



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

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CALIBRATION

Valid to: April 6, 2011

Certificate Number: AC-1265

I. Electromagnetic - DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source	Up to 220 mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V 220 V to 1.1 kV	9 μV + 800 nV/V 8 μV + 1.2 μV/V 8 μV + 4 μV/V 8 μV + 8 μV/V 9 mV + 100 μV/V 11 mV + 600 μV/V	Fluke 5700A	GIDEP Sourced Procedures
DC Voltage - Measure	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV	9 μV/V + 3 μV 8 μV/V + 300 nV 8 μV/V + 50 nV 10 μV/V + 30 μV 10 μV/V + 100 μV	HP 3458A	
DC Current - Source	Up to 220 μA 220 μA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 11) A (11 to 20.5) A	60 μA/A + 10 nA 60 μA/A + 10 nA 60 μA/A + 100 nA 70 μA/A + 1 μA 95 μA/A + 30 μA 360 μA/A + 480 μA 1 mA/A + 750 μA	Fluke 5700A and 5725A Fluke 5520A	
DC Current - Measure	(10 to 100) μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	20 μA/A + 8 μA 20 μA/A + 5 μA 20 μA/A + 5 μA 35 μA/A + 5 μA 110 μA/A + 10 μA	HP 3458A	



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source (cont.)	Up to 2.2 mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	600 $\mu\text{V}/\text{V} + 5 \mu\text{V}$ 240 $\mu\text{V}/\text{V} + 5 \mu\text{V}$ 120 $\mu\text{V}/\text{V} + 5 \mu\text{V}$ 410 $\mu\text{V}/\text{V} + 5 \mu\text{V}$ 950 $\mu\text{V}/\text{V} + 8 \mu\text{V}$ 1.3 $\text{mV}/\text{V} + 15 \mu\text{V}$ 1.8 $\text{mV}/\text{V} + 30 \mu\text{V}$ 3.6 $\text{mV}/\text{V} + 30 \mu\text{V}$	Fluke 5700A and 5725A	GIDEP Sourced Procedures
	(2.2 to 22) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	600 $\mu\text{V}/\text{V} + 6 \mu\text{V}$ 240 $\mu\text{V}/\text{V} + 6 \mu\text{V}$ 120 $\mu\text{V}/\text{V} + 6 \mu\text{V}$ 410 $\mu\text{V}/\text{V} + 6 \mu\text{V}$ 950 $\mu\text{V}/\text{V} + 8 \mu\text{V}$ 1.3 $\text{mV}/\text{V} + 15 \mu\text{V}$ 1.8 $\text{mV}/\text{V} + 30 \mu\text{V}$ 3.6 $\text{mV}/\text{V} + 30 \mu\text{V}$		
	(22 to 220) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	600 $\mu\text{V}/\text{V} + 16 \mu\text{V}$ 240 $\mu\text{V}/\text{V} + 10 \mu\text{V}$ 110 $\mu\text{V}/\text{V} + 10 \mu\text{V}$ 360 $\mu\text{V}/\text{V} + 10 \mu\text{V}$ 900 $\mu\text{V}/\text{V} + 30 \mu\text{V}$ 1.1 $\text{mV}/\text{V} + 30 \mu\text{V}$ 1.8 $\text{mV}/\text{V} + 40 \mu\text{V}$ 3.6 $\text{mV}/\text{V} + 100 \mu\text{V}$		
	220 mV to 2.2 V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	600 $\mu\text{V}/\text{V} + 100 \mu\text{V}$ 180 $\mu\text{V}/\text{V} + 30 \mu\text{V}$ 85 $\mu\text{V}/\text{V} + 7 \mu\text{V}$ 140 $\mu\text{V}/\text{V} + 20 \mu\text{V}$ 280 $\mu\text{V}/\text{V} + 80 \mu\text{V}$ 480 $\mu\text{V}/\text{V} + 150 \mu\text{V}$ 1.2 $\text{mV}/\text{V} + 400 \mu\text{V}$ 2.4 $\text{mV}/\text{V} + 1 \text{mV}$		
	(2.2 to 22) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	600 $\mu\text{V}/\text{V} + 1 \text{mV}$ 180 $\mu\text{V}/\text{V} + 300 \mu\text{V}$ 85 $\mu\text{V}/\text{V} + 70 \mu\text{V}$ 140 $\mu\text{V}/\text{V} + 200 \mu\text{V}$ 280 $\mu\text{V}/\text{V} + 400 \mu\text{V}$ 600 $\mu\text{V}/\text{V} + 1.7 \text{mV}$ 1.4 $\text{mV}/\text{V} + 5 \text{mV}$ 3 $\text{mV}/\text{V} + 9 \text{mV}$		



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source (cont.)	(22 to 220) V (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300z to 500) kHz 500 kHz to 1 MHz 220 V to 1.1 kV 40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz (220 to 750) V (30 to 50) kHz (50 to 100) kHz	600 $\mu\text{V}/\text{V} + 10 \text{ mV}$ 180 $\mu\text{V}/\text{V} + 3 \text{ mV}$ 90 $\mu\text{V}/\text{V} + 1 \text{ mV}$ 250 $\mu\text{V}/\text{V} + 4 \text{ mV}$ 600 $\mu\text{V}/\text{V} + 10 \text{ mV}$ 1600 $\mu\text{V}/\text{V} + 110 \text{ mV}$ 5400 $\mu\text{V}/\text{V} + 110 \text{ mV}$ 13 $\text{mV}/\text{V} + 220 \text{ mV}$ 90 $\text{mV}/\text{V} + 4 \text{ mV}$ 165 $\text{mV}/\text{V} + 6 \text{ mV}$ 600 $\text{mV}/\text{V} + 11 \text{ mV}$ 600 $\text{mV}/\text{V} + 11 \text{ mV}$ 23 $\text{mV}/\text{V} + 45 \text{ mV}$	Fluke 5700A and 5725A	
AC Voltage - Measure	Up 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 300 kHz 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 300 kHz to 1MHz (1 to 2) MHz	3 $\text{mV}/\text{V} + 3 \mu\text{V}$ 2 $\text{mV}/\text{V} + 1.1 \mu\text{V}$ 3 $\text{mV}/\text{V} + 1.1 \mu\text{V}$ 1 $\text{mV}/\text{V} + 1.1 \mu\text{V}$ 5 $\text{mV}/\text{V} + 1.1 \mu\text{V}$ 40 $\text{mV}/\text{V} + 2 \mu\text{V}$ 70 $\mu\text{V}/\text{V} + 4 \mu\text{V}$ 70 $\mu\text{V}/\text{V} + 2 \mu\text{V}$ 140 $\mu\text{V}/\text{V} + 2 \mu\text{V}$ 300 $\mu\text{V}/\text{V} + 2 \mu\text{V}$ 800 $\mu\text{V}/\text{V} + 2 \mu\text{V}$ 3 $\text{mV}/\text{V} + 10 \mu\text{V}$ 10 $\text{mV}/\text{V} + 10 \mu\text{V}$ 15 $\text{mV}/\text{V} + 10 \mu\text{V}$ 70 $\mu\text{V}/\text{V} + 40 \mu\text{V}$ 70 $\mu\text{V}/\text{V} + 20 \mu\text{V}$ 140 $\mu\text{V}/\text{V} + 20 \mu\text{V}$ 300 $\mu\text{V}/\text{V} + 20 \mu\text{V}$ 800 $\mu\text{V}/\text{V} + 20 \mu\text{V}$ 3 $\text{mV}/\text{V} + 100 \mu\text{V}$ 10 $\text{mV}/\text{V} + 100 \mu\text{V}$ 15 $\text{mV}/\text{V} + 100 \mu\text{V}$	HP 3458A	GIDEP Sourced Procedures

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	(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 300 kHz to 1 MHz 1 kHz 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 300 kHz to 1 MHz 100 V to 1 kV (1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	70 $\mu\text{V/V} + 400 \mu\text{V}$ 70 $\mu\text{V/V} + 200 \mu\text{V}$ 140 $\mu\text{V/V} + 200 \mu\text{V}$ 300 $\mu\text{V/V} + 200 \mu\text{V}$ 800 $\mu\text{V/V} + 200 \mu\text{V}$ 3 mV/V + 1 mV 10 mV/V + 1 mV 15 mV/V + 100 mV 200 $\mu\text{V/V} + 4 \text{ mV}$ 200 $\mu\text{V/V} + 2 \text{ mV}$ 200 $\mu\text{V/V} + 2 \text{ mV}$ 350 $\mu\text{V/V} + 2 \text{ mV}$ 1.2 mV/V + 2 mV 4 mV/V + 10 mV 15 mV/V + 10 mV 200 $\mu\text{V/V} + 40 \text{ mV}$ 200 $\mu\text{V/V} + 20 \text{ mV}$ 200 $\mu\text{V/V} + 20 \text{ mV}$ 350 $\mu\text{V/V} + 20 \text{ mV}$ 1.2 mV/V + 20 mV	HP 3458A	GIDEP Sourced Procedures
AC Current - Measure	Up to 100 μA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz 100 μA to 1 mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (1 to 10) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (10 to 100) mA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz 100 mA to 1 A (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	4 mA/A + 30 nA 1.5 mA/A + 30 nA 605 $\mu\text{A/A} + 30 \text{ nA}$ 4 mA/A + 20 nA 1.5 mA/A + 20 nA 605 $\mu\text{A/A} + 30 \text{ nA}$ 305 $\mu\text{A/A} + 30 \text{ nA}$ 4 mA/A + 2 μA 1.5 mA/A + 2 μA 605 $\mu\text{A/A} + 2 \mu\text{A}$ 305 $\mu\text{A/A} + 2 \mu\text{A}$ 4 mA/A + 20 μA 1.5 mA/A + 20 μA 605 $\mu\text{A/A} + 20 \mu\text{A}$ 305 $\mu\text{A/A} + 20 \mu\text{A}$ 4 mA/A + 200 μA 1.5 mA/A + 200 μA 605 $\mu\text{A/A} + 200 \mu\text{A}$ 305 $\mu\text{A/A} + 200 \mu\text{A}$	HP 3458A	

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Resistance - Source	0 Ω	50 μΩ	Fluke 5700A and 5725A	GIDEP Sourced Procedures
	1 Ω	95 μΩ		
	1.9 Ω	181 μΩ		
	10 Ω	280 μΩ		
	19 Ω	513 μΩ		
	100 Ω	1.8 mΩ		
	190 Ω	3.3 mΩ		
	1 kΩ	13 mΩ		
	1.9 kΩ	24.7 mΩ		
	10 kΩ	120 mΩ		
	19 kΩ	228 mΩ		
	100 kΩ	1.4 Ω		
	190 kΩ	2.7 Ω		
	1 MΩ	20 Ω		
	1.9 MΩ	40 Ω		
10 MΩ	400 Ω	Fluke 5520A		
19 MΩ	893 Ω			
100 MΩ	11 kΩ			
	(33 to 110) MΩ	500 μΩ/Ω		
	(110 to 330) MΩ	3 mΩ/Ω		
	330 MΩ to 1.1 GΩ	15 mΩ/Ω		
Resistance - Measure	100 μΩ to 10 Ω	18 μΩ/Ω + 5 μΩ	HP 3458A	
	(10 to 100) Ω	15 μΩ/Ω + 5 mΩ		
	100 Ω to 1 kΩ	13 μΩ/Ω + 500 μΩ		
	(1 to 10) kΩ	13 μΩ/Ω + 500 μΩ		
	(10 to 100) kΩ	13 μΩ/Ω + 500 mΩ		
	100 kΩ to 1 MΩ	18 μΩ/Ω + 2 Ω		
	(1 to 10) MΩ	53 μΩ/Ω + 100 Ω		
(10 to 100) MΩ	503 μΩ/Ω + 100 Ω			
100 MΩ to 1 GΩ	5.03 mΩ/Ω + 1 kΩ			
Capacitance - Source (fixed values) @ 100 Hz @ 1 kHz	1 pF	650 μF/F	Standard Capacitors	
	1 nF	200 μF/F		
	10 nF	200 μF/F		
	100 nF	200 μF/F		
	1 μF	200 μF/F		



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Capacitance - Source	50 Hz to 1 kHz 330 pF to 11 nF (11 to 110) nF (110 to 330) nF 330 nF to 1.1 μ F (1.1 to 3.3) μ F (50 to 400) Hz (3.3 to 11) μ F (11 to 33) μ F (50 to 200) Hz (33 to 110) μ F (50 to 100) Hz (110 to 330) μ F 330 μ F to 1.1 mF	5 μ F/F + 10 pF 2.5 μ F/F + 100 pF 2.5 μ F/F + 300 pF 2.5 μ F/F + 1 nF 3.5 μ F/F + 3 nF 3.5 μ F/F + 10 nF 4 μ F/F + 30 nF 5 μ F/F + 100 nF 7 μ F/F + 300 nF 10 μ F/F + 300 nF	Fluke 5500A	GIDEP Sourced Procedures
Oscilloscopes Square Wave Signal 50 Ω at 1 kHz Source	(1 to 110) mV 110 mV to 2.2 V (2.2 to 11) V 11 V to 1.1 kV	2.8 mV/V + 48 μ V 2.8 mV/V + 120 μ V 2.8 mV/V + 1.2 mV 2.8 mV/V + 12 mV	Fluke 5520A SC1100	
Square Wave Signal 1 M Ω at 1 kHz Source	(1 to 110) mV 110 mV to 2.2 V (2.2 to 11) V 11 V to 1.1 kV	1.2 mV/V + 48 μ V 1.2 mV/V + 120 μ V 1.2 mV/V + 1.2 mV 1.2 mV/V + 12 mV		
Leveled Sine Wave Amplitude	50 kHz reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	20 mV/V + 300 μ V 35 mV/V + 300 μ V 40 mV/V + 300 μ V 60 mV/V + 300 μ V		
Leveled Sine Wave Flatness (relative to 50 kHz)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	70 mV/V + 300 μ V 15 mV/V + 100 μ V 20 mV/V + 100 μ V 40 mV/V + 100 μ V		
Time Marker 50 Ω Source and Period	5 s to 50 ms 20 ms to 2 ns	26 μ s/s + 70 μ s 2.6 μ s/s		
Rise Time	\leq 300 ps	+0 / -100 ps		



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Inductance - Source 100 Hz to 1 kHz	500 μ H 2 mH 20 mH 1 H 10 H	390 μ H/H 660 μ H/H 350 μ H/H 610 μ H/H 340 μ H/H	Standard Inductors	GIDEP Sourced Procedures
Electrical Simulation of Thermocouple Indicators*				
Type J	(-230 to 1 200) °C	0.44 °C	Thermocouple Simulator	SCP-120-0014
Type K	(-230 to -100) °C (-100 to 1 050) °C (1 050 to 1 370) °C	0.75 °C 0.37 °C 0.45 °C		
Type T	(-260 to -200) °C (-200 to -50) °C (-50 to 0) °C (0 to 400) °C	1.19 °C 0.64 °C 0.37 °C 0.32 °C		

II. Time & Frequency

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Source	10 MHz	1×10^{-10} Hz	NIST Frequency Receiver	GIDEP Sourced Procedures
Frequency - Source ³	10 Hz to 300 MHz	25 μ Hz/Hz	Multi-Function Calibrator	

III. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature - Measure	(-200 to -100) °C (-100 to 100) °C (100 to 200) °C (200 to 300) °C (300 to 450) °C (450 to 500) °C	0.05 °C 0.03 °C 0.04 °C 0.06 °C 0.08 °C 0.13 °C	Platinum Resistance Thermometer	SCP-120-0008

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Humidity	(20 to 50) %RH (50 to 90) %RH	1.6 %RH 2.1 %RH	Humidity Indicator	SCP-120-0002

IV. Mechanical

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Force ^{3,4}	0.000035 oz to 500 lb	0.03 % of applied value	Dead Weight	SCP-110-0003
	(350 to 100 000) lb	0.06 % of applied value	Load Cells, Class AA	SCP-120-0004
	(30 000 to 400 000) lb	0.29 % of applied value	Load Cells, Class A (compression only)	
Pressure ³	(-14.7 to 300) psi (300 to 1 000) psi (1 000 to 10 000) psi	0.1 % of reading 0.1 % of reading 0.12 % of reading	Pressure Calibrator	SCP-130-0001
Pressure	(1 to 30) inHg (0 to 10 000) psi	0.02 % of reading + 0.6R	Dead Weight Tester	SCP-130-0005
Accelerometers	(0.5 to 5) Hz (5 to 10) Hz (10 to 99) Hz 100 Hz (100 to 920) Hz 920 Hz to 5 kHz (5 to 10) kHz (10 to 15) kHz	3.26 % of reading 2.81 % of reading 1.72 % of reading 0.94 % of reading 1.23 % of reading 1.47 % of reading 2.03 % of reading 3.46 % of reading	PCB Shaker Table with PCB Reference Accelerometer	SCP -110-0013
Torque Tools ⁴	0.5 in·oz to 1 000 ft·lb	0.86 % of reading	Torque Tester	SCP-140-0001
Torque Transducers ³	0.5 in·oz to 1 000 ft·lb	0.08 % of reading	Dead Weight Torque Arms	SCP-140-0002
Mass	2 mg to 100 g	0.25 mg	Class 1 Weights	SCP-110-0042
	(100 to 500) g 500 g to 3 kg (3 to 10) kg (10 to 25) kg	0.002 g 0.013 g 0.13 g 0.14 g		SCP-110-0043

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Scales and Balances ^{3,4}	Up to 30 g (30 to 50) g (50 to 100) g (100 to 200) g (200 to 300) g (300 to 500) g 500 g to 1 kg (1 to 2) kg (2 to 3) kg (3 to 5) kg	0.09 mg 0.16 mg 0.38 mg 0.64 mg 0.85 mg 1.3 mg 2.2 mg 5.2 mg 7.9 mg 12 mg	Class 1 Weights	SCP-110-0021 based on NIST Handbook 44
	(0.5 to 2 000) lb	0.01 % reading + 0.6R	Class 6 Weights	
Hardness Testers ⁴	HRA Low	1.6 HRA	Indirect Verification to Test Blocks	SCP-150-0071
	HRA Middle	1.6 HRA		
	HRA High	1.2 HRA		
	HRBW Low	1.6 HRBW		
	HRBW Middle	2.1 HRBW		
	HRBW High	1.6 HRBW		
	HRC Low	1.6 HRC		
	HRC Middle	1.6 HRC		
	HRC High	1.2 HRC		
	HREw Low	1.6 HREw		
	HREw Middle	1.6 HREw		
	HREw High	1.6 HREw		
	HRMw Low	1.6 HRMw		
HRMw Middle	1.6 HRMw			
HRMw High	1.6 HRMw			
HR15N Low	1.7 HR15N			
HR15N Middle	1.6 HR15N			
HR15N High	1.3 HR15N			
HR15Tw Low	1.6 HR15Tw			
HR15Tw Middle	1.6 HR15Tw			
HR15Tw High	1.6 HR15Tw			
HR30N Low	1.6 HR30N			
HR30N Middle	1.6 HR30N			
HR30N High	1.4 HR30N			



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Hardness Testers ⁴ (cont.)	HR30Tw Low HR30Tw Middle HR30Tw High HR45N Low HR45N Middle HR45N High	1.6 HR30Tw 1.6 HR30Tw 1.6 HR30Tw 1.6 HR45N 1.6 HR45N 1.6 HR45N	Indirect Verification to Test Blocks	SCP-150-0071
Indirect Verification of Microindentation Hardness Testers ⁴ (Knoop and Vickers)	Repeatability under forces P (gf): 100 ≤ HK ≤ 500 HV = 100	2.1 % of Reading 4.1 % of Reading	Indirect Verification to Test Blocks	SCP-150-0058

V. Dimensional

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Gage Blocks	(0.0001 to 1) in (1 to 5) in (5 to 12) in (12 to 20) in	(2.9 + 0.9 L) μin (1.8 + 2 L) μin (3.3 + 2.2 L) μin (14.9 + 1L) μin	Gage Blocks Gage Block Comparator Horizontal Measuring Machine	SCP-150-0055
Indicators ^{3,4}	(0.0001 to 6) in	(5.8 + 3.5L + 0.6R) μin	Horizontal Measuring Machine	SCP-150-0006
Calipers ^{3,4}	Up to 60 in	(189 + 5.7L + 0.6R) μin	Horizontal Measuring Machine	SCP-150-0002
Micrometers ^{3,4}	Up to 12 in	(44 + 2.6L + 0.6R) μin	Gage Blocks Optical Parallels	SCP-150-0008
Height Gages ^{3,4}	Up to 36 in	(55 + 3.8L + 0.6R) μin	Gage Blocks	SCP-150-0030
External Diameter ^{3,4} (Plain Plugs)	(0.0001 to 4) in	(4.3 + 3L) μin	Horizontal Measuring Machine	SCP-150-0005

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Internal Diameter ⁴ (Plain Rings)	(0.04 to 13) in	(5.4 + 4.8L) μin	Horizontal Measuring Machine	SCP-150-0070
Thread Plugs ^{3,4} Pitch Diameter	(0.0001 to 4) in Pitch (0.2 to 5) mm	(86.8 + 1.9L) μin	Horizontal Measuring Machine	SCP-150-0031
Major Diameter	Pitch 90 – 4 TPI (0.0001 to 4) in	(3.5 + 4.6L) μin	Thread Measuring Wires	
Thread Rings ⁴	(0.0001 to 2) in	320 μin	Thread Setting Plug	SCP-150-0014
Optical Comparators ^{3,4} Linear Accuracy	Up to 12 in	(255 + 5.5L) μin	Glass Scale	SCP-150-0027
Magnification	5X to 100X	300 μin	Glass Scale (Sphere)	
Surface Plates ^{3,4} Flatness	Up to (168 by 168) in	(25 + 2.9L) μin	Laser System	SCP-150-0029
Repeatability	Up to (168 by 168) in	34 μin	Repeat-O-Meter	
Roundness / Cylindricity	Up to 150 mm	0.02 μm	Rondcom41c	SCP-150-0228
Surface Finish Analysis	Up to 500 μin	2.4 μin	Profilometer Master Patch	SCP-150-0032
Profilometers ³	Up to 500 μin	3.1 μin	Master Patch	SCP-150-0089
Steel Rulers	Up to 54 in 54 to 72 in	(73 + 4L) μin (289 + 7L) μin	Laser System	SCP-150-0039
Tape Measures	Up to 200 ft	(9300 + 58.2L) μin	Comparison to Master Rule	SCP-150-0065
Optical Flats Parallelism Flatness	Up to 2 in	2.7 μin 4.7 μin	Gage Block Comparator Master Flat	SCP-150-0016

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
CMMs	Linearity	(25 + 2.4L) μin	Laser Measuring System	SCP-150-0061
	Volumetric Repeatability	66 μin 45 μin	Ball Bar CMM Sphere	

Notes:

1. Best Measurement Capabilities (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of $k=2$.
2. This laboratory's capabilities include in-laboratory and on-site calibration. 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.
3. These parameters are available for field calibrations.
4. This capability is available from the satellite office at 1210 Allanson Road, Mundelein, Illinois 60060. Some ranges may be limited.
5. The use of (R) signifies the Resolution of the unit under test (UUT).
6. The use of (L) represents Length in inches.
7. The uncertainties listed for Electromagnetic - DC/Low Frequency do not include possible contributions from the UUT.
8. This scope is part of and must be included with the Certificate of Accreditation No. AC -1265.



Vice-President

