



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

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CALIBRATION

Valid to: October 2, 2011

Certificate Number: AC-1290

**I. Electromagnetic – DC/Low Frequency**

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source <sup>3</sup>	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	11.9 µV/V + 400 nV 5.8 µV/V + 700 nV 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 Sourced Procedures
DC Voltage - Measure <sup>3</sup>	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V 100 V to 1 kV  (1 to 10) kV (10 to 100) kV	7.8 µV/V + 800 nV 5.7 µV/V + 800 nV 5.6 µV/V + 1 µV 7.9 µV/V + 80 µV 7.9 µV/V + 150 µV  60 V 600 V	Agilent 3458A OPT002  Hipotronics KVM-100	
DC Current - Source <sup>3</sup>	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  (20.5 to 1000) A	118 µA/A + 6 nA 41.6 µA/A + 7 nA 40.7 µA/A + 40 nA 52.2 µA/A + 700 nA 92.8 µA/A + 12 µA  582 µA/A + 500 µA 1.21 mA/A + 750 µA  86 mA/A + 500 mA	Fluke 5720A  Fluke 5520A  Fluke 5520A w/ 50-turn Coil	
DC Power - Source <sup>3</sup>	10 mW to 330 W 330 W to 3 kW (3 to 20.5) kW	267 µW/W 261 µW/W 815 µW/W	Fluke 5520A	





PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source <sup>3</sup>	<p><b>Up to 2.2 mV</b>  (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</p> <p><b>(2.2 to 22) mV</b>  (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</p> <p><b>(22 to 220) mV</b>  (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</p> <p><b>220 mV to 2.2 V</b>  (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</p>	<p>2.35 mV/V + 4 μV  2.34 mV/V + 4 μV  2.17 mV/V + 4 μV  2.18 mV/V + 4 μV  2.25 mV/V + 5 μV  2.49 mV/V + 10 μV  2.71 mV/V + 20 μV  3.8 mV/V + 20 μV</p> <p>612 μV/V + 4 μV  555 μV/V + 4 μV  361 μV/V + 4 μV  418 μV/V + 4 μV  694 μV/V + 5 μV  1.29 mV/V + 10 μV  1.68 mV/V + 20 μV  3.35 mV/V + 20 μV</p> <p>289 μV/V + 12 μV  132 μV/V + 7 μV  109 μV/V + 7 μV  238 μV/V + 7 μV  537 μV/V + 17 μV  1.05 mV/V + 20 μV  1.62 mV/V + 25 μV  3.28 mV/V + 45 μV</p> <p>279 μV/V + 40 μV  108 μV/V + 15 μV  55 μV/V + 8 μV  119 μV/V + 10 μV  130 μV/V + 30 μV  487 μV/V + 80 μV  1.16 mV/V + 200 μV  1.97 mV/V + 300 μV</p>	Fluke 5720A	OEM and GIDEP Sourced Procedures



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source <sup>3</sup> (cont.)	<b>(2.2 to 22) V</b> (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 <b>(22 to 220) V</b> (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 <b>220 V to 1.1 kV</b> (15 to 50) Hz 50 Hz to 1 kHz	279 µV/V + 400 µV 108 µV/V + 150 µV 56 µV/V + 50 µV 119 µV/V + 100 µV 119 µV/V + 200 µV 321 µV/V + 600 µV 1.16 mV/V + 2 mV 1.74 mV/V + 3.2 mV  279 µV/V + 4.0 mV 109 µV/V + 1.5 mV 65 µV/V + 600 µV 123 µV/V + 1 mV 176 µV/V + 2.5 mV 1.04 mV/V + 16 mV 5.08 mV/V + 40 mV 9.24 mV/V + 80 mV  348 µV/V + 16 mV 88 µV/V + 3.5 mV	Fluke 5720A	OEM and GIDEP Sourced Procedures
AC Voltage - Measure <sup>3</sup> Bandwidth < 2 MHz	<b>Up to 10 mV</b> (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 <b>(10 to 100) mV</b> (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	463 µV/V + 13 µV 348 µV/V + 11.1 µV 463 µV/V + 11.1 µV 1.27 mV/V + 11.1 µV 5.89 mV/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 3.53 mV/V + 10.5 µV 11.6 mV/V + 10.5 µV 17.4 mV/V + 10.5 µV	Agilent 3458A Opt 002	

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AC Voltage - Measure <sup>3</sup> Bandwidth < 2 MHz (cont.)	<b>100 mV to 1 V</b> (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	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 3.53 mV/V + 105 µV 11.6 mV/V + 105 µV 17.4 mV/V + 105 µV	Agilent 3458A Opt 002	OEM and GIDEP Sourced Procedures	
	<b>(1 to 10) V</b> (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	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			
<b>(10 to 100) V</b> (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	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				
<b>100 V to 1 kV</b> (1 to 40) Hz 40 Hz 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				
<b>(1 to 10) kV</b> (50 to 60) Hz	120 V		Hippotronics KVM-100		
<b>(10 to 100) kV</b> (50 to 60) Hz	1.2 kV				
Bandwidth > 2 MHz	<b>Up to 10 mV</b> 45 Hz to 100 kHz 100 kHz 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 Opt 002		

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AC Voltage - Measure <sup>3</sup> Bandwidth > 2 MHz (cont.)	<b>(10 to 100) mV</b> 45 Hz to 100 kHz 100 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz <b>100 mV to 1 V</b> 45 Hz to 100 kHz 100 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz <b>(1 to 10) V</b> 45 Hz to 100 kHz 100 kHz to 1 MHz (1 to 4) MHz (4 to 8) MHz (8 to 10) MHz <b>(10 to 100) V</b> 45 Hz to 100 kHz <b>100 V to 1 kV</b> 45 Hz to 100 kHz	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  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 + 1.01 mV  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  1.48 mV/V + 2.5 mV 3.61 mV/V + 105 mV	Agilent 3458A Opt 002	OEM and GIDEP Sourced Procedures
AC Current - Source <sup>3</sup>	<b>Up to 220 µA</b> (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz <b>220 µA to 2.2 mA</b> (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz <b>(2.2 to 22) mA</b> (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz <b>(22 to 220) mA</b> (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	298.7 µA/A + 16 nA 200.2 µA/A + 10 nA 155.7 µA/A + 8 nA 331 µA/A + 12 nA 1.29 mA/A + 65 nA  312.6 µA/A + 40 nA 220.3 µA/A + 35 nA 152.6 µA/A + 35 nA 239.7 µA/A + 110 nA 1.27 mA/A + 650 nA  319.1 µA/A + 400 nA 229.4 µA/A + 350 nA 151.4 µA/A + 350 nA 238.9 µA/A + 550 nA 1.27 mA/A + 5 µA  298.8 µA/A + 4 µA 200.2 µA/A + 3.5 µA 153.1 µA/A + 2.5 µA 239.9 µA/A + 3.5 µA 1.27 mA/A + 10 µA	Fluke 5720A	OEM and GIDEP Sourced Procedures

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Source <sup>3</sup> (cont.)	<b>220 mA to 2.2 A</b> 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz <b>(2.2 to 3) A</b> (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz <b>(3 to 11) A</b> (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz <b>(11 to 20.5) A</b> (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz <b>(20.5 to 1 000) A</b> (45 to 65) Hz <b>(20.5 to 150) A</b> (65 to 440) Hz	308.5 µA/A + 35 µA 524.5 µA/A + 80 µA 8.09 mA/A + 160 µA  2.1 mA/A + 100 µA 746.1 µA/A + 100 µA 6.9 mA/A + 1 mA 28.9 mA/A + 5 mA  738.1 µA/A + 2 mA 1.18 mA/A + 2 mA 34.6 mA/A + 2 mA  1.41 mA/A + 5 mA 1.75 mA/A + 5 mA 34.6 mA/A + 5 mA  90 mA/A + 500 mA  544 µA/A + 500 mA	Fluke 5720A  Fluke 5520A  Fluke 5520A w/ 50-turn coil	OEM and GIDEP Sourced Procedures
	AC Current - Measure <sup>3</sup>	<b>Up to 100 µA</b> (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz <b>100 µA to 1 mA</b> (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz <b>(1 to 10) mA</b> (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	4.75 mA/A + 30 nA 1.89 mA/A + 30 nA 827 µA/A + 30 nA 827 µA/A + 30 nA  4.85 mA/A + 200 nA 1.89 mA/A + 200 nA 827 µA/A + 200 nA 472.6 µA/A + 200 nA 827 µA/A + 200 nA 4.85 mA/A + 400 nA 6.62 mA/A + 1.5 µA  4.85 mA/A + 2 µA 1.89 mA/A + 2 µA 827 µA/A + 2 µA 472.6 µA/A + 2 µA 827 µA/A + 2 µA 4.85 mA/A + 4 µA 6.62 mA/A + 15 µA	

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Current - Measure <sup>3</sup>	<b>(10 to 100) mA</b> (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz (50 to 100) kHz	4.85 mA/A + 20 µA 1.89 mA/A + 20 µA 827 µA/A + 20 µA 472.6 µA/A + 20 µA 827 µA/A + 20 µA 4.85 mA/A + 40 µA 6.62 mA/A + 150 µA	Agilent 3458A Opt 002	OEM and GIDEP Sourced Procedures
	<b>100 mA to 1 A</b> (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz <b>(1 to 10) A</b> 45 Hz to 2 kHz	4.8 mA/A + 200 µA 2 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 116 mA/A + 20 mA	Fluke 87 Series III	
AC Power - Source <sup>3</sup>	100 µW to 9 W (9 to 33) W (33 to 90) W (90 to 330) W (330 to 900) W 900 W to 2.2 kW	1.7 mW/W 1.2 mW/W 1.7 mW/W 1.2 mW/W 11 mW/W 4.6 mW/W		
Capacitance - Source <sup>3</sup>	130 pF to 3.3 nF (3.3 to 11) nF (11 to 110) nF (110 to 330) nF 330 nF 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 330 µF 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 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	
Inductance - Source <sup>3</sup>	(1 to 10) mH (10 to 100) mH 100 mH to 1 H (1 to 10) H	22 mH/H 11 mH/H 6 mH/H 3 mH/H	General Radio 1490-D	

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)		
<b>Oscilloscopes<sup>3</sup></b>						
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	Fluke 5520A SC1100	OEM and GIDEP Sourced Procedures		
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 Sine Wave 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				
Wave Gen. (50Ω) Wave Gen. (1MΩ)	1.8 mV to 2.5 V p-p 1.8 mV to 55 V p-p	34.6 mV/V + 100 μV 34.6 mV/V + 100 μV				
Pulse Generator Width Pulse Generator Period	(4 to 45) ns (45 to 500) ns	57.8 ms/s + 500 ps 57.8 ms/s + 4ns				
Input Impedance Measure	200 ns to 20 ms  (50 to 60) Ω (0.5 to 1) MΩ	57.8 ms/s + 200 ns  1.2 mΩ/Ω 1.2 mΩ/Ω				
<b>Electrical Simulation of Thermocouples<sup>3</sup></b>						
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	
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1 200) °C	0.5 °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 & Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Measure <sup>3</sup>	DC to 225 MHz	5.8 µHz/Hz	Agilent 53131A	OEM and GIDEP Sourced Procedures
Frequency - Source <sup>3</sup>	DC to 1 GHz	5.8 µHz/Hz	Agilent 53131A & Fluke 5520A SC1100	
Time Interval <sup>3</sup>	(1 to 86 400) s	0.00045 s	Agilent 53131A	

## III. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Temperature	(-0.15 to 350) °C	0.14 °C	Hart Scientific 9009	OEM and GIDEP Sourced Procedures

## IV. Dimensional

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Gage Blocks	Up to 20 in	(7.7 + L) µin	Zeiss ULM 600	ASME B89.1.9
Length Standards	Up to 9 in (9 to 24) in	(38 + 0.8L) µin (16 + 0.9L) µin	P&W Supermicrometer Zeiss ULM 600	OEM and GIDEP Sourced Procedure
Cylindrical Rings	(0.025 to 12) in	(33.9 + 1.7D) µin	Zeiss ULM 600	ASME B89.1.6
Cylindrical Plugs <sup>4</sup>	(0.01 to 8) in	(21.7 + 0.3D) µin	Zeiss ULM 600	ASME B89.1.5

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<b>Thread Rings</b> - Pitch Diameter - Minor Diameter	(0.01 to 8) in (0.03 to 3) in	(236 + 0.3 D) μin 422 μin	Setting Plug Gages ID Bore Gages	ASME B1.2
<b>NPT Rings</b> Standoff and Basic Length	(0.0625 to 6) in	244 μin	NPT Plugs and P&W Supermicrometer	ASME B1.20.5
<b>NPT Plugs</b> Standoff and Basic Length	(0.0625 to 6) in	488 μin	NPT Rings and P&W Supermicrometer	ASME B1.20.5
<b>Threaded Plugs<sup>4</sup></b> - Pitch Diameter - Major Diameter	(0.01 to 10) in (0.1 to 10) in	(73 + 0.9D) μin (40 + 1.2D) μin	P&W Supermicrometer and Thread Measuring Wires	ASME B1.2
Calipers <sup>3</sup>	Up to 40 in	(382 + 15L) μin	Gage Blocks	OEM and GIDEP Sourced Procedures
Dial Indicators <sup>3</sup>	Up to 4 in	(36 + 10L) μin	Indicator Checker	
Test Indicators <sup>3</sup>	Up to 0.00 in	232 μin	Indicator Checker	
Bore Gages <sup>3</sup>	(0.25 to 12) in	351 μin	Cylindrical Rings	
OD Micrometers <sup>3</sup>	Up to 24 in	(62 + 20L) μin	Gage Blocks	
ID Micrometers <sup>3</sup>	(1.5 to 24) in	(64 + 6L) μin		
Height Gages <sup>3</sup>	Up to 40 in	(375 + 11L) μin		
<b>Crimpers<sup>3</sup></b> - Die Check - Crimp Height	(0.011 to 0.5) in (0.01 to 0.5) in	233 μin 1200 μin	Pin Gages Micrometer	
<b>Profilometers<sup>3</sup></b> Ra	(2 to 300) μin	2.2 μin	Roughness Specimen	
<b>Surface Plates<sup>3</sup></b> --Repeatability --Flatness	(4 to 34) in (Diagonal) (34 to 175) in (Diagonal)	(30 + 0.2D) μin (66 + 0.2D) μin	Repeat – O – Meter Electronic Levels	
<b>Optical Comparators<sup>3</sup></b> - Linearity - Magnification	Up to 12 in 10x, 20x, 31.25x, 50x, 62.5x, 100x, 200x	(97 + 12L) μin 0.000463 in	Glass Scale Precision Balls Calibration Sphere	
Film Thickness Gages <sup>3</sup>	(0.01 to 0.06) in	382 μin	Film Thickness Standards	

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Brinell Scopes <sup>3</sup>	(1 to 6) mm	11 µm	Stage Micrometer	OEM and GIDEP Sourced Procedures

### V. Mechanical

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Bench and Floor Scales <sup>3</sup>	(0.5 to 120) lb	0.08 lb	NIST 105 Class F Weights	NIST Handbook 44
Analytical Balances <sup>3</sup>	Up to 3 kg	0.58 mg	ASTM E617 Class 1 Weights	
Pressure <sup>3</sup>	(-12 to 300) psi (300 to 1 000) psi (1 000 to 10 000) psi	0.2 psi 1.9 psi 7.5 psi	Pressure Calibrator Pressure Transducers	OEM and GIDEP Sourced Procedures
Force <sup>3</sup>	Up to 200 lb (200 to 2 500) lb (2 500 to 12 500) lb	0.05 % of reading 0.05 % of reading 0.05 % of reading	Dead Weights Load Cells Load Cells	
Torque - Measure <sup>3</sup>	4 lbf·in to 600 lbf·ft	0.3 % of reading	CDI Torque System	
Hardness Testers <sup>3</sup> Rockwell	HRA Low	1.22 HRA	Rockwell Test Blocks	Indirect Comparison per ASTM E18
	HRA Med	1.24 HRA		
	HRA High	0.75 HRA		
	HRB Low	1.39 HRB		
	HRB Med	1.39 HRB		
HRB High	1.33 HRB			
HRC Low	1.22 HRC	HRC High	0.7 HRC	
	1.22 HRC			
	0.7 HRC			
HRE Low	1.28 HRE	HRE High		
HRE Med	1.42 HRE			
HRE High	1.34 HRE			
HRF Low	1.43 HRF	HRF High		
	1.43 HRF			
	1.42 HRF			

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Hardness Testers <sup>3</sup> 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	0.9 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	1.4 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	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
<b>Durometers</b> <sup>3</sup> - Spring Force - Indentor Angle - Indentor Length - Indentor Radius	(0.1 to 45) N (20 to 40) ° (0.049 to 0.198) in (0.05 to 0.1) in	0.044 N 0.07 ° 333 μin 337 μin	Triple Beam Balance Video Measuring Machine Gage Blocks Gage Blocks	ASTM D2240
pH Meters <sup>3</sup>	(4.01, 7.00, 10.00) pH	0.02 pH	pH Buffer Solutions	OEM and GIDEP Sourced Procedures
Conductivity Meters <sup>3</sup>	12.85 mS/cm 1 408 μS/cm	0.18 mS/cm 13.5 μS/cm	Conductivity Solutions	
Refractometers <sup>3</sup>	(0.0, 18.0, 29.7) BRIX	0.24 BRIX	Refractive Index Solutions	
<b>Viscosity</b> Rotational Viscometers  Viscosity Cups	500 cP 5000 cP  17.82 cP 65.28 cP 231 cP	0.02 cP/cP  0.03 cP/cP	Viscosity Solutions, Temperature Bath  Viscosity Solutions, Temperature Bath, Stopwatch	OEM and GIDEP Sourced Procedures  OEM and GIDEP Sourced Procedures ASTM D4212

**Notes:**

1. Calibration and Measurement Capabilities (CMC)(Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of k=2.
2. This laboratory offers in-laboratory and on-site calibrations at customer-designated locations. 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. 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 uncertainties listed for Electromagnetic – DC/Low Frequency do not include possible contributions to uncertainty from the unit under test.
6. The use of (L) signifies an expression of Length in inches.
7. The use of (D) signifies an expression of Diameter or Diagonal in inches.
8. This scope is part of and must be included with the Certificate of Accreditation No. ACT-1290.



Vice-President