



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

**Techmaster de Mexico SA de CV**

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**CALIBRATION**

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

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Voltage - Source	(2.2 to 220) mV 200 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 $\mu$ V/V + 482 nV 6.2 $\mu$ V/V + 840 nV 4.2 $\mu$ V/V + 3 $\mu$ V 4.2 $\mu$ V/V + 4.8 $\mu$ V 6.1 $\mu$ V/V + 48 $\mu$ V 8 $\mu$ V/V + 480 $\mu$ V	Fluke 5720A	OEM and GIDEP Sourced Procedures
DC Voltage - Measure	(2 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V 200 V to 1 kV  (1 to 20) kV (20 to 70) kV	6.7 $\mu$ V/V + 120 nV 4.3 $\mu$ V/V + 480 nV 4.3 $\mu$ V/V + 4.8 $\mu$ V 6.7 $\mu$ V/V + 48 $\mu$ V 6.7 $\mu$ V + 600 $\mu$ V  500 $\mu$ V/V + 6.81 V 600 $\mu$ V/V + 51.21 V	Fluke 8508  Vitretek 4600A	
Charge Analyzer	Up to 1 kV (1 to 5) kV	24 mV/V + 500 mV 24 mV/V + 11.66 V	Monroe Electronics 2.68A	
DC Current - Source	(2 to 220) $\mu$ A 220 $\mu$ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A  (2.2 to 10) A (10 to 10.9) A (10.9 to 20.5) A	49.4 $\mu$ A/A + 7.2 nA 42.7 $\mu$ A/A + 8.4 nA 42.7 $\mu$ A/A + 48 nA 54.7 $\mu$ A/A + 840 nA 97.2 $\mu$ A/A + 14.4 $\mu$ A  600 $\mu$ A/A + 657 $\mu$ A 600 $\mu$ A/A + 890 $\mu$ A 1.2 mA/A + 1.18 mA	Fluke 5720A  Fluke 5520A	



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
DC Current - Measure	(2 to 200) $\mu$ A 200 $\mu$ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	15.2 $\mu$ A/A + 480 pA 15.2 $\mu$ A/A + 4.8 nA 17.3 $\mu$ A/A + 48 nA 58.8 $\mu$ A/A + 960 nA 223 $\mu$ A/A + 19.2 $\mu$ A 489 $\mu$ A/A + 48 $\mu$ A	Fluke 8508	OEM and GIDEP Sourced Procedures
Resistance - Source (Fixed Values)	1 $\Omega$ 1.9 $\Omega$ 10 $\Omega$ 19 $\Omega$ 100 $\Omega$ 190 $\Omega$ 1 k $\Omega$ 1.9 k $\Omega$ 10 k $\Omega$ 19 k $\Omega$ 100 k $\Omega$ 190 k $\Omega$ 1 M $\Omega$ 1.9 M $\Omega$ 10 M $\Omega$ 19 M $\Omega$ 100 M $\Omega$	114.8 $\mu\Omega$ 219.4 $\mu\Omega$ 278 $\mu\Omega$ 529 $\mu\Omega$ 1.3 m $\Omega$ 2.3 m $\Omega$ 10.5 m $\Omega$ 19.8 m $\Omega$ 111 m $\Omega$ 201 m $\Omega$ 1.34 $\Omega$ 2.56 $\Omega$ 24.6 $\Omega$ 51.2 $\Omega$ 495 $\Omega$ 1.15 k $\Omega$ 13.9 k $\Omega$	Fluke 5720A	
Resistance - Measure	Up to 2 $\Omega$ (2 to 20) $\Omega$ (20 to 200) $\Omega$ 200 $\Omega$ to 2 k $\Omega$ (2 to 20) k $\Omega$ (20 to 200) k $\Omega$ 200 k $\Omega$ to 2 M $\Omega$ (2 to 20) M $\Omega$ (20 to 200) M $\Omega$ 200 M $\Omega$ to 2 G $\Omega$	22.7 $\mu\Omega/\Omega$ + 4.8 $\mu\Omega$ 12.1 $\mu\Omega/\Omega$ + 16.8 $\mu\Omega$ 9.8 $\mu\Omega/\Omega$ + 60 $\mu\Omega$ 11.9 $\mu\Omega/\Omega$ + 600 $\mu\Omega$ 10.8 $\mu\Omega/\Omega$ + 6 m $\Omega$ 10.8 $\mu\Omega/\Omega$ + 60 m $\Omega$ 12.4 $\mu\Omega/\Omega$ + 1.2 $\Omega$ 27.8 $\mu\Omega/\Omega$ + 120 $\Omega$ 150 $\mu\Omega/\Omega$ + 1.2 k $\Omega$ 1.84 m $\Omega/\Omega$ + 12 k $\Omega$	Fluke 8508A	
AC Voltage - Source	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	288 $\mu$ V/V + 4.8 $\mu$ V 108 $\mu$ V/V + 4.8 $\mu$ V 96 $\mu$ V/V + 4.8 $\mu$ V 240 $\mu$ V/V + 4.8 $\mu$ V 600 $\mu$ V/V + 6 $\mu$ V 1.26 mV/V + 12 $\mu$ V 1.68 mV/V + 24 $\mu$ V 3.24 mV/V + 24 $\mu$ V	Fluke 5720A	

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source (cont.)	<b>(2.2 to 22) mV</b>	295 $\mu\text{V/V} + 4.8 \mu\text{V}$	Fluke 5720A	OEM and GIDEP Sourced Procedures
	(10 to 20) Hz	125 $\mu\text{V/V} + 4.8 \mu\text{V}$		
	(20 to 40) Hz	115 $\mu\text{V/V} + 4.8 \mu\text{V}$		
	40 Hz to 20 kHz	243 $\mu\text{V/V} + 4.8 \mu\text{V}$		
	(20 to 50) kHz	619 $\mu\text{V/V} + 6 \mu\text{V}$		
	(50 to 100) kHz	1.27 mV/V + 12 $\mu\text{V}$		
	(100 to 300) kHz	1.7 mV/V + 24 $\mu\text{V}$		
	(300 to 500) kHz	3.32 mV/V + 24 $\mu\text{V}$		
	500 kHz to 1 MHz			
	<b>(22 to 220) mV</b>	289 $\mu\text{V/V} + 14.4 \mu\text{V}$		
	(10 to 20) Hz	110 $\mu\text{V/V} + 8.4 \mu\text{V}$		
	(20 to 40) Hz	97.6 $\mu\text{V/V} + 8.4 \mu\text{V}$		
	40 Hz to 20 kHz	241 $\mu\text{V/V} + 8.4 \mu\text{V}$		
	(20 to 50) kHz	553 $\mu\text{V/V} + 20.4 \mu\text{V}$		
	(50 to 100) kHz	1.08 mV/V + 24 $\mu\text{V}$		
	(100 to 300) kHz	1.69 mV/V + 30 $\mu\text{V}$		
	(300 to 500) kHz	3.32 mV/V + 54 $\mu\text{V}$		
	500 kHz to 1 MHz			
	<b>220 mV to 2.2 V</b>	289 $\mu\text{V/V} + 48 \mu\text{V}$		
	(10 to 20) Hz	110 $\mu\text{V/V} + 18 \mu\text{V}$		
	(20 to 40) Hz	57.2 $\mu\text{V/V} + 9.62 \mu\text{V}$		
	40 Hz to 20 kHz	90.7 $\mu\text{V/V} + 12 \mu\text{V}$		
	(20 to 50) kHz	133 $\mu\text{V/V} + 36 \mu\text{V}$		
	(50 to 100) kHz	576 $\mu\text{V/V} + 186 \mu\text{V}$		
(100 to 300) kHz	504 $\mu\text{V/V} + 96 \mu\text{V}$			
(300 to 500) kHz	1.2 mV/V + 240 $\mu\text{V}$			
500 kHz to 1 MHz				
<b>(2.2 to 22) V</b>	289 $\mu\text{V/V} + 48.4 \mu\text{V}$			
(10 to 20) Hz	110 $\mu\text{V/V} + 19 \mu\text{V}$			
(20 to 40) Hz	57.2 $\mu\text{V/V} + 11.3 \mu\text{V}$			
40 Hz to 20 kHz	90.7 $\mu\text{V/V} + 13.4 \mu\text{V}$			
(20 to 50) kHz	133 $\mu\text{V/V} + 36.5 \mu\text{V}$			
(50 to 100) kHz	540 $\mu\text{V/V} + 96.2 \mu\text{V}$			
(100 to 300) kHz	1.2 mV/V + 240 $\mu\text{V}$			
(300 to 500) kHz	2.06 mV/V + 360 $\mu\text{V}$			
500 kHz to 1 MHz				
<b>(22 to 220)V</b>	291 $\mu\text{V/V} + 4.8 \text{ mV}$			
(10 to 20) Hz	115 $\mu\text{V/V} + 1.8 \text{ mV}$			
(20 to 40) Hz	74.4 $\mu\text{V/V} + 722.5 \mu\text{V}$			
40 Hz to 20 kHz	102 $\mu\text{V/V} + 1.2 \text{ mV}$			
(20 to 50) kHz	192 $\mu\text{V/V} + 3 \text{ mV}$			
(50 to 100) kHz	1.08 mV/V + 19.2 mV			
(100 to 300) kHz	5.31 mV/V + 48 mV			
(300 to 500) kHz	9.7 mV/V + 96 mV			
500 kHz to 1 MHz				
<b>(220 to 250) V</b>	290 $\mu\text{V/V} + 48 \text{ mV}$			
(15 to 50) Hz	112 $\mu\text{V/V} + 18 \text{ mV}$			
50 Hz to 1 kHz				

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Source (cont.)	<b>250 V to 1.1 kV</b> 50 Hz to 1 kHz	112 $\mu\text{V/V}$ + 18 mV	Fluke 5720A	
AC Voltage - Measure	<b>Up to 200 mV</b> (1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz <b>200 mV to 2 V</b> (1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz <b>(2 to 20) V</b> (1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz <b>(20 to 200) V</b> (1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	200 $\mu\text{V/V}$ + 17 $\mu\text{V}$ 171 $\mu\text{V/V}$ + 5 $\mu\text{V}$ 142 $\mu\text{V/V}$ + 5 $\mu\text{V}$ 172 $\mu\text{V/V}$ + 2 $\mu\text{V}$ 166 $\mu\text{V/V}$ + 5 $\mu\text{V}$ 414 $\mu\text{V/V}$ + 10 $\mu\text{V}$ 925 $\mu\text{V/V}$ + 24 $\mu\text{V}$  185 $\mu\text{V/V}$ + 144 $\mu\text{V}$ 145 $\mu\text{V/V}$ + 24 $\mu\text{V}$ 116 $\mu\text{V/V}$ + 24 $\mu\text{V}$ 170 $\mu\text{V/V}$ + 24 $\mu\text{V}$ 135 $\mu\text{V/V}$ + 24 $\mu\text{V}$ 270 $\mu\text{V/V}$ + 48 $\mu\text{V}$ 697 $\mu\text{V/V}$ + 240 $\mu\text{V}$  183 $\mu\text{V/V}$ + 1.44 mV 142 $\mu\text{V/V}$ + 240 $\mu\text{V}$ 112 $\mu\text{V/V}$ + 240 $\mu\text{V}$ 151 $\mu\text{V/V}$ + 240 $\mu\text{V}$ 134 $\mu\text{V/V}$ + 240 $\mu\text{V}$ 265 $\mu\text{V/V}$ + 480 $\mu\text{V}$ 688 $\mu\text{V/V}$ + 2.4 mV 3.6 mV/V + 24 mV 12 mV/V + 240 mV  186 $\mu\text{V/V}$ + 14.4 mV 146 $\mu\text{V/V}$ + 2.4 mV 117 $\mu\text{V/V}$ + 2.4 mV 150 $\mu\text{V/V}$ + 2.4 mV 138 $\mu\text{V/V}$ + 2.4 mV 266 $\mu\text{V/V}$ + 4.8 mV 690 $\mu\text{V/V}$ + 24 mV 3.6 mV/V + 240 mV 12 mV/V + 2.4 V	Fluke 8508 A	OEM and GIDEP Sourced Procedures

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
AC Voltage - Measure (cont.)	<b>200 V to 1 kV</b> (1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz <b>(1 to 2) kV</b> (20 to 400) Hz <b>(2 to 20) kV</b> (20 to 100) Hz <b>(20 to 70) kV</b> (50 to 60) Hz	189 $\mu\text{V/V} + 84 \text{ mV}$ 155 $\mu\text{V/V} + 24 \text{ mV}$ 287 $\mu\text{V/V} + 24 \text{ mV}$ 281 $\mu\text{V/V} + 48 \text{ mV}$ 719 $\mu\text{V/V} + 24 \text{ mV}$ 500 $\mu\text{V/V} + 48.38 \text{ V}$ 500 $\mu\text{V/V} + 48.38 \text{ V}$ 600 $\mu\text{V/V} + 210 \text{ V}$	Fluke 8508 A           Vitrek 4600A	
AC Current - Source	<b>Up to 220 <math>\mu\text{A}</math></b> (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz <b>220 <math>\mu\text{A}</math> 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 <b>220 mA to 2.2 A</b> 20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	376 $\mu\text{A/A} + 19.2 \text{ nA}$ 297 $\mu\text{A/A} + 12 \text{ nA}$ 268 $\mu\text{A/A} + 9.6 \text{ nA}$ 405 $\mu\text{A/A} + 14.4 \text{ nA}$ 1.35 mA/A + 78 nA 301 $\mu\text{A/A} + 48.4 \text{ nA}$ 193 $\mu\text{A/A} + 42.4 \text{ nA}$ 145 $\mu\text{A/A} + 42.4 \text{ nA}$ 271 $\mu\text{A/A} + 132 \text{ nA}$ 1.33 mA/A + 780 nA 301.4 $\mu\text{A/A} + 484 \text{ nA}$ 194.2 $\mu\text{A/A} + 424 \text{ nA}$ 146.9 $\mu\text{A/A} + 424 \text{ nA}$ 384.2 $\mu\text{A/A} + 663 \text{ nA}$ 1.36 mA/A + 6 $\mu\text{A}$ 432 $\mu\text{A/A} + 4.9 \mu\text{A}$ 365 $\mu\text{A/A} + 4.3 \mu\text{A}$ 357 $\mu\text{A/A} + 3.1 \mu\text{A}$ 405 $\mu\text{A/A} + 4.3 \mu\text{A}$ 3.28 mA/A + 12 $\mu\text{A}$ 4.3 $\mu\text{A/A} + 42.4 \mu\text{A}$ 4 $\mu\text{A/A} + 96.2 \mu\text{A}$ 9.3 mA/A + 192.1 $\mu\text{A}$	OEM and GIDEP Sourced Procedures           Fluke 5720A	



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AC Current - Measure	<b>Up to 200 <math>\mu</math>A</b> 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz <b>200 <math>\mu</math>A to 2 mA</b> 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz <b>(2 to 20) mA</b> 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz <b>(20 to 200) mA</b> 10 Hz to 10 kHz (10 to 30) kHz <b>200 mA to 20 A</b> 10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz <b>(2 A to 20 A)</b> 10 Hz to 2 kHz (2 to 10) kHz	418 $\mu$ A/A + 24 nA 878 $\mu$ A/A + 24 nA 4.8 mA/A + 24 nA  362 $\mu$ A/A + 240 nA 854 $\mu$ A/A + 240 nA 4.8 mA/A + 240 nA  368 $\mu$ A/A + 2.4 $\mu$ A 857 $\mu$ A/A + 2.4 $\mu$ A 4.8 mA/A + 2.4 $\mu$ A  350 $\mu$ A/A + 24 $\mu$ A 751 $\mu$ A/A + 24 $\mu$ A  745 $\mu$ A/A + 240 $\mu$ A 872 $\mu$ A/A + 240 $\mu$ A 3.6 mA/A + 240 $\mu$ A  988 $\mu$ A/A + 2.4 mA 3.05 mA/A + 2.4 mA	Fluke 8508A   Fluke 8508A	
	Electrical Simulation of Thermocouple Indicators			
Type B	(600 to 800) °C (800 to 1 000) °C (1 000 to 1 550) °C (1 550 to 1 820) °C	0.53 °C 0.41 °C 0.36 °C 0.41 °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	0.36 °C 0.28 °C 0.37 °C 0.61 °C 1.01 °C		
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1 000) °C	0.19 °C 0.32 °C 0.17 °C 0.21 °C 0.28 °C	Fluke 5520 A	
Type J	(-200 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1 200) °C	0.19 °C 0.32 °C 0.17 °C 0.21 °C 0.28 °C		

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Electrical Simulation of Thermocouple Indicators (cont.)				
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1 000) °C (1 000 to 1 372) °C	0.4 °C 0.22 °C 0.19 °C 0.31 °C 0.48 °C	Fluke 5520 A	OEM and GIDEP Sourced Procedures
Type L	(-200 to -100) °C (-100 to 800) °C (800 to 900) °C	0.45 °C 0.32 °C 0.21 °C		
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1 300) °C	0.48 °C 0.26 °C 0.23 °C 0.22 °C 0.33 °C		
Type R	(0 to 250) °C (250 to 400) °C	0.69 °C 0.42 °C		
Type S	(400 to 1 000) °C (1 000 to 1 767) °C	0.48 °C 0.6 °C		
Type T	(0 to 250) °C (250 to 1 000) °C (1 000 to 1 400) °C (1 400 to 1 767) °C	0.57 °C 0.43 °C 0.44 °C 0.57 °C		
Type U	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.76 °C 0.29 °C 0.19 °C 0.48 °C		
	(-200 to 0) °C (0 to 600) °C	0.69 °C 0.33 °C		

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Electrical Simulation of RTDs						
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.05 °C 0.08 °C 0.11 °C 0.16 °C 0.14 °C 0.28 °C	Fluke 5520A	OEM and GIDEP Sourced Procedures		
Pt 385, 200 Ω	(-200 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.05 °C 0.06 °C 0.14 °C 0.16 °C 0.17 °C 0.19 °C				
Pt 385, 500 Ω	(-200 to -80) °C (-80 to 100) °C (100 to 260) °C (260 to 400) °C (400 to 600) °C (600 to 630) °C	0.07 °C 0.07 °C 0.08 °C 0.11 °C 0.12 °C 0.14 °C				
Pt 3916, 1 kΩ	(-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 600) °C (600 to 630) °C	0.06 °C 0.07 °C 0.07 °C 0.08 °C 0.09 °C 0.28 °C				
Pt 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.06 °C 0.08 °C 0.11 °C 0.12 °C 0.14 °C				
Capacitance - Source						
10 Hz to 10 kHz	(200 to 400) pF	6 mF/F + 10 pF				
10 Hz to 10 kHz	400 pF to 1.1 nF	6 mF/F + 10 pF				
10 Hz to 3 kHz	(1.1 to 3.3 ) nF	6 mF/F + 10 pF				
10 Hz to 1 kHz	(3.3 to 11) nF	3 mF/F + 10 pF				
10 Hz to 1 kHz	(11 to 33) nF	3 mF/F + 120 pF				
10 Hz to 1 kHz	(33 to 110) nF	3 mF/F + 130 pF				
10 Hz to 1 kHz	(110 to 330) nF	3 mF/F + 400 pF				
(10 to 600) Hz	330 nF to 1.1 μF	3 mF/F + 1 nF				
(10 to 300) Hz	(1.1 to 3.3) μF	3 mF/F + 4 nF				
(10 to 150) Hz	(3.3 to 11) μF	3 mF/F + 14 nF				
(10 to 120) Hz	(11 to 33 ) μF	4.8 mF/F + 40 nF				
(10 to 80) Hz	(33 to 110) μF	5.4 mF/F + 137 nF				

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Capacitance - Measure (1 to 100) kHz 300 Hz to 100 kHz (50 to 100) kHz (50 to 200) kHz 50 Hz to 10 kHz 50 Hz to 1 kHz	100 pF to 1 nF (1 to 10) nF (10 to 100) nF 100 to 1 $\mu$ F (1 to 10) $\mu$ F (10 to 100) $\mu$ F	1 mF + 0.013 pF 1 mF + 0.134 pF 1 mF + 1.34 pF 1 mF + 13.4 pF 1 mF + 134 pF 1 mF + 1.34 nF	Fluke PM6304	OEM and GIDEP Sourced Procedures
Capacitance - Source (Fixed Values @ 1 kHz)	1 nF 10 nF 100 nF 1 $\mu$ F	0.7 pF 12.2 pF 136 pF 643 pF	Genrad 1409	
Inductance - Source 100 Hz to 10 kHz	100 $\mu$ H 1 mH 20 H 100 H	850 nH 10 $\mu$ H 30 $\mu$ H 120 $\mu$ H	Genrad 1482-B Genrad 1482-E Genrad 1482-J Genrad 1482-I	
Inductance - Measure (2 to 100) kHz 300 Hz to 100k Hz 100 Hz to 100 kHz (50 to 100) kHz 50 Hz to 10 kHz 50 Hz to 2 kHz	(100 $\mu$ H to 1 mH) (1 to 10) mH (10 to 100) mH 100 mH to 1 H (1 to 10) H (10 to 100) H	1 mH/H + 13 nH 1 mH/H + 134 nH 1 mH/H + 1.34 $\mu$ H 1 mH/H + 13.4 $\mu$ H 1 mH/H + 134 $\mu$ H 1 mH/H + 1.34 mH	Fluke PM6304	
<b>Oscilloscopes</b> DC Signal into 50 $\Omega$ DC Signal into 1 M $\Omega$ Amplitude Square Wave 50 $\Omega$ Load  1 M $\Omega$ Load  Leveled Sine Wave  Time Marker into 50 $\Omega$	(0 $\pm$ 6.6) V (0 $\pm$ 130) V  1 mV to 6.6 V p-p 10 Hz to 10 kHz  1 mV to 130 V p-p 10 Hz to 10 kHz  [5 mV to 5.5 V] 50 kHz to 100 MHz (100 to 300) MHz (300 to 500) MHz (500 to 600) MHz  5 s to 50 ms 20 ms to 1 ns	3 mV/V + 48 $\mu$ V 300 $\mu$ V/V + 741 $\mu$ V  3 mV/V + 891 $\mu$ V  3 mV/V + 1.4 mV  42 mV/V + 997 $\mu$ V 48 mV/V + 997 $\mu$ V 66 mV/V + 997 $\mu$ V 72 mV/V + 997 $\mu$ V  3 $\mu$ s/s + 9 $\mu$ s 1 $\mu$ s/s + 60 ns	Fluke 5800	

## II. Electromagnetic - RF/Microwave

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power/Gain - Measure*	(10 to 20) MHz (20 to 50) MHz (50 to 100) MHz 100 MHz to 1 GHz (1 to 4) GHz (4 to 8) GHz (8 to 18) GHz	2.06 % 1.74 % 1.35 % 1.17 % 1.17 % 1.36 % 2.48 %	F1109, 1805B TEGAM	DOD Midas, OEM and GIDEP Sourced Procedures
Frequency Modulation - Measure	Rate: 20 Hz to 10 kHz Deviation: ≤ 40 kHz peak 250 kHz to 10 MHz  Rate: 20 Hz to 10 kHz Deviation: ≤ 400 kHz peak 10 MHz to 1.3 GHz	2.4 % + 100 Hz  1.2 % + 100 Hz	HP 8902A w/11722A	
Amplitude Modulation - Measure	Rate: 50 Hz to 10 kHz Depths;(5 to 99) % 150 kHz to 10 MHz  Rate 10 MHz to 1.3 GHz Depths (5 to 99) % 50 Hz to 50 kHz	2.4 % + 0.1 % depth  1.2 % + 0.1 % depth		
Phase Modulation - Measure	Rate: 200 Hz to 10 kHz 150 kHz to 10 MHz  Rate: 200 Hz to 20 kHz 10 MHz to 1.3 GHz	4.8 % + 0.3 rad  3.6 % + 0.3 rad		
RF Power - Measure	<b>(+30 to -20) dBm</b> 100 kHz to 2.6 GHz <b>(+20 to -30) dBm</b> 100 kHz to 4.2 GHz 50 MHz to 26.5 GHz	0.07 dB  4.9 % 3.1 %	HP 8902Aw/11722A  HP 8482A HP 8485A	
Tuned RF Power Relative - Measure	<b>2.5 MHz to 1.3 GHz</b> (0 to -10) dB (-10 to -40) dB (-40 to -50) dB (-50 to -80) dB (-80 to -90) dB (-90 to -110) dB (-110 to -127) dB	0.02 dB 0.03 dB 0.07 dB 0.12 dB 0.14 dB 0.41 dB 0.44 dB	HP 8902A w/11722A	

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
RF Power - Source	<b>10 MHz to 2 GHz</b> > + 10 dBm (+10 to -10) dBm (-10 to -60) dBm ≤ -60 dBm <b>2 GHz to 20 GHz</b> >+ 10 dBm (+10 to -10) dBm (-10 to -60) dBm ≤ - 60 dBm <b>20 GHz to 26.5 GHz</b> >- 10 dBm (-10 to -60) dBm ≤ - 60 dBm	1.45 dB 0.72 dB 1.1 dB 1.70 dB 1.56 dB 0.84 dB 1.22 dB 1.82 dB 1.08 dB 1.45 dB 1.82 dB		

### III. Time & Frequency

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Frequency - Measure	150 kHz to 1.3 GHz	$(2.4 \times 10^{-8}) \text{ Hz} + 2R$	HP 8902A	OEM and GIDEP Sourced Procedures
Frequency - Source	(0.01 to 120 ) Hz 120 Hz to 1.2 kHz (1.2 to 120) kHz 120 kHz to 1.2 MHz (1.2 to 2 ) MHz	3 μHz/Hz + 61 μHz 3 μHz/Hz + 61 μHz 3 μHz/Hz + 117 μHz 3 μHz/Hz + 10 mHz 3 μHz/Hz + 12 mHz	Fluke 5520	
	10 MHz to 26.5 GHz	$(1.2 \times 10^{-7}) \text{ Hz} + R$	HP 8902A	

### IV. Thermodynamic

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Humidity	(0 to 100) %RH	1.96 %RH	Hart Scientific 2626-H	OEM and GIDEP Sourced Procedures
Temperature - Source (Black Body)	(50 to 100) °C (100 to 500) °C	0.63 °C 1.01 °C	Hart Scientific 9132	

## V. Mechanical

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Force Tension/Compression	Up to 10 000 lbf (10 000 to 50 000) lbf	24.17 lbf 60.25 lbf	LSB 400 Futek L2901 Futek	DOD Midas, OEM and GIDEP Sourced Procedures
Scales / Balances	Up to 50 g (50 to 200) g 200 g to 10 kg (10 to 500) kg	0.046 mg + 0.6R 0.096 mg + 0.6 R 85 mg + 0.6 R 4.48 g + 0.6R	Class F Weights	
Torque	50 in•lb 250 in•lb 1 000 in•lb 250 ft•lb 1 000 ft•lb	0.33 % rdg + 0.006 in•lb 0.31 % rdg + 0.04 in•lb 0.31 % rdg + 0.12 in•lb 0.31 % rdg + 1.9 ft•lb 0.31 % rdg + 0.88 ft•lb	950 DT CDI  1000-F-TTP-CDI	
Pressure	(-14.7 to 300) psig (1 000 to 10 000) psig (0.25 to 2.5) psig	0.09 psi 3.77 psi 0.0008 psi	Druck DPI 610 Druck PDCR 2200 Druck PDCR2200-A145	DOD Midas, OEM and GIDEP Sourced Procedures
Sound - Source	114 dB @ 1 kHz	1.3 dB	Quest QC-10	
Tachometer (Measure )  Stroboscope (Source)	Up to 100 rpm (100 to 1 000) rpm (1 000 to 99 999) rpm  (20 to 29 999) rpm	0.03 % + 0.01 rpm 0.03 % + 0.13 rpm 0.0 3% + 1.34 rpm  0.02 % + 1.34 rpm	Amprobe TACH20  Ametek 1965	
Mass	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 25 kg	0.13 mg 0.15 mg 0.17 mg 0.21 mg 0.24 mg 0.42 mg 0.52 mg 0.65 mg 0.74 mg 1.08 mg 1.32 mg 1.8 mg 2.4 mg 4.8 mg 12 mg 24 mg 48 mg 84 mg 141.6 mg 251.9 mg 605.1 mg 3.07 g	Troemner Class F Weights and Balances	DOD Midas, OEM and GIDEP Sourced Procedures  NIST 105-1 Handbook  Up to Class F only

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)	
Air Flow	(0 to 30) sccm (30 to 300) sccm (1 to 10) slm (10 to 100) slm (100 to 1000) slm (0 to 200) sccm	1.35 % rdg + 0.01 sccm 1.35 % rdg + 0.08 sccm 1.35 % rdg + 0.001 slm 1.35 % rdg + 0.01 slm 1.35 % rdg + 0.85 slm 1% rdg + 2 sccm	CME 60B-1-.3-10A  Uson Testra 1100	DOD Midas, OEM and GIDEP Sourced Procedures	
Air Velocity	100 to 6 800 fpm	1.29 % + 40.8 fpm	Omega HHF710-P1-137-0166		
Leak Standards	0.803 to 1.017 sccm (-6.5 to -10.35) psi 31.25 to 102.06 sccm (5.62 to 15.84) psi 35.33 to 113.43 sccm (5.73 to 16.15) psi	1.21 % + 0.06 sccm  1.21 % + 0.06 sccm  1.21 % + 0.06 sccm	American Specialty Gold Restrictor		
Leak Tester	0 to 200 sccm	1 % rdg. + 2 sccm	Uson Testra 1100		
Surface Plates Repeatability	Up to 1 in	34.07 µin /step	Rahn Repeat-o-Meter		
Flatness	Up to 1 000 arc sec	12.03 N arc sec	Federal Level System		
Surface Finish - Source	(118) uin	2.53 µin	178-602		
Surface Finish - Measure	(0 to 300) µin	5.57 µin	SJ-201 Mitutoyo		
Hardness	49.20 HRC 62.42 HRC 27.11 HRC 29.51 HR45N 47.37 HR45N 70.07 HR45N 82.57 HRBW 62.56 HRBW 45.28 HRBW 82.41 HR30TW 59.90 HR30TW 54.51 HR30TW 91.10 HR15N 81.10 HR15N 74.04 HR15N 92.21 HR15TW 81.07 HR15TW 75.69 HR15TW 76.15 HREW 89.62 HREW 97.23 HREW 712 HK 714 HV	1.18 HRC 0.68 HRC 1.19 HRC 1.25 HR45N 1.25 HR45N 0.75 HR45N 1.26 HRBW 1.54 HRBW 2.13 HRBW 1.20 HR30TW 1.15 HR30TW 1.34 HR30TW 0.77 HR15N 1.13 HR15N 1.19 HR15N 1.13 HR15TW 1.13 HR15TW 1.23 HR15TW 1.33 HREW 1.37 HREW 1.29 HREW 36.08 HK 34.50 HV	Qualitest USA, LC/David L Ellis Co		DOD Midas, OEM and GIDEP Sourced Procedures  ASTM E18-08



## VI. Dimensional

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Shore Hardness Type - M Type - A Type - D	37.7 to 87.6 31.8 to 89.4 19.1 to 82.5	3.78 3.78 3.78	Shore M TB kit Shore A TB kit Rex D TBK	DOD Midas, OEM and GIDEP Sourced Procedures
Plug Gages*	(0.05 to 0.5) in (0.5 to 1) in (1 to 2.5) in (2.5 to 4) in (4 to 12) in	(6.5 + 2.6L) $\mu$ in (7.8 + 2.3L) $\mu$ in (10.4 + 4.6L) $\mu$ in (17.6 + 3L) $\mu$ in (13.1 + 7.7L) $\mu$ in	Pratt & Whitney Labmaster	OEM and GIDEP Sourced Procedures
Ring Gages*	(0.5 to 1) in (1 to 4) in (4 to 10) in	(9 + 19.6L) $\mu$ in (8.1 + 8.4L) $\mu$ in (11.3 + 10.7L) $\mu$ in		
Gage Blocks*	(0.05 to 1) in (1 to 4) in 6 in 10 in	(4 + 0.8L) $\mu$ in (3.1 + 1.7L) $\mu$ in 14.2 $\mu$ in 22.8 $\mu$ in		
Thread Plug Gages*	(0.05 to 1) in (1 to 2) in (2 to 12) in	100.3 $\mu$ in 101.4 $\mu$ in 132 $\mu$ in		
Thread Ring Gages*	(0.19 to 1) in (1 to 2) in (2 to 10) in	37.8 $\mu$ in 40.1 $\mu$ in 76.8 $\mu$ in		
Calipers	Up to 40 in	(324 + 8.49L) $\mu$ in		
OD Micrometers	Up to 12 in	(65.9 + 9.63L) $\mu$ in		
ID Micrometers	Up to 12 in	(66.3 + 9.53L) $\mu$ in		
Dial Indicators	Up to 4 in	(61.4 + 5.6L) $\mu$ in		
Test Indicators	Up to 0.06 in	(61.4 + 4.4L) $\mu$ in	Grade 2 Gage Blocks	
Height Gages	Up to 40 in	(324 + 8.49L) $\mu$ in		
Optical Length	0 to 50 mm	(1.94 + 0.005L) $\mu$ m	172-116 Glass Scale	
Protractor / Angle	(30 to 90) °	1.94 arc min	Angle Block Set	

## VII. Fluid Quantities

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (+)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
pH	4.01 pH 6.98 pH 10.03 pH	0.01 pH 0.02 pH 0.01 pH	pH Solutions	OEM and GIDEP Sourced Procedures
Viscosity @ 25 °C	7.239 cp 100.9 cp 498.1 cp 717.7 cp 4 595 cp 7 686 cp 200 050 cp	0.09 cp 1.03 cp 5.1 cp 7.4 cp 48 cp 79 cp 208 cp	Standard Solutions: S6 S60 D500 N350 S2000 D7500 S8000	
Conductivity Standard	2 µmhos/cm 10 µmhos/cm 100 µmhos/cm 1 000 µmhos/cm 1 400 µmhos/cm 10 000 µmhos/cm 100 000 µmhos/cm	0.24 µmhos/cm 1.2 µmhos/cm 14.4 µmhos/cm 120 µmhos/cm 178 µmhos/cm 2 162 µmhos/cm 8 029 µmhos/cm	Conductivity Solutions	

**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 calibration services in its laboratories and on-site 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. Capabilities denoted with an asterisk (\*) cannot be performed on-site.
4. This scope also applies to the laboratory's satellite sites at:
  - (1) **MEXICALI, B.C.** - Calle Sicilla y Gales No. 1763, Fracc. Villa Fontana, Mexicali, B.C. C.P.21180. Contact: Mauricio Garayzar. Tels: 01(686) 555-1660, 557-6117. Fax: 01(686) 555-1766, and
  - (2) **CD JUAREZ, CHIHUAHUA** - Blvd. Gomez Morin 9050-L8, Col. Partido Senecu, C.P. 32469, Tel 01(656) 687-2471, 648-1181 ventasjuarez@techmastermx.com mxl\_sales@techmastermx.com.

Only one certificate and scope of accreditation is issued with the corporate organization's address.
5. The use of (R) signifies an expression of the Resolution of the unit under test or monitoring device.
6. The use of (L) refers to Length in inches.
7. For surface plate flatness, (N) is the length of the surface plate in inches divided by 4.
8. This scope is part of and must be included with the Certificate of accreditation No. AC-1342.



Vice President