20 mA Resistance Measure Up to 2 kΩ Frequency Measure Up to 1 MHz AC Voltage Measure Up to 400 mV	0.212 µA 0.022 mA 0.048 mA 180 mΩ (0.002F) Hz 15.246 mV	Keithley 2001 Keithley 2001 Tektronix Scopemeter Tektronix Scopemeter	W5.4.1-57, W5.4.1-58, W5.4.1-59
Electrical Simulation of Thermocouples				
Type J	(-210 to 0) °C (0 to 760) °C (760 to 1 200) °C	1.1573 °C 0.9377 °C 0.9275 °C	Keithley 2001 Digital Thermometer	W5.4.1-47
Type K	(-210 to 0) °C (0 to 500) °C (500 to 1 372) °C	1.352 °C 0.9617 °C 0.9903 °C		

III. Time and Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Time Measure	Up to 2 400 s Above 2 400 s	0.31 s 0.71 s	Digital Stopwatch	W5.4.1-34 NIST SP 960-12
Stopwatches	Up to 2 400 s Above 2 400 s	0.31 s 0.71 s	Digital Stopwatch	W5.4.1-34 NIST SP 960-12

Notes:

1. Calibration and Measurement Capabilities (Expanded Uncertainty) are based on approximately a 95% confidence interval, using a coverage of $k=2$
2. The use of (E) signifies the reading in joules.
3. The use of (L) signifies the reading in liters per minute.
4. This scope is part of and must be included with the Certificate of Accreditation No. AC 1425



Vice President