



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

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CALIBRATION and TESTING

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I. Dimensional Calibration

Table with 5 columns: PARAMETER / EQUIPMENT, RANGE, CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)], REFERENCE STANDARD OR EQUIPMENT, METHOD(S). Rows include Gage Blocks*, Caliper, Micrometer OD, Micrometer ID, Micrometer Depth, Indicator, Height Gage, Bore Gage, Tri-bore, and Bore Gage, 2-pt.



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Pin Gage	Up to 1 in	43 μin	Bench micrometer	CP-7
Plain Plug Gage*	Up to 20 in	(15 + 2D) μin	ULM Gage Blocks	CP-8
Plain Ring Gage*	(0.08 – 18) in	(10 + 2D) μin	Supermicrometer® Master ring	CP-9
Thread Plug Gage* Major Diameter Pitch Diameter	Up to 8 in Up to 8 in	(26 + 2D) μin (54 + 2D) μin	ULM Thread wire	CP-10
Thread Ring (Solid)* Minor Diameter Pitch Diameter	Up to 8 in	(33 + 2D) μin (45 + 2D) μin	ULM	CP-11
Thread Ring (Adj.)* Minor Diameter Pitch Diameter	Up to 8 in	(33 + 2D) μin 310 μin	ULM Master Setting Plug	CP-12
Thread Measuring Wires*	Up to 80 TPI	13 μin	ULM 0.750 Roll 0.125 Roll	CP-13
Linear Scale* Steel Rule	Up to 72 in	(100 + 5L) μin	Measuring microscope	CP-14
Tape Measure	Up to 300 ft	(500 + 5L) μin	CMM	CP-15
Level, Machinist*	Up to 96 in	0.00015 in / ft	Surface plate	CP-16
Pi Tape*	Up to 60 ft	0.0005 in / ft diameter	CMM	CP-17
CMM Linear Accuracy Volumetric Accuracy Repeatability	Up to 120 in	(55 + 4L) μin (120 + 4L) μin 120 μin	Laser interferometer Ball bar Sphere	CP-18
Optical Comparator Linearity X-Y Axis Squareness	Up to 20 in Up to 30 in	150 μin 180 μin	Glass master Glass master	CP-19

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Optical Comparator Magnification	10x 20x 31.25x 50x 61.25x 100x	0.001 in 0.0005 in 0.00032 in 0.0002 in 0.00016 in 0.00010 in	Glass master Glass rule	CP-19
Glass Master*	Up to 12 in	28 µin	Measuring microscope	CP-20
Measuring Microscope	Up to 12 in	16 µin	Laser interferometer	CP-21
Surface Analyzer	Up to 500 µin	(5 + 0.6R) µin	Roughness Standard	CP-22
Roughness Standard*	Up to 250 µin	3.5 µin	Profilometer	CP-23
Surface Plate Flatness Repeatability	(6 × 6) to (18 × 18) in (18 × 24) to (72 × 144) in 0.002 in	48 µin (30 + 0.5d) µin 30 µin	Electronic levels Autocollimator Repeat O Meter	CP-24
Electronic Levels*	± 1 000 arc sec	1.2 arc sec	Gage blocks – Sine plate	CP-25
Autocollimator*	Up to 30 min	0.82 arc sec	Angle generator	CP-26

II. Dimensional Inspection / Measurement

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Angle	(0 to 360) °	30 arc sec 1.5 arc sec 16 arc sec 14 arc sec	CMM Sine Plate Optical comparator Measuring microscope	Dimensional Layout GD&T Metrology
Diameter	Up to 40 in Up to 16 in Up to 8 in	(160 + 10D) µin (180 + 10D) µin (100 + 10D) µin	CMM Optical comparator Measuring microscope	Dimensional Layout GD&T Metrology

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Flatness	(0 to 0.020) μ in	73 μ in/ft 1.6 μ in 45 μ in 48 μ in 110 μ in 30 μ in	CMM Optical flat Autocollimator Electronic levels Height stand – LVDT Laser interferometer	Dimensional Layout GD&T Metrology
Length X Axis Y Axis Z Axis	Up to 40 in Up to 80 in Up to 40 in	(165 + 4L) μ in (190 + 4L) μ in (140 + 4L) μ in	CMM	Dimensional Layout GD&T Metrology
Volumetric	40 in \times 80 in \times 40 in	350 μ in	CMM	Dimensional Layout GD&T Metrology
Length X Axis Y Axis	Up to 8 in Up to 4 in	40 μ in 25 μ in	Microscope	Dimensional Layout GD&T Metrology
Length X Axis Y Axis	Up to 12 in Up to 8 in	150 μ in 90 μ in	Optical Comparator	Dimensional Layout GD&T Metrology
Length	Up to 20 in Up to 6 in Up to 20 in Up to 1 in	(230 + 4L) μ in (2.7 + 1.1L) μ in (9 + 2L) μ in 43 μ in	Height Gage Laser Interferometer ULM Bench micrometer	Dimensional Layout GD&T Metrology
Parallelism	(0 to 0.020) in	72 μ in / ft 73 μ in 32 μ in	CMM Height stand, LVDT Measuring microscope	Dimensional Layout GD&T Metrology
Roundness	(0 to 0.020) in	33 μ in / in diameter 10 μ in	CMM Roundness tester	Dimensional Layout GD&T Metrology
Sphericity	(0 to 0.020) in	180 μ in	CMM	Dimensional Layout GD&T Metrology
Squareness	(0 to 0.020) in	77 μ in / ft 1.6 μ in 86 μ in 18 μ in 35 μ in	CMM Optical flat Height stand – LVDT Laser interferometer Measuring microscope	Dimensional Layout GD&T Metrology
Straightness	(0 to 0.020) in	47 μ in 14 μ in 26 μ in	CMM Laser interferometer Measuring microscope	Dimensional Layout GD&T Metrology

III. Chemical Quantities

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
pH Meters	4, 7, 10 pH units	0.027 pH 20 $\mu\text{V/V} + 1 \mu\text{V}$	Buffer solution Fluke 5520A	CP-27 OEM, GIDEP, MET/CAL Sourced Procedures
Conductivity	10 μS 100 μS 1000 μS 10 000 μS 100 000 μS	1 μS 10 μS 100 μS 1 000 μS 10 000 μS	Conductivity solution	CP-28
	10 μS 100 μS 1000 μS 10 000 μS 100 000 μS	0.005 μS 0.05 μS 0.5 μS 5 μS 50 μS	Decade Box Multifunction Calibrator	OEM, GIDEP, MET/CAL Sourced Procedures

IV. Fluid properties

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Refractometer	(0 to 100) %	0.28 + 0.6R	Standard solution	CP-29
Viscosity Cups	10-120 cSt	1 cSt + 0.44 %	Viscosity standard	CP-30
Viscometer	(0 to 100 000) cps	50 cps	Viscosity standard	CP-30
Volumetric dispenser calibration*	Up to 1 000 mL	0.014 mL	Analytical Balance	CP-31

V. Thermodynamic Calibration

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature, Measure	(-200 to 660) °C (661 to 1 370) °C	0.05 °C 3.0 °C	PRT Calibrator w/ thermocouple	OEM, GIDEP, MET/CAL Sourced Procedures
Temperature Measuring Equip.	(-40 to 660) °C	0.5 °C	Dry Block	OEM, GIDEP, MET/CAL Sourced Procedures
IR Non-Contact Temperature Equipment	(35 to 500) °C (200 to 1 150) °C	1.4 °C	Black Body	CP-49
Relative Humidity Measure	(10 to 50) %RH	0.5 °C	Chilled Mirror	OEM, GIDEP, MET/CAL Sourced Procedures

VI. Time and Frequency Calibration

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency	10 Hz to 1.3 GHz	1.7×10^{-9} Hz	GPS reference	OEM, GIDEP, MET/CAL Sourced Procedures
Time Interval	Up to 24 hrs	13 ms	GPS reference Frequency Counter	OEM, GIDEP, MET/CAL Sourced Procedures

VII. Calibration of Non-Destructive Testing Equipment

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Magnetic Particle Unit Ammeter Timer Black Light White Light	(0 to 20 000) A (0.01 to 9.99) s (0 to 19 990) μ W/cm ² (0 to 199.9) fc	8.3 A 0.002 s 240 μ W/cm ² 0.15 fc	Current timer Digital radiometer	CP-32

VIII. Mechanical Calibration

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Force Measure and Measuring Equip. (Compression / Tension)	(0 to 2 000) lbf	0.4 % + 0.6R	Class F weight	CP-33
	(0 to 150 000) lbf	0.4 % + 0.6R	Load cell	CP-34
Extensometer	(0 to 1) in	0.0001 in	Extensometer calibrator	CP-35
Extrusion plastometer Temperature Bore diameter Piston diameter	(100 to 400) °C Up to 0.25 in Up to 1 in	0.05 °C 0.0003 in 0.0001 in	PRT Pin gage Micrometer	CP-36
Durometer	(0 to 822) gf (0 to 10) gf	0.34 units	Durocalibrator	CP-37
Durocalibrator* A-Scale D-Scale	(0 to 822) gf (0 to 10) gf	0.15 gf 0.5 gf	Gram weight Measuring microscope	CP-38
Pressure gauges and transducers	(-15 to 100) psi (100 to 1 500) psi (1 000 to 15 000) psi	0.012 psi 0.38 psi 5.9 psi	Pressure calibrator DWT	CP-39
Torque Analyzer	(0 to 2 000) lbf·ft	1 lbf·ft	Torque arm Class F weight	CP-40
Torque Wrench	(0 to 2 000) lbf·ft	2.8 lbf·ft	Torque analyzer	CP-41
Mass	(1 to 200) g 200 g to 5 kg (5 to 52) kg	0.3 mg 6.2 mg 23 mg	Balance Class 1 weights	CP-42
Scales and Balances	10 mg to 1g 1.1 g to 1 kg	0.12 mg + 0.6R 1.8 mg + 0.6R	Class 1 weights	CP-43
Scales and Balances	(1.1 to 20) kg (50 to 1 000) lb (1 001 to 10 000) lb	76 mg + 0.6R 0.15 lb + 0.6R 0.50 lb + 0.6R	Class F weights	CP-43
Brinell hardness tester	(500 to 3 000) kgf	3 HBW	Hardness test blocks	CP-44

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Rockwell and superficial hardness tester	HRA HRB HRC HRE HRF HRN HRT	1 HRA 1.2 HRB 0.8 HRC 1 HRE 1.2 HRF 1 HRN 1.2 HRT	Hardness test blocks	CP-45
Knoop hardness tester	(100 to 940) HK	25 HK	Hardness test blocks	CP-46
Vickers hardness tester	(100 to 940) HV	13 HV	Hardness test blocks	CP-47

IX. Electromagnetic– DC & Low Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage – Source	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1 000) V	20 $\mu\text{V}/\text{V} + 1 \mu\text{V}$ 11 $\mu\text{V}/\text{V} + 2 \mu\text{V}$ 12 $\mu\text{V}/\text{V} + 20 \mu\text{V}$ 18 $\mu\text{V}/\text{V} + 150 \mu\text{V}$ 18 $\mu\text{V}/\text{V} + 1.5 \text{ mV}$	Fluke 5520A	OEM, GIDEP, MET/CAL Sourced Procedures
DC Voltage – Measure	(10 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1 000) V	7 $\mu\text{V}/\text{V} + 1 \mu\text{V}$ 6 $\mu\text{V}/\text{V} + 3 \mu\text{V}$ 6 $\mu\text{V}/\text{V} + 1 \mu\text{V}$ 8 $\mu\text{V}/\text{V} + 30 \mu\text{V}$ 8 $\mu\text{V}/\text{V} + 0.1 \text{ mV}$	HP 3458A	OEM, GIDEP, MET/CAL Sourced Procedures
DC High Voltage – Measure	(0 to 6) kV (0 to 40) kV	10 mV/V 20 mV/V	HP 3458A w/ probe	OEM, GIDEP, MET/CAL Sourced Procedures

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Current – Source	(0 to 330) μ A 330 μ A to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (11 to 20) A (20 to 150) A (150 to 1 000) A	150 μ A/A + 0.02 μ A 100 μ A/A + 0.05 μ A 100 μ A/A + 0.25 μ A 100 μ A/A + 2.5 μ A 200 μ A/A + 40 μ A 380 μ A/A + 40 μ A 500 μ A/A + 0.5 mA 1 mA/A + 0.75 mA 27 mA/A + 0.05 A 27 mA/A + 0.05 A	Fluke 5520A w/ 50 turn coil	OEM, GIDEP, MET/CAL Sourced Procedures
DC Current – Measure	Up to 100 nA 100 nA to 1 μ A (1 to 10) μ A (10 to 100) μ A 100 μ A to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	35 μ A/A + 0.04 nA 25 μ A/A + 0.04 nA 25 μ A/A + 0.1 nA 25 μ A/A + 0.8 μ A 25 μ A/A + 5 μ A 25 μ A/A + 50 μ A 40 μ A/A + 0.5 mA 115 μ A/A + 10 μ A	HP 3458A	OEM, GIDEP, MET/CAL Sourced Procedures
DC Current – Measure	(1 to 60) A (0 to 2 000) A	0.6 mA/A 15 mA/A + 2 A	HP 3458A w/ Shunt Clamp-on Meter	OEM, GIDEP, MET/CAL
Resistance – Source	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (0.33 to 1.1) k Ω (1.1 to 3.3) k Ω (3.3 to 11) k Ω (11 to 33) k Ω (33 to 110) k Ω (110 to 330) k Ω (0.33 to 1.1) M Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω (330 to 1 100) M Ω	40 $\mu\Omega/\Omega$ + 1 m Ω 30 $\mu\Omega/\Omega$ + 1.5 m Ω 28 $\mu\Omega/\Omega$ + 1.4 m Ω 28 $\mu\Omega/\Omega$ + 2 m Ω 28 $\mu\Omega/\Omega$ + 2 m Ω 28 $\mu\Omega/\Omega$ + 20 m Ω 28 $\mu\Omega/\Omega$ + 20 m Ω 28 $\mu\Omega/\Omega$ + 0.2 Ω 28 $\mu\Omega/\Omega$ + 0.2 Ω 32 $\mu\Omega/\Omega$ + 2 Ω 32 $\mu\Omega/\Omega$ + 2 Ω 60 $\mu\Omega/\Omega$ + 30 Ω 130 $\mu\Omega/\Omega$ + 50 Ω 250 $\mu\Omega/\Omega$ + 2.5 k Ω 500 $\mu\Omega/\Omega$ + 3 k Ω 3 m Ω/Ω + 100 k Ω 15 m Ω/Ω + 500 k Ω	Fluke 5520A	OEM, GIDEP, MET/CAL

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Resistance – Measure	10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ	18 μΩ/Ω + 50 μΩ 15 μΩ/Ω + 0.5 mΩ 13 μΩ/Ω + 0.5 mΩ 13 μΩ/Ω + 5 mΩ 13 μΩ/Ω + 50 mΩ 18 μΩ/Ω + 2 Ω 53 μΩ/Ω + 100 Ω 503 μΩ/Ω + 1 kΩ 5 mΩ/Ω + 10 kΩ	HP 3458A	OEM, GIDEP, MET/CAL
DC Power – Source 33 mV to 1020 V	(0.33 to 330) mA (0.33 to 3) A (3 to 20.5) A	0.023 % of watts output 0.022 % of watts output 0.07 % of watts output	Fluke 5520A	OEM, GIDEP, MET/CAL
Electrical Simulation of Thermocouple Devices				
Type B	(600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C	0.44 °C 0.34 °C 0.30 °C 0.33 °C		
Type C	(0 to 150) °C (150 to 650) °C (650 to 1 000) °C (1 000 to 1 800) °C (1 800 to 2 316) °C	0.30 °C 0.26 °C 0.31 °C 0.50 °C 0.84 °C	Fluke 5520A	OEM, GIDEP, MET/CAL Sourced Procedures
Type E	(-250 to -100) °C (-100 to 650) °C (650 to 1 000) °C	0.50 °C 0.16 °C 0.21 °C		
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1 200) °C	0.27 °C 0.17 °C 0.23 °C		
Type K	(-200 to -100) °C (-100 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C	0.33 °C 0.18 °C 0.26 °C 0.40 °C		

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Electrical Simulation of Thermocouple Devices				
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.37 °C 0.26 °C 0.17 °C		
Type N	(-250 to -100) °C (-100 to -25) °C (-25 to 410) °C (410 to 1 300) °C	0.40 °C 0.22 °C 0.19 °C 0.27 °C		
Type R	(0 to 250) °C (250 to 400) °C (400 to 1 000) °C (1 000 to 1 767) °C	0.57 °C 0.35 °C 0.33 °C 0.40 °C	Fluke 5520A	OEM, GIDEP, MET/CAL Sourced Procedures
Type S	(0 to 250) °C (250 to 1400) °C (1400 to 1767) °C	0.47 °C 0.37 °C 0.46 °C		
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.63 °C 0.24 °C 0.16 °C 0.14 °C		
Type U	(-200 to 0) °C (0 to 600) °C	0.56 °C 0.27 °C		

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Electrical Simulation of RTD Devices				
Pt 395, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 400) °C (400 to 630) °C (630 to 800) °C	0.05 °C 0.07 °C 0.10 °C 0.12 °C 0.23 °C		
Pt 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 400) °C (400 to 630) °C	0.05 °C 0.07 °C 0.10 °C 0.12 °C		
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to 100) °C (100 to 400) °C (400 to 600) °C (600 to 630) °C	0.25 °C 0.06 °C 0.09 °C 0.10 °C 0.23 °C	Fluke 5520A	OEM, GIDEP, MET/CAL Sourced Procedures
Pt 385, 200 Ω	(-200 to 260) °C (260 to 600) °C (600 to 630) °C	0.05 °C 0.14 °C 0.16 °C		
Pt 385, 500 Ω	(-200 to 260) °C (260 to 600) °C (600 to 630) °C	0.06 °C 0.09 °C 0.11 °C		
Pt 385, 1000 Ω	(-200 to 260) °C (0 to 300) °C (260 to 600) °C (600 to 630) °C	0.05 °C 0.06 °C 0.07 °C 0.23 °C		
PtNi 385, 120 Ω	(-80 to 100) °C (100 to 260) °C	0.08 °C 0.14 °C		
Cu 427, 10 Ω	(-100 to 260) °C	0.3 °C		

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage – Source	<p>(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</p> <p>(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</p> <p>(0.33 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</p> <p>(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</p> <p>(33 to 330) V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz</p> <p>(330 to 1020) V 45 Hz to 10 kHz (1 to 5) kHz (5 to 10) kHz</p>	<p>800 μV/V + 6 μV 150 μV/V + 6 μV 200 μV/V + 6 μV 1 mV/V + 6 μV 3.5 mV/V + 12 μV 8.0 mV/V + 50 μV</p> <p>300 μV/V + 8 μV 145 μV/V + 8 μV 160 μV/V + 8 μV 350 μV/V + 8 μV 800 μV/V + 32 μV 2 mV/V + 70 μV</p> <p>300 μV/V + 50 μV 150 μV/V + 60 μV 190 μV/V + 60 μV 300 μV/V + 50 μV 700 μV/V + 125 μV 2.4 mV/V + 600 μV</p> <p>300 μV/V + 650 μV 150 μV/V + 600 μV 240 μV/V + 600 μV 350 μV/V + 600 μV 900 μV/V + 1.6 mV</p> <p>190 μV/V + 2 mV 200 μV/V + 6 mV 250 μV/V + 6 mV 300 μV/V + 6 mV 2 mV/V + 50 mV</p> <p>300 μV/V + 10 mV 250 μV/V + 10 mV 300 μV/V + 10 mV</p>	Fluke 5520A	OEM, GIDEP, MET/CAL Sourced Procedures

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage – Measure	<p>(1 to 10) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (10 to 100) mV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz 100 mV to 1 V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz (1 to 10) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz (1 to 2) MHz (10 to 100) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz</p>	<p>300 μV/V + 3 μV 200 μV/V + 1.1 μV 300 μV/V + 1.1 μV 1 mV/V + 1.1 μV 5 mV/V + 1.1 μV 40 mV/V + 2 μV 70 μV/V + 4 μV 70 μV/V + 2 μV 140 μV/V + 2 μV 300 μV/V + 2 μV 800 μV/V + 2 μV 3 mV/V + 10 μV 10 mV/V + 10 μV 15 mV/V + 10 μV 70 μV/V + 40 μV 70 μV/V + 20 μV 140 μV/V + 20 μV 300 μV/V + 20 μV 800 μV/V + 20 μV 3 mV/V + 100 μV 10 mV/V + 100 μV 15 mV/V + 100 μV 70 μV/V + 400 μV 70 μV/V + 200 μV 140 μV/V + 200 μV 300 μV/V + 200 μV 800 μV/V + 200 μV 3 mV/V + 1 mV 10 mV/V + 1 mV 15 mV/V + 1 mV 200 μV/V + 4 mV 200 μV/V + 2 mV 200 μV/V + 2 mV 350 μV/V + 2 mV 1.2 mV/V + 2 mV 4 mV/V + 10 mV 15 mV/V + 10 mV</p>	HP 3458A	OEM, GIDEP, MET/CAL Sourced Procedures



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage – Measure	(100 to 700) V (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	400 μV/V + 40 mV 400 μV/V + 20 mV 600 μV/V + 20 mV 1.3 mV/V + 20 mV 3 mV/V + 20 mV	HP 3458A	OEM, GIDEP, MET/CAL Sourced Procedures
AC High Voltage – Measure	(0 to 6) kV (0 to 500) Hz (0 to 6) kV 500 Hz to 1 kHz (0 to 40) kV 60 Hz	10 mV/V 20 mV/V 50 mV/V	HP 3458A w/ HV probe	OEM, GIDEP, MET/CAL Sourced Procedures
AC Current – Source	(29 to 330) μA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (0.33 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 (10 to 30) 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 (10 to 30) 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 (10 to 30) kHz (0.33 to 3) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	2 mA/A + 0.1 μA 1.5 mA/A + 0.1 μA 1.3 mA/A + 0.1 μA 3 mA/A + 0.15 μA 8 mA/A + 0.2 μA 16 mA/A + 0.4 μA 2 mA/A + 0.15 μA 1.3 mA/A + 0.15 μA 1 mA/A + 0.15 μA 2 mA/A + 0.2 μA 5 mA/A + 0.3 μA 10 mA/A + 0.6 μA 1.8 mA/A + 2 μA 0.9 mA/A + 2 μA 0.4 mA/A + 2 μA 0.8 mA/A + 2 μA 2 mA/A + 3 μA 4 mA/A + 4 μA 1.8 mA/A + 20 μA 0.9 mA/A + 20 μA 0.4 mA/A + 20 μA 1 mA/A + 50 μA 2 mA/A + 100 μA 4 mA/A + 200 μA 1.8 mA/A + 100 μA 0.5 mA/A + 100 μA 6 mA/A + 100 μA 25 mA/A + 5 mA	Fluke 5520A w/ 50 turn coil	OEM, GIDEP, MET/CAL Sourced Procedures

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current – Source (Cont.)	(3 to 11) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (11 to 20.5) A (45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz Clamp-On Only (20 to 1000) A (45 to 100) Hz	0.6 mA/A + 2 mA 1 mA/A + 2 mA 30 mA/A + 2 mA 1.2 mA/A + 5 mA 1.5 mA/A + 5 mA 30 mA/A + 5 mA 2.8 mA/A + 0.11 A	Fluke 5520A w/ 50 turn coil	OEM, GIDEP, MET/CAL Sourced Procedures
AC Current – Measure	(5 to 100) µA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz 100 µA to 1 mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz (1 to 10) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz (10 to 100) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	4 mA/A + 0.03 µA 1.5 mA/A + 0.03 µA 0.6 mA/A + 0.03 µA 0.6 mA/A + 0.03 µA 4 mA/A + 0.2 µA 1.5 mA/A + 0.2 µA 0.6 mA/A + 0.2 µA 0.3 mA/A + 0.2 µA 0.6 mA/A + 0.2 µA 4 mA/A + 0.4 µA 6 mA/A + 1.5 µA 4 mA/A + 2 µA 1.5 mA/A + 2 µA 0.6 mA/A + 2 µA 0.3 mA/A + 2 µA 0.6 mA/A + 2 µA 4 mA/A + 4 µA 6 mA/A + 15 µA 4 mA/A + 20 µA 1.5 mA/A + 20 µA 0.6 mA/A + 20 µA 0.3 mA/A + 20 µA 0.6 mA/A + 20 µA 4 mA/A + 40 µA 6 mA/A + 150 µA	HP 3458A	OEM, GIDEP, MET/CAL Sourced Procedures

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current – Measure	100 mA to 1 A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 1) kHz (5 to 20) kHz (20 to 50) kHz (20 to 2 000) A (60-100) Hz	4 mA/A + 0.2 mA 1.6 mA/A + 0.2 mA 0.8 mA/A + 0.2 mA 1 mA/A + 0.2 mA 3 mA/A + 0.2 mA 10 mA/A + 0.4 mA 35 mA/A + 3.0 A	HP 3458A Clamp-On Meter	OEM, GIDEP, MET/CAL Sourced Procedures
Capacitance – Source	10 Hz to 10 kHz (0.19 to 0.4) nF 10 Hz to 10 kHz (0.4 to 1.1) nF 10 Hz to 3 kHz (1.1 to 3.3) nF 10 Hz to 1 kHz (3.3 to 11) nF 10 Hz to 1 kHz (11 to 33) nF 10 Hz to 1 kHz (33 to 110) nF 10 Hz to 1 kHz (110 to 330) nF 10 Hz to 1 kHz (0.33 to 1.1) μF (10 to 300) kHz (1.3 to 3.3) μF (10 to 150) kHz (3.3 to 11) μF (10 to 120) kHz (11 to 33) μF (10 to 80) kHz (33 to 110) μF (10 to 50) kHz (110 to 330) μF (0 to 20) Hz (0.33 to 1.1) mF (0 to 6) Hz (1.1 to 3.3) mF (0 to 2) Hz (3.3 to 11) mF (0 to 0.6) Hz (11 to 33) mF (0 to 0.2) Hz (33 to 110) mF	5 mF/F + 0.01 nF 5 mF/F + 0.01 nF 5 mF/F + 0.01 nF 2.5 mF/F + 0.01 nF 2.5 mF/F + 0.1 nF 2.5 mF/F + 0.1 nF 2.5 mF/F + 0.3 nF 2.5 mF/F + 1 nF 2.5 mF/F + 3 nF 2.5 mF/F + 10 nF 4 mF/F + 30 nF 4.5 mF/F + 100 nF 4.5 mF/F + 300 nF 4.5 mF/F + 1 μF 4.5 mF/F + 3 μF 4.5 mF/F + 10 μF 7.5 mF/F + 30 μF 11 mF/F + 100 μF	Fluke 5520A	OEM, GIDEP, MET/CAL Sourced Procedures
Oscilloscope Calibration				
Phase – Angle	(10 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz	0.1 ° 0.25 ° 0.5 ° 2.5 °	Fluke 5520A	OEM, GIDEP, MET/CAL Sourced Procedures
0 ° to 90 °	(5 to 10) kHz (10 to 30) kHz	5 ° 10 °		

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Leveled Sine Wave 5 mV to 5.5 V Absolute Flatness	50 kHz reference (0.05 to 100) MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz (0.05 to 100) MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	20 mV/V + 300 μV 35 mV/V + 300 μV 40 mV/V + 300 μV 60 mV/V + 300 μV 70 mV/V + 300 μV 15 mV/V + 100 μV 20 mV/V + 100 μV 40 mV/V + 100 μV 50 mV/V + 100 μV	Fluke 5520A	OEM, GIDEP, MET/CAL Sourced Procedures
AC Power – Source (33 to 330) mV 330 mV to 1 020 V	(3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA 900 mA to 2.2 A (2.2 to 4.5) A (4.5 to 20.5) A (3.3 to 9) mA (9 to 33) mA (33 to 90) mA (90 to 330) mA (330 to 900) mA 900 mA to 2.2 A (2.2 to 4.5) A (4.5 to 20.5) A	0.14 % of watts output 0.10 % of watts output 0.14 % of watts output 0.10 % of watts output 0.13 % of watts output 0.11 % of watts output 0.13 % of watts output 0.11 % of watts output 0.12 % of watts output 0.08 % of watts output 0.12 % of watts output 0.08 % of watts output 0.11 % of watts output 0.09 % of watts output 0.12 % of watts output 0.10% of watts output	Fluke 5520A	OEM, GIDEP, MET/CAL Sourced Procedures

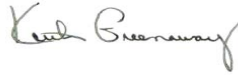


X. Electromagnetic – RF & Microwave

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power – Measure ⁴ (-20 to 30) dBm	0.15 MHz to 1.3 GHz	0.05 dB	Measuring receiver	OEM, GIDEP, MET/CAL Sourced Procedures
Attenuation ⁴ (0 to -50) dBm (-50 to -80) dBm (-80 to -120) dBm	(0.1 to 1.3) GHz	0.3 dB	Measuring receiver Signal generator	OEM, GIDEP, MET/CAL Sourced Procedures

Notes:

- 1. Calibration and Measurement Capabilities (Expanded Uncertainty) are based on approximately a 95% confidence level using a coverage factor of k=2.*
- 2. The use of (L) for length, (D) for diameter, (d) for diagonal, and (R) for resolution signifies a measurement expression in inches.*
- 3. The calibration parameters marked with an asterisk (*) are only available in-house (within Accu-Chek, Inc.'s laboratory). All other parameters are offered both in-house or in the field (on-site). Since field conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected in the field than what is reported on the accredited scope.*
- 4. Mismatch error not included in CMC calculation.*
- 5. This scope is part of and must be included with the Certificate of Accreditation No. ACT – 1317*



Vice President

