



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

Fox Valley Metrology Ltd.
 551 Wolfner Dr., Fenton, MO 63026
 Caleb Pohlman Phone: (636) 326-1601

CALIBRATION

Valid to: October 2, 2009

Certificate Number: AC-1290

I. Electromagnetic – DC/Low Frequency

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage – Source ³	Up to 220 mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	11.9 μV/V + 0.4 μV 5.8 μV/V + 0.7 μV 4.2 μV/V + 2.5 μV 4.1 μV/V + 4 μV 5.8 μV/V + 40 μV 7.6 μV/V + 400 μV	Fluke 5720A	OEM and GIDEP
DC Voltage – Measure ³	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	7.8 μV/V + 0.8 μV 5.7 μV/V + 0.8 μV 5.6 μV/V + 1.0 μV 7.9 μV/V + 80 μV 7.9 μV/V + 150 μV	Agilent 3458A OPT002	OEM and GIDEP
	(1 to 10) kV (10 to 100) kV	0.06 kV 0.6 kV	Hipotronics KVM-100	
DC Current – Source ³	Up to 220 μA (0.22 to 2.2) mA (2.2 to 22) mA (22 to 220) mA (220 to 2.2) A	118.0 μA/A + 6 nA 41.6 μA/A + 7 nA 40.7 μA/A + 40 nA 52.2 μA/A + 0.7 μA 92.8 μA/A + 12 μA	Fluke 5720A	OEM and GIDEP
	(2.2 to 11) A (11 to 20.5) A	582 μA/A + 500 μA 1211 μA/A + 750 μA	Fluke 5520A	
	(20.5 to 1000) A	86 mA/A + 500 mA	Fluke 5520A w/ 50-turn coil	
DC Power – Source ³	(0.01 to 330) W (0.33 to 3) kW (3 to 20.5) kW	267 μW/W 261 μW/W 815 μW/W	Fluke 5520A	OEM and GIDEP



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Current – Measure ³	Up to 100 nA (0.1 to 1) μ A (1 to 10) μ A (10 to 100) μ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	47.9 μ A/A + 65 pA 35.1 μ A/A + 65 pA 35.1 μ A/A + 150 pA 35.1 μ A/A + 1.3 nA 35.0 μ A/A + 10 nA 35.8 μ A/A + 100nA 14.4 μ A/A + 1 μ A 140 μ A/A + 20 μ A	Agilent 3458A OPT002	OEM and GIDEP
	(1 to 10) A	25 mA/A + 20 mA	Fluke 87 III	
Resistance – Source ³	0 Ω	113.2 $\mu\Omega$	Fluke 5720A	OEM and GIDEP
	1 Ω	113.2 $\mu\Omega$		
	1.9 Ω	211.5 $\mu\Omega$		
	10 Ω	268.8 $\mu\Omega$		
	19 Ω	510.4 $\mu\Omega$		
	100 Ω	1355 $\mu\Omega$		
	190 Ω	2568 $\mu\Omega$		
	1 k Ω	11.1 m Ω		
	1.9 k Ω	21.0 m Ω		
	10 k Ω	110.8 m Ω		
	19 k Ω	209.6 m Ω		
	100 k Ω	1 279 m Ω		
	190 k Ω	2 672 m Ω		
	1 M Ω	24.2 Ω		
	1.9 M Ω	48.0 Ω		
	10 M Ω	472.7 Ω		
	19 M Ω	1 113 Ω		
100 M Ω	22.9 k Ω			
1 G Ω	1.9 M Ω	IET Labs HRRS Decade Box		
10 G Ω	46.3 M Ω			
100 G Ω	945 M Ω			
Resistance – Measure ³	Up to 10 Ω	24.0 $\mu\Omega/\Omega$ + 100 $\mu\Omega$	Agilent 3458A OPT002	OEM and GIDEP
	(10 to 100) Ω	20.2 $\mu\Omega/\Omega$ + 1 000 $\mu\Omega$		
	(0.1 to 1) k Ω	17.5 $\mu\Omega/\Omega$ + 1 m Ω		
	(1 to 10) k Ω	17.4 $\mu\Omega/\Omega$ + 10 m Ω		
	(10 to 100) k Ω	17.5 $\mu\Omega/\Omega$ + 100 m Ω		
	(0.1 to 1) M Ω	23.4 $\mu\Omega/\Omega$ + 7 m Ω		
	(1 to 10) M Ω	87.1 $\mu\Omega/\Omega$ + 200 m Ω		
	(10 to 100) M Ω	723.4 $\mu\Omega/\Omega$ + 2 Ω		
	(0.1 to 1) G Ω	7 217 $\mu\Omega/\Omega$ + 20 k Ω		

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage – Source ³	0 to 2.2 mV (10 to 20) Hz (20 to 40) Hz (0.04 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz (2.2 to 22) mV (10 to 20) Hz (20 to 40) Hz (0.04 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz (22 to 220) mV (10 to 20) Hz (20 to 40) Hz (0.04 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz (0.22 to 2.2) V (10 to 20) Hz (20 to 40) Hz (0.04 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz (2.2 to 22) V (10 to 20) Hz (20 to 40) Hz (0.04 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	2 351 $\mu\text{V/V} + 4 \mu\text{V}$ 2 337 $\mu\text{V/V} + 4 \mu\text{V}$ 2 170 $\mu\text{V/V} + 4 \mu\text{V}$ 2 181 $\mu\text{V/V} + 4 \mu\text{V}$ 2 244 $\mu\text{V/V} + 5 \mu\text{V}$ 2 484 $\mu\text{V/V} + 10 \mu\text{V}$ 2 705 $\mu\text{V/V} + 20 \mu\text{V}$ 3 798 $\mu\text{V/V} + 20 \mu\text{V}$ 612 $\mu\text{V/V} + 4 \mu\text{V}$ 555 $\mu\text{V/V} + 4 \mu\text{V}$ 361 $\mu\text{V/V} + 4 \mu\text{V}$ 418 $\mu\text{V/V} + 4 \mu\text{V}$ 694 $\mu\text{V/V} + 5 \mu\text{V}$ 1 293 $\mu\text{V/V} + 10 \mu\text{V}$ 1 678 $\mu\text{V/V} + 20 \mu\text{V}$ 3 351 $\mu\text{V/V} + 20 \mu\text{V}$ 289 $\mu\text{V/V} + 12 \mu\text{V}$ 132 $\mu\text{V/V} + 7 \mu\text{V}$ 109 $\mu\text{V/V} + 7 \mu\text{V}$ 238 $\mu\text{V/V} + 7 \mu\text{V}$ 537 $\mu\text{V/V} + 17 \mu\text{V}$ 1 045 $\mu\text{V/V} + 20 \mu\text{V}$ 1 620 $\mu\text{V/V} + 25 \mu\text{V}$ 3 276 $\mu\text{V/V} + 45 \mu\text{V}$ 279 $\mu\text{V/V} + 40 \mu\text{V}$ 108 $\mu\text{V/V} + 15 \mu\text{V}$ 55 $\mu\text{V/V} + 8 \mu\text{V}$ 119 $\mu\text{V/V} + 10 \mu\text{V}$ 130 $\mu\text{V/V} + 30 \mu\text{V}$ 487 $\mu\text{V/V} + 80 \mu\text{V}$ 1 158 $\mu\text{V/V} + 200 \mu\text{V}$ 1 967 $\mu\text{V/V} + 300 \mu\text{V}$ 279 $\mu\text{V/V} + 400 \mu\text{V}$ 108 $\mu\text{V/V} + 150 \mu\text{V}$ 56 $\mu\text{V/V} + 50 \mu\text{V}$ 119 $\mu\text{V/V} + 100 \mu\text{V}$ 119 $\mu\text{V/V} + 200 \mu\text{V}$ 321 $\mu\text{V/V} + 600 \mu\text{V}$ 1 158 $\mu\text{V/V} + 2 \text{ mV}$ 1 741 $\mu\text{V/V} + 3.2 \text{ mV}$	Fluke 5720A	OEM and GIDEP

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage – Source ³ (cont.)	(22 to 220) V (10 to 20) Hz (20 to 40) Hz (0.04 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz (220 to 1 100) V (15 to 50) Hz (0.05 to 1) kHz	279 μV/V + 4.0 mV 109 μV/V + 1.5 mV 65 μV/V + 0.6 mV 123 μV/V + 1.0 mV 176 μV/V + 2.5 mV 1 040 μV/V + 16 mV 5 081 μV/V + 40 mV 9 240 μV/V + 80 mV 348 μV/V + 16 mV 88 μV/V + 3.5 mV	Fluke 5720A	OEM and GIDEP
AC Voltage – Measure ³ Bandwidth < 2 MHz	Up to 10 mV (1 to 40) Hz (0.04 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 (0.04 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 (0.1 to 1) V (1 to 40) Hz (0.04 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 (0.04 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	463 μV/V + 13 μV 348 μV/V + 11.1 μV 463 μV/V + 11.1 μV 1 271 μV/V + 11.1 μV 5 890 μV/V + 11.1 μV 46 μV/V + 12 μV 140 μV/V + 4.5 μV 143 μV/V + 2.5 μV 222 μV/V + 2.5 μV 407 μV/V + 2.5 μV 984 μV/V + 2.5 μV 3 525 μV/V + 10.5 μV 11.6 mV/V + 10.5 μV 17.4 mV/V + 10.5 μV 139 μV/V + 45 μV 139 μV/V + 25 μV 220 μV/V + 25 μV 406 μV/V + 25 μV 982 μV/V + 25 μV 3 523 μV/V + 105 μV 11.6 mV/V + 105 μV 17.4 mV/V + 105 μV 139 μV/V + 450 μV 139 μV/V + 250 μV 220 μV/V + 250 μV 405 μV/V + 250 μV 982 μV/V + 250 μV 3.5 mV/V + 1.05 mV 11.6 mV/V + 1.05 mV 17.4 mV/V + 1.05 mV	Agilent 3458A OPT002	OEM and GIDEP

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)		
AC Voltage – Measure ³ Bandwidth < 2 MHz (cont.)	(1 to 10) V (1 to 40) Hz (0.04 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	139 µV/V + 450 µV 139 µV/V + 250 µV 220 µV/V + 250 µV 405 µV/V + 250 µV 982 µV/V + 250 µV 3.5 mV/V + 1.05 mV 11.6 mV/V + 1.05 mV 17.4 mV/V + 1.05 mV	Agilent 3458A OPT002	OEM and GIDEP		
	(10 to 100) V (1 to 40) Hz (0.04 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	290 µV/V + 4.5 mV 289 µV/V + 2.5 mV 289 µV/V + 2.5 mV 289 µV/V + 2.5 mV 1.44 mV/V + 2.5 mV 4.7 mV/V + 10.5 mV 17.4 mV/V + 10.5 mV				
	(100 to 1 000) V (1 to 40) Hz (0.04 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	520 µV/V + 45 mV 520 µV/V + 25 mV 751 µV/V + 25 mV 1.44 mV/V + 25 mV 3 52 mV/V + 25 mV				
	(1 to 10) kV (50 to 60) Hz	0.12 kV				
	(10 to 100) kV (50 to 60) Hz	1.2 kV				
	Bandwidth > 2 MHz	(0 to 10) mV (0.045 to 100) kHz (0.1 to 1) MHz (1 to 4) MHz (4 to 8) MHz			1.18 mV/V + 6 µV 14.2 mV/V + 5.1 µV 82.8 mV/V + 7.1 µV 237 mV/V + 8.1 µV	Agilent 3458A OPT002
		(10 to 100) mV (0.045 to 100) kHz (0.1 to 1) MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz			1.12 mV/V + 60.5 µV 23.7 mV/V + 50.5 µV 47.3 mV/V + 70.5 µV 47.3 mV/V + 80.5 µV 177 mV/V + 101 µV	



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AC Voltage – Measure ³ Bandwidth > 2 MHz (cont.)	100 mV to 1 V (0.045 to 100) kHz (0.1 to 1) MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz	1.12 mV/V + 605 μV 23.7 mV/V + 505 μV 47.3 mV/V + 705 μV 47.3 mV/V + 805 μV 177 mV/V + 1 005 μV	Agilent 3458A OPT002	OEM and GIDEP
	(1 to 10) V (0.045 to 100) kHz (0.1 to 1) MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz	1.14 mV/V + 6.1 μV 23.7 mV/V + 5.1 μV 47.3 mV/V + 7.1 μV 47.3 mV/V + 8.1 μV 177 mV/V + 10.1 μV		
	(10 to 100) V (0.045 to 100) kHz	1.48 mV/V + 2.5 mV		
	(100 to 1 000) V (0.045 to 100) kHz	3.61 mV/V + 105 mV		



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AC Current – Source ³	<p>Up to 220 μA (10 to 20) Hz (20 to 40) Hz (0.04 to 1) kHz (1 to 5) kHz (5 to 10) kHz</p> <p>(0.22 to 2.2) mA (10 to 20) Hz (20 to 40) Hz (0.04 to 1) kHz (1 to 5) kHz (5 to 10) kHz</p> <p>(2.2 to 22) mA (10 to 20) Hz (20 to 40) Hz (0.04 to 1) kHz (1 to 5) kHz (5 to 10) kHz</p> <p>(22 to 220) mA (10 to 20) Hz (20 to 40) Hz (0.04 to 1) kHz (1 to 5) kHz (5 to 10) kHz</p> <p>(0.22 to 2.2) A (20 to 1000) Hz (1 to 5) kHz (5 to 10) kHz</p> <p>(2.2 to 3) A (10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz</p> <p>(3 to 11) A (45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz</p> <p>(11 to 20.5) A (45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz</p> <p>(20.5 to 1 000) A (45 to 65) Hz</p> <p>(20.5 to 150) A (65 to 440) Hz</p>	<p>298.7 μA/A + 16 nA 200.2 μA/A + 10 nA 155.7 μA/A + 8 nA 331 μA/A + 12 nA 1 286 μA/A + 65 nA</p> <p>312.6 μA/A + 40 nA 220.3 μA/A + 35 nA 152.6 μA/A + 35 nA 239.7 μA/A + 110 nA 1 273 μA/A + 650 nA</p> <p>319.1 μA/A + 400 nA 229.4 μA/A + 350 nA 151.4 μA/A + 350 nA 238.9 μA/A + 550 nA 1 273 μA/A + 5000 nA</p> <p>298.8 μA/A + 4.0 μA 200.2 μA/A + 3.5 μA 153.1 μA/A + 2.5 μA 239.9 μA/A + 3.5 μA 1 273 μA/A + 10 μA</p> <p>308.5 μA/A + 35 μA 524.5 μA/A + 80 μA 8 087 μA/A + 160 μA</p> <p>2 097 μA/A + 100 μA 746.1 μA/A + 100 μA 6.9 mA/A + 1 mA 28.9 mA/A + 5 mA</p> <p>738.1 μA/A + 2 mA 1 177 μA/A + 2 mA 34.6 mA/A + 2 mA</p> <p>1 407 μA/A + 5 mA 1 744 μA/A + 5 mA 34.6 mA/A + 5 mA</p> <p>90 mA/A + 500 mA 544 μA/A + 500 mA</p>	<p>Fluke 5720A</p> <p>Fluke 5520A</p> <p>Fluke 5520A w/ 50-turn coil</p>	<p>OEM and GIDEP</p>



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AC Current – Measure ³	<p>Up to 100 µA (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz (0.1 to 5) kHz</p> <p>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</p> <p>(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</p> <p>(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</p> <p>100 mA to 1 A (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</p> <p>(1 to 10) A (0.045 to 2) kHz</p>	<p>4750 µA/A + 30 nA 1890 µA/A + 30 nA 827 µA/A + 30 nA 827 µA/A + 30 nA</p> <p>4844 µA/A + 200 nA 1890 µA/A + 200 nA 827 µA/A + 200 nA 472.6 µA/A + 200 nA 827 µA/A + 200 nA 4844 µA/A + 400 nA 6616 µA/A + 1500 nA</p> <p>4844 µA/A + 2 µA 1890 µA/A + 2 µA 827 µA/A + 2 µA 472.6 µA/A + 2 µA 827 µA/A + 2 µA 4844 µA/A + 4 µA 6616 µA/A + 15 µA</p> <p>4844 µA/A + 20 µA 1890 µA/A + 20 µA 827 µA/A + 20 µA 472.6 µA/A + 20 µA 472.6 µA/A + 20 µA 4 844 µA/A + 40 µA 6 616 µA/A + 150 µA</p> <p>4.8 mA/A + 200 µA 2.0 mA/A + 200 µA 1.1 mA/A + 200 µA 1.3 mA/A + 200 µA 3.7 mA/A + 200 µA 11.8 mA/A + 400 µA</p> <p>116 mA/A + 20 mA</p>	<p>Agilent 3458A OPT002</p> <p>Fluke 87 III</p>	<p>OEM and GIDEP</p>



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AC Power – Source ³	0.1 mW to 9 W (9 to 33) W (33 to 90) W (90 to 330) W (330 to 900) W (900 to 2 200) W	1.7 mW/W 1.2 mW/W 1.7 mW/W 1.2 mW/W 11 mW/W 4.6 mW/W	Fluke 5520A	OEM and GIDEP
Capacitance – Source ³	(0.13 to 3.3) nF (3.3 to 11) nF (11 to 110) nF (110 to 330) nF (0.33 to 1.1) μF (1.1 to 3.3) μF (3.3 to 11) μF (11 to 33) μF (33 to 110) μF (110 to 330) μF (0.33 to 1.1) mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	5.8 mF/F + 10 pF 2.9 mF/F + 10 pF 2.9 mF/F + 100 pF 2.9 mF/F + 300 pF 2.9 mF/F + 1 nF 2.9 mF/F + 3 nF 2.9 mF/F + 10 nF 4.7 mF/F + 30 nF 5.3 mF/F + 100 nF 1.0 mF/F + 300 nF 6 mF/F + 1 μF 5.3 mF/F + 3 μF 5.3 mF/F + 10 μF 8.9 mF/F + 30 μF 13 mF/F + 100 μF	Fluke 5520A	OEM and GIDEP
Inductance – Source ³	(1 to 10) mH (10 to 100) mH (100 to 1 000) mH (1 to 10) H	22 mH/H 11 mH/H 6 mH/H 3 mH/H	General Radio 1490-D	OEM and GIDEP
Oscilloscopes³				
DC Voltage (50Ω) DC Voltage (1MΩ)	1 mV to 6.6 V 1 mV to 130 V	2.9 mV/V + 40 μV 544.4 μV/V + 40 μV		
AC Voltage (50Ω) AC Voltage (1MΩ)	1 mV to 6.6 V 1 mV to 130 V	2.9 mV/V + 40 μV 1.1 mV/V + 40 μV		
Leveled Sinewave 50 kHz to 1.1 GHz	5 mV to 5.5 V	50.7 mV/V + 100 μV		
Time Markers	1 ns to 5 s	6.4 μs/s	Fluke 5520A SC1100	OEM and GIDEP
Wave Gen. (50Ω) Wave Gen. (1MΩ)	(0.0018 to 2.5) Vp-p (0.0018 to 55) Vp-p	34.6 mV/V + 100 μV 34.6 mV/V + 100 μV		
Pulse Generator Width	(4 to 45) ns (45 to 500) ns	57.8 ms/s + 500 ps 57.8 ms/s + 4ns		
Pulse Generator Period	200 ns to 20 ms	57.8 ms/s + 200 ns		
Input Impedance Measure	(50 to 60) Ω (0.5 to 1) MΩ	1.2 mΩ/Ω 1.2 mΩ/Ω		

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Thermocouple Simulation ³				
Type K	(-200 to -100) °C (-100 to 120) °C (120 to 1 000) °C (1000 to 1 372) °C	0.98 °C 0.93 °C 0.95 °C 1.02 °C	Fluke 5520A	OEM and GIDEP
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1200) °C	0.50 °C 0.44 °C 0.47 °C		
Type E	(-250 to -100) °C (-100 to 650) °C (650 to 1 000) °C	0.67 °C 0.38 °C 0.41 °C		
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 400) °C	0.83 °C 0.48 °C 0.43 °C		
Type S	(0 to 250) °C (250 to 1 400) °C (1 400 to 1 767) °C	1.82 °C 1.79 °C 1.81 °C		

II. Time and Frequency

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency – Measure ³	DC to 225 MHz	5.8 parts in 10 ⁻⁶	Agilent 53131A	OEM and GIDEP
Frequency – Source ³	DC to 1 GHz	5.8 parts in 10 ⁻⁶	Agilent 53131A & Fluke 5520A SC1100	OEM and GIDEP
Time Interval ³	(1 to 86 400) s	0.00045 s	Agilent 53131A	OEM and GIDEP

III. Dimensional

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Gage Block	Up to 20 in	$(7.7 + 1L) \mu\text{in}$	Zeiss ULM 600	ASME B89.1.9
Length Standards	Up to 9 in (9 to 24) in	$(38 + 0.8L) \mu\text{in}$ $(16 + 0.9L) \mu\text{in}$	P&W Supermicrometer Zeiss ULM 600	OEM and GIDEP
Cylindrical Rings	(0.025 to 12) in	$(33.9 + 1.7D) \mu\text{in}$	Zeiss ULM 600	ASME B89.1.6
Cylindrical Plugs ⁴	(0.010 to 8) in	$(21.7 + 0.3D) \mu\text{in}$	Zeiss ULM 600	ASME B89.1.5
Thread Rings				
--Pitch Diameter	(0.010 to 8) in	$(236 + 0.3 D) \mu\text{in}$	Setting Plug Gages	ASME B1.2
--Minor Diameter	(0.030 to 3) in	422 μin	ID Bore Gages	
NPT Rings				
Standoff and Basic Length	(0.0625 to 6) in	244 μin	NPT plugs and P&W Supermicrometer	ASME B1.20.5
NPT Plugs				
Standoff and Basic Length	(0.0625 to 6) in	488 μin	NPT rings and P&W Supermicrometer	ASME B1.20.5
Threaded Plugs ⁴				
--Pitch Diameter	(0.010 to 10) in	$(73 + 0.9D) \mu\text{in}$	P&W Supermicrometer and Thread Measuring Wires	ASME B1.2
--Major Diameter	(0.010 to 10) in	$(40 + 1.2D) \mu\text{in}$		
Thread Wires	(0.005 to 0.5) in	$(19.8 + 0.7D) \mu\text{in}$	Zeiss ULM 600	ASME B89.1.17

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Calipers ³	Up to 40 in	(382 + 15L) μin	Gage Blocks	OEM and GIDEP
Dial Indicators ³	Up to 4 in	(36 + 10L) μin	Indicator Checker	OEM and GIDEP
Test Indicator ³	Up to 0.060 in	232 μin	Indicator Checker	OEM and GIDEP
Bore Gages ³	(0.250 to 12.000) in	351 μin	Cylindrical Rings	OEM and GIDEP
OD Micrometer ³	Up to 24 in	(62 + 20L) μin	Gage Blocks	OEM and GIDEP
ID Micrometer ³	(1.5 to 24) in	(64 + 6L) μin	Gage Blocks	OEM and GIDEP
Height Gages ³	Up to 40 in	(375 + 11L) μin	Gage Blocks	OEM and GIDEP
Crimpers ³				
--Die Check	(0.011 to 0.500) in	233 μin	Pin Gages	OEM and GIDEP
--Crimp Height	(0.010 to 0.500) in	0.0012 in	Micrometer	
Profilometer ³				
Ra	(2 to 300) μin	2.2 μin	Roughness Specimen	OEM and GIDEP
Surface Plates ³				
--Repeatability	4 in to 34 in (Diagonal)	(30 + 0.2D) μin	Repeat – O – Meter	OEM and GIDEP
--Flatness	34 in to 175 in (Diagonal)	(66 + 0.2D) μin	Electronic Levels	
Optical Comparator ³				
--Linearity	Up to 12 in	(97 + 12L) μin	Glass Scale / Precision Balls	OEM and GIDEP
--Magnification	10x, 20x, 31.25x, 50x, 62.5x, 100x, 200x	0.000463 in	Calibration sphere	
Film Thickness Gage ³	(0.01 to 0.06) in	382 μin	Film Thickness Standards	OEM and GIDEP

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Brinell Scope ³	(1 to 6) mm	11 μm	Stage Micrometer	OEM and GIDEP

IV. Mechanical

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Bench and Floor Scales ³	(0.5 to 120) lb	0.08 lb	NIST 105 Class F weights	NIST Handbook 44
Analytical Balances ³	1 mg to 3 kg	0.58 mg	ASTM E617 Class 1 weights	NIST Handbook 44
Pressure ³	(-12 to 300) psi (300 to 1 000) psi (1 000 to 10 000) psi	0.20 psi 1.9 psi 7.5 psi	Pressure Calibrator Pressure Transducers	OEM and GIDEP
Force ³	Up to 200 lb (200 to 2 500) lb (2 500 to 12 500) lb	0.045 % reading 0.05 % reading 0.05 % reading	Dead Weight Load Cell Load Cell	OEM and GIDEP
Torque – Measure ³	4 lbf·in to 250 lbf·ft	0.3 % reading	CDI Torque System	OEM and GIDEP
Hardness Testers ³ Rockwell	HRA Low HRA Med HRA High HRB Low HRB Med HRB High HRC Low HRC Med HRC High HRE Low HRE Med HRE High HRF Low HRF Med HRF High	1.22 HRA 1.24 HRA 0.75 HRA 1.39 HRB 1.39 HRB 1.33 HRB 1.22 HRC 1.22 HRC 0.70 HRC 1.28 HRE 1.42 HRE 1.34 HRE 1.43 HRF 1.43 HRF 1.42 HRF	Rockwell Test Blocks	Indirect comparison per ASTM E18

PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Hardness Testers ³ Rockwell (cont.)	HRH Low	1.35 HRH	Rockwell Test Blocks	Indirect comparison per ASTM E18
	HRH Med	1.35 HRH		
	HRH High	1.35 HRH		
	HR15N Low	1.51 HR15N		
	HR15N Med	1.24 HR15N		
	HR15N High	0.90 HR15N		
	HR30N Low	1.31 HR30N		
	HR30N Med	1.25 HR30N		
	HR30N High	0.93 HR30N		
	HR45N Low	1.34 HR45N		
	HR45N Med	1.26 HR45N		
	HR45N High	0.95 HR45N		
	HR15T Low	1.95 HR15T		
	HR15T Med	1.40 HR15T		
	HR15T High	1.47 HR15T		
	HR30T Low	1.99 HR30T		
	HR30T Med	1.51 HR30T		
	HR30T High	1.33 HR30T		
	HR45T Low	1.95 HR45T		
	HR45T Med	1.33 HR45T		
	HR45T High	1.42 HR45T		
Brinell	1 mm to 7 mm	0.026 mm	Brinell Test Blocks & Brinell Scope	Indirect comparison per ASTM E10
Knoop	1 µm to 200 µm	0.25 µm	Knoop & Vickers Test Blocks	Indirect comparison per ASTM E384
Vickers	1 µm to 200 µm	0.17 µm		



PARAMETER / EQUIPMENT	RANGE	BEST MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Durometers ³				
-- Spring Force	(0.1 to 45.0) N	0.044 N	Triple Beam Balance	Per ASTM D2240
-- Indentor Angle	(20 to 40) °	0.07 °	Video Measuring Machine	
-- Indentor Length	(0.049 to 0.198) in	333 µin	Gage Blocks	
-- Indentor Radius	(0.050 to 0.100) in	337 µin	Gage Blocks	
pH Meters ³	(4.01, 7.00, 10.00) pH	0.020 pH	pH Buffer Solutions	OEM and GIDEP
Conductivity Meters ³	12.85 mS/cm 1 408 µS/cm	0.18 mS/cm 13.5 µS/cm	Conductivity Solutions	OEM and GIDEP
Refractometers ³	(0.0, 18.0, 29.7) BRIX	0.24 BRIX	Refractive Index Solutions	OEM and GIDEP
Viscosity ⁷				
Rotational Viscometers	500 cP 5000 cP	0.02 cP/cP	Viscosity Solutions, Temperature Bath	OEM and GIDEP
Viscosity Cups	17.82 cP 65.28 cP 231.0 cP	0.03 cP/cP	Viscosity Solutions, Temperature Bath, Stopwatch	OEM and GIDEP ASTM D4212

Notes:

1. Best Measurement Capabilities (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of $k=2$
2. This laboratory offers depot and on-site calibrations. Since field (on-site) conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected in the field (on-site) than what is reported on the accredited scope.
3. On-site capability offered for this parameter.
4. On-site capability for this parameter using plug gage comparator only. Gages up to 4 inches.
5. The use of (L) signifies an expression of Length in inches.
6. The use of (D) signifies an expression of Diameter or Diagonal in inches.
7. Where ranges overlap, the uncertainty for the overlapping specifications will be the lower of the two uncertainties.
8. This scope is part of and must be included with the Certificate of Accreditation No. ACT-1290

Karl Greenway

Vice-President

