

International Accreditation Service, Inc.

CERTIFICATE OF ACCREDITATION

This is to signify that

INyMET

SALVATIERRA NO. 32-5, COL. SAN BARTOLO ATEPEHUACAN
D.F. 07730 MEXICO

Calibration Laboratory CL-101

has demonstrated compliance with the ANS/ISO/IEC Standard 17025:2005, *General criteria for the competence of testing and calibration laboratories*, and has been accredited commencing July 13, 2007, for the calibration discipline(s) listed in the approved scope of accreditation. The laboratory meets requirements of ANSI/NCSL Z540-1-1994, Part 1, and the IAS program requirements in the field of calibration.



Patrick V. McCullen
Vice President



C. P. Ramani, P.E.
President

(see attached scope of accreditation for measurement area or type of test, range or quantity, best measurement capability, technique reference, standard equipment or unique conditions)

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SCOPE OF ACCREDITATION

INyMET CL-101

INyMET
Salvatierra No. 32-5, Col. San Bartola Atepehuacan
D.F. 07730 Mexico

Javier Garcia
Quality Assurance Manager
+52-55-5754-3087

MEASUREMENT AREA	RANGE & RESOLUTION	BEST MEASUREMENT CAPABILITY ¹ (BMC) (±)	TECHNIQUE, REFERENCE STANDARD, EQUIPMENT
Calipers (Vernier and dial)	0-100 m/0,02 mm 0-1000 m/0,02 mm	15 µm 18 µm	Gauge blocks
Calipers (Digital-electronic)	0-150 mm/0,01 mm 0-300 mm/0,01 mm 0-600 mm/0,01 mm	8 µm 10 µm 25 µm	Gauge blocks
Outside Micrometers	0-25 m/0,001 mm 0-50 m/0,001 mm 0-25 mm/0,01 mm 0-50 mm/0,01 mm 0-300 mm/0,01mm	0.58 µm 0.8 µm 2.50 µm 9 µm 12 µm	Gauge
Inside Micrometer	5-25 mm/0,01 m 10-30 mm/0,01 mm	8 µm 8 µm	Gauge blocks & gauge block holder
Depth Micrometer	0-100 mm/0,01 mm	7.49 µm	Gauge blocks
Micrometer Head (Mechanical)	0-25 mm/0,01 mm 0-50 mm/0,01 mm	7 µm 9 µm	Gauge blocks

July 13, 2007
Commencement Date


C. P. Ramani, P.E.
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Height Gauges (Vernier & dial type)	0-300 mm/0,02 mm 0-600 mm/0,02 mm 0-1000 mm/0,02 mm	15 µm 18 µm 20 µm	Gauge blocks, long gauge blocks and electronic pick-up
Height Gauges (Digital-electronic)	0-600 mm/0,001 mm 0-1,000 mm/0,001 mm	2 µm 3,5 µm	Gauge blocks
Dial Indicators (Plunger type)	0-25 mm/0,001 mm (Electronic) 0-10 mm/0,01 mm (Mechanical) 0-100 mm/0,001 mm (Electronic)	1,5 µm 8 µm 2,6 µm	Gauge blocks
Dial Indicator (Lever type)	0-2 mm/0,01 mm 0-0,2 mm/0,002 mm	8µm 1,5 µm	Gauge blocks Electrical comparator
Electrical Comparator (Analogue/digital display)	0-50 mm/0,0001 mm	0,4 µm	Gauge blocks
Ends Standards	up to 25 mm >25 up to 50 mm >50 up to 100 mm >100 up to 200 mm >200 up to 500 mm	1 µm 1,5 µm 2 µm 2,2 µm 3,8 µm	Gauge blocks, long gauge blocks and electronic pick-up
Scales/Steel Rules/Steel Tapes	Up to 50 meters	(0,8 + 0,024L) mm, Where L is in meters	

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Bevel Protractor	0-360°/5 mins	3 mins	Angle gauges
Surface Plate	up to 1600 mm x 1000 mm	16.7 µm	Using precision level of 0.02 mm/m sensitivity
<i>Mechanical</i>			
Pressure Pressure Gauges	Up to 62,16 kPa Up to 250 in H ₂ O	0.022% of reading	Pressure calibrator DRUCK DPI 610LP Pressure Balance, PRESSUREMENTS T9000
	21 to 689,47 kPa) 3 to 100 psi g	0,012% reading	Pressure Balance, PRESSUREMENTS T2400/3
	(70 to 6894.7 kPa) 10 to 1000 psi g	0,014% reading	Pressure Balance, PRESSUREMENTS T2700/3LP
	(1380 to 68947,5 kPa) 200 to 10000 psi g	0,014% reading	Pressure Balance, PRESSUREMENTS M2200/3P
	(1380 to 13789,5 kPa) 200 to 2000 psi g	0,026% of full scale	Pressure Transducer, DRUCK PDCR2200-A145
	(7000 to 68947,5 kPa) 1000 to 10000 psi g	0,026% of full scale	Pressure Transducer, DRUCK PDCR220-A145
Vacuum and Pressure	(-96,5 to 2068,4 kPa) -14 to 300 psi	0,026% of full scale	Pressure Calibrator DRUCK 610

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Volume – Glass	Up to 50µL	1%	Electronic Balance, Ohaus Explorer, Mettler-Toledo AB-104 (Automatic Micropipette)
	>50µL up to 1 mL	0,27%	Electronic Balance, Ohaus Explorer, Mettler-Toledo AB-104 (Automatic Micropipette)
	>1 mL up to 100 mL	0,07%	Electronic Balance, Ohaus Explorer, Mettler-Toledo AB-104 (Glassware)
	>100 mL up to 4000 mL	0,16%	Electronic Balance, Sartorius BA4100S (Glassware)
	>4L up to 20 L	0,16%	Electronic Balance, Sartorius LC34000P (Glassware)

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Volume – Metal	>2L up to 20 L	0,017%	Electronic Balance, Sartorius LC34000P
	>20 L up to 200 L	0,02%	Electronic Balance, Sartorius LC34000P
	>200 L up to 5000 L	0,03%	Volumetric Standard INYMET 200 L
	>5000 up to 1 000 000 L	0,12%	Dual rotor turbine meter, Exact Flow EFM32DR-W-CAN-B-Y
	200 000 L to 50 000 000 L	±0,5% reading	Manual of Petroleum Measurement Standards, chap 4 Steel Tape Measure LUPFKIN 24 m Square STANLEY 45-600
Torque			
Torque Wrenches	0 to 25 Nm	0,075 Nm	25 Nm Transducer
	>25 to 160 Nm	0,48 Nm	160 Nm Transducer
Torque Analyser	>160 to 1000 Nm	3,0 Nm	1000 Nm Transducer
	0-1000 Nm	0.13% Reading	Balance Arms: 1m, 0,5m, 0,1m Mass sets: 1g to 5kg to 100 kg

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Temperature PRT	-38°C to 450°C	0,02°C	Thermometric Bridge ASL F300, RTD ROSEMOUNT 162CE and 25 Ω Resistor TINSLEY 5685 ^a
Thermocouples (J,K,T)	0°C to 1000°C	0,6°C	Au-Pt Thermocouple HART 5629 and Digital Multimeter PREMA 6001
Ovens & Furnaces	up to 600°C	1,5°C	ASTM D 5423 & D 5374 Standards (NMX-J-417-ANCE-2002 Standard), Energy Meter SOAR 2720 and Digital Thermometer HART 1560 with 10 T Thermocouples
Liquid in Glass Thermometer	-35°C to 200°C	0,13°C	Thermometric Bridge ASL F150 and RTD
IR Thermometers	0°C to 500°C	1,0 % reading	IR Calibrator HART 9132, Digital Thermometer HART 1560 and RTD HART 5618-9
Humidity – Measure and Generate	5 to 95 % R.H.	1,0 % R.H.	Thermometric Bridge ASL F250RH or Relative Humidity Indicator with 2 RTD's

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<i>Electromagnetics—DC/Low Frequency</i> DC Voltage – Generate	1 V 10 V	0,5 ppm 0,5 ppm	FLUKE 732A FLUKE 732A
	0 mV to 220 mV >220 mV to 2,2 V >2,2 V to 11 V >11 V to 22 V >22 V to 220 V >220 V to 1100 V 0 mV to 12 V	(8 ppm + 0,6 µV) (8.2 ppm + 1 µV) (7.6 ppm + 3,5 µV) (7 ppm + 6,5 µV) (8 ppm + 80 µV) (9 ppm + 500 µV) (0,004% reading + 0,004% range)	FLUKE 5700A FLUKE 5700A FLUKE 5700A FLUKE 5700A FLUKE 5700A FLUKE 5700A UNOMAT MCX

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DC Voltage – Measure	0 to 100 mV	(9 + 3)	HP 3458A
	>100 mV to 1 V	(6,5 + 0,3)	HP 3458A
	>1 V to 10 V	(6,3 + 0,05)	HP 3458A
	>10 V to 100 V	(10 + 0,3)	HP 3458A
	>100 V to 1000 V	(10 + 0,1)	HP 3458A
	>1 kV to 20 kV	2% reading	FLUKE 80K-40
	0 mV to 100 mV	(0,004% reading + 0,004% range)	UNOMAT MCX
>100 mV to 60 V	(0,01% reading + 0,006% range)	UNOMAT MCX	

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DC Current – Generate	0,1 nA to 2,2 mA	(50 ppm + 8 nA)	FLUKE 5700A
	>2,2 mA to 22 mA	(50 ppm + 80 nA)	FLUKE 5700A
	>22 mA to 220 mA	(60 ppm + 0,8 µA)	FLUKE 5700A
	>220 mA to 2,2 A	(80 ppm + 25 µA)	FLUKE 5700A
	>2,2 A to 11 A	(600 ppm + 330 µA)	FLUKE 5500A
>11 A to 20 A	(600 ppm + 4,8 mA)	WAVETEK/DATRON 9000	
>20 A to 1000 A	0,6% output	FLUKE 5500A W/100 turn coil	
0 to 24 mA	0,025% total scale	UNOMAT MCX	

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DC Current – Measure	0 to 100 nA	(30 + 400)	HP 3458A
	>100 nA to 1 µA	(20 + 40)	HP 3458A
	>1 µA to 100 µA	(20 + 10)	HP 3458A
	>100 µA to 10 mA	(20 + 5)	HP 3458A
	>10 mA to 100 mA	(35 + 5)	HP 3458A
	>100 mA to 1 A	(110 + 10)	HP 3458A
	>1 A to 100 A	0,01% reading	Guidline 9230/15 + HP 3458A Guidline 9230/100 + HP 3458A
	0 to 52 mA	(0,005% reading + 0,01% range)	UNOMAT MCX

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AC Current – Generate	1 nA to 220 µA 40 Hz to 1 kHz >1 kHz to 5 kHz >5 kHz to 10 kHz	(140 ppm + 16 nA) (600 ppm + 40 nA) (0,16% + 80 nA)	FLUKE 5700A FLUKE 5700A FLUKE 5700A
	220 µA to 2,2 mA 40 Hz to 1 kHz >1 kHz to 5 kHz >5 kHz to 10 kHz	(140 ppm + 35 nA) (600 ppm + 400 nA) (0,16% + 800 nA)	FLUKE 5700A FLUKE 5700A FLUKE 5700A
	>2,2 mA to 22 mA 40 Hz to 1 kHz >1 kHz to 5 kHz >5 kHz to 10 kHz	(140 ppm + 350 nA) (600 ppm + 4 µA) (0,16% + 8 µA)	FLUKE 5700A FLUKE 5700A FLUKE 5700A
	>22 mA to 220 mA 40 Hz to 1 kHz >1 kHz to 5 kHz >5 kHz to 10 kHz	(140 ppm + 3,5 µA) (600 ppm + 40 µA) (0,16% + 80 µA)	FLUKE 5700A FLUKE 5700A FLUKE 5700A

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AC Current – Generate	>220 mA to 2,2 A 20 Hz to 1 kHz	(650 ppm + 35 µA)	FLUKE 5700A FLUKE 5700A
	>1 kHz to 5 kHz >5 kHz to 10 kHz	(750 ppm + 80 µA) (0,85%+ 160 µA)	
	2,2 A to 11 A 45 Hz to 500 Hz >500 Hz to 1 kHz	(0,10% + 2 mA) (0,33% + 2 mA)	FLUKE 5500A FLUKE 5500A
	11 A to 20 A 10 Hz to 3 kHz >3 kHz to 10 kHz	(0,2% + 6,9 mA) (0,5% + 23 mA)	WAVETEK/DATRON 9000 WAVETEK/DATRON 9000
	20 A to 750 A @ 50/60 Hz	1% output	FLUKE 5500A w/100 turn coil

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AC Current – Measure	100 µA 45 Hz to 5 kHz	(% reading + % range) (0,06% + 0,03%)	HP 3458A
	1 mA to 100 mA 45 Hz to 100 Hz >100 Hz to 5 kHz	 (0,06% + 0,02%) (0,03% + 0,02%)	HP 3458A HP 3458A
	>100 mA to 1 A 45 Hz to 100 Hz >100 Hz to 5 kHz	 (0,08% + 0,02%) (0,10% + 0,02%)	HP 3458A HP 3458A
AC Voltage – Generate	2,2 mV to 22 mV 40 Hz to 20 kHz >20 kHz to 50 kHz >50 kHz to 100 kHz >100 kHz to 300 kHz >300 kHz to 500 kHz >500 kHz to 1 MHz	 (105 ppm + 5 µV) (370 ppm + 5 µV) (850 ppm + 7 µV) (0,11% + 13 µV) (0,17% + 25 µV) (0,34% + 25 µV)	FLUKE 5700A FLUKE 5700A FLUKE 5700A FLUKE 5700A FLUKE 5700A FLUKE 5700A

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AC Voltage – Generate	220 mV		
	40 Hz to 20 kHz	(105 ppm + 8 µV)	FLUKE 5700A
	>20 kHz to 50 kHz	(320 ppm + 8 µV)	FLUKE 5700A
	>50 kHz to 100 kHz	(850 ppm + 25 µV)	FLUKE 5700A
	>100 kHz to 300 kHz	(0,11% + 25 µV)	FLUKE 5700A
	>300 kHz to 500 kHz	(0,17% + 35 µV)	FLUKE 5700A
	>500 kHz to 1 MHz	(0,34% + 80 µV)	FLUKE 5700A
	2,2 V		
	40 Hz to 20 kHz	(75 ppm + 6 µV)	FLUKE 5700A
	>20 kHz to 50 kHz	(120 ppm + 16 µV)	FLUKE 5700A
	>50 kHz to 100 kHz	(250 ppm + 70 µV)	FLUKE 5700A
	>100 kHz to 300 kHz	(430 ppm + 130 µV)	FLUKE 5700A
	>300 kHz to 500 kHz	(0,105% + 350 µV)	FLUKE 5700A
	>500 kHz to 1 MHz	(0,22% + 850 µV)	FLUKE 5700A

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AC Voltage – Generate	22 V		
	40 Hz to 20 kHz	(75 ppm + 60 µV)	FLUKE 5700A
	>20 kHz to 50 kHz	(120 ppm + 160 µV)	FLUKE 5700A
	>50 kHz to 100 kHz	(250 ppm + 350 µV)	FLUKE 5700A
	>100 kHz to 300 kHz	(500 ppm + 1,5 mV)	FLUKE 5700A
	>300 kHz to 500 kHz	(0,125% + 4,3 mV)	FLUKE 5700A
	>500 kHz to 1 MHz	(0,27% + 8,5 mV)	FLUKE 5700A
	220 V		
	40 Hz to 20 kHz	(80 ppm + 0,8 mV)	FLUKE 5700A
	>20 kHz to 50 kHz	(220 ppm + 3,5 mV)	FLUKE 5700A
>50 kHz to 100 kHz	(500 ppm + 8 mV)	FLUKE 5700A	
>100 kHz to 300 kHz	(0,15% + 90 mV)	FLUKE 5700A	
>300 kHz to 500 kHz	(0,47% + 90 mV)	FLUKE 5700A	
>500 kHz to 1 MHz	(1,15% + 190 mV)	FLUKE 5700A	
1100 V			
50 Hz to 1 kHz	(80 ppm + 3,5 mV)	FLUKE 5700A	

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AC Voltage – Measure		(% reading + % range)	
	10 nV to 10 mV 40 Hz to 20 kHz	(0,03% + 0,011%)	HP 3458A
	>20 kHz to 50 kHz	(0,10% + 0,011%)	HP 3458A
	>50 kHz to 100 kHz	(0,50% + 0,011%)	HP 3458A
	>100 kHz to 300 kHz	(4,0% + 0,02%)	HP 3458A
	>10 mV to 10 V 40 Hz to 20 kHz	(0,014% + 0,002%)	HP 3458A
	>20 kHz to 50 kHz	(0,03% + 0,002%)	HP 3458A
	>50 kHz to 100 kHz	(0,08% + 0,002%)	HP 3458A
	>100 kHz to 300 kHz	(0,30% + 0,01%)	HP 3458A
	>300 kHz to 1 MHz	(1,0% + 0,01%)	HP 3458A

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AC Voltage – Measure	>10 V to 100 V 40 Hz to 20 kHz >20 kHz to 50 kHz >50 kHz to 100 kHz >100 kHz to 300 kHz >300 kHz to 1 MHz	(0,02% + 0,002%) (0,035% + 0,002%) (0,12% + 0,002%) (0,40% + 0,01%) (1,5% + 0,01%)	HP 3458A HP 3458A HP 3458A HP 3458A HP 3458A
	>100 V to 1000 V 40 Hz to 20 kHz >20 kHz to 50 kHz >50 kHz to 100 kHz 1 kV to 20 kV @ 60 Hz	(0,06% + 0,002%) (0,12% + 0,002%) (0,30% + 0,002%) 5% reading	HP 3458A HP 3458A HP 3458A FLUKE 80K-40

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MEASUREMENT AREA	RANGE & RESOLUTION	BEST MEASUREMENT CAPABILITY ¹ (BMC) (±)	TECHNIQUE, REFERENCE STANDARD, EQUIPMENT
Resistance – Generate	1Ω	8.02 ppm	FLUKE 742A-1
	10Ω	2 ppm	FLUKE 742A-10
	1 kΩ	2 ppm	FLUKE 742A-1k
	10 kΩ	2 ppm	FLUKE 742A-10k
	(0,1 Ω to 10 Ω)	(15 + 5)	HP 3458A w/Decade Resistors: Guildline 9347/1 MΩ
	(10 Ω to 100 Ω)	(12 + 5)	HP 3458A w/Decade Resistors: Guildline 9347/1 MΩ
	(100 Ω to 100 kΩ)	(10 + 0,5)	HP 3458A w/Decade Resistors: Guildline 9347/1 MΩ
	(100 kΩ to 1 MΩ)	(15 + 2)	HP 3458A w/Decade Resistors: Guildline 9347/1 MΩ

July 13, 2007

Commencement Date



C. P. Ramani, P.E.

President

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Resistance – Generate	(1 MΩ to 10 MΩ)	(50 + 10)	HP 3458A w/Decade Resistors: Guildline 9347/1 GΩ
	(10 MΩ to 100 MΩ)	(500 + 10)	HP 3458A w/Decade Resistors: Guildline 9347/1 GΩ
	(100 MΩ to 1 GΩ)	(0,5% + 10)	HP 3458A w/Decade Resistors: Guildline 9347/1 GΩ
	(0,1 Ω to 1 Ω)	0,1% setting	(range is per decade) Decade Resistors: Guildline 9347/1 MΩ
	(1 Ω to 1 MΩ)	0,01% setting	Decade Resistors: Guildline 9347/1 MΩ
	(1 MΩ to 1 GΩ)	0,1% setting	Decade Resistors: Guildline 9347/1 MΩ
Resistance – Measure	(0,01 Ω to 0,1 Ω)	7% setting	Decade Resistors ESI DB62 (10kΩ-10 MΩ)
	(0,1 Ω to 1 Ω)	0,7% setting	Decade Resistors ESI DB62 (10kΩ-10 MΩ)
	(1 Ω to 10 Ω)	0,10% setting	Decade Resistors ESI DB62 (10kΩ-10 MΩ)
	(10 Ω to 100 Ω)	0,04% setting	Decade Resistors ESI DB62 (10kΩ-10 MΩ)
	(100 Ω to 10 MΩ)	0,03% setting	Decade Resistors ESI DB62 (10kΩ-10 MΩ)
			(ppm reading + ppm range)
	0,1 Ω to 10 Ω	(566 + 5)	HP 3458A
	>10 Ω to 100 Ω	(20 + 5)	HP 4589A
	>100 Ω to 100 kΩ	(10 + 0,5)	HP 3458A

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<i>Cont.</i>	>100 kΩ to 1 MΩ >1 MΩ to 10 MΩ >10 MΩ to 100 MΩ >100 MΩ to 1 GΩ	(15 + 2) (50 + 10) (500 + 10) (0.5% + 10)	HP 3458A HP 3458A HP 3458A HP 3458A
Capacitance – Generate	up to 10 nF >10 up to 100 nF >100 nF	0,06% setting + 5 pF 0,05% setting + 46 pF 0,05% setting + 454 pF	Decade Capacitor General Radio 1413
Inductance – Generate	1 mH to 11,111 H	2% setting @ 1 kHz	Decade Inductor General Radio 1491-G
<i>Time and Frequency</i> Frequency – Measure, Pulse Signal	>100 Hz to 500 MHz >100 Hz to 500 MHz	$4,7 \times 10^{-11}$ $2,0 \times 10^{-9}$	HP 5351B or HP 5335A or HP 5345A + HP 58503A Frequency Counters + GPS Time Base HP 5351B or HP 5335A or HP 5345A + HP 105B Frequency Counters + Quartz Oscillator
Frequency – Measure Sine, Square Pulse	1 mHz to 100 Hz 1 mHz to 100 Hz	$1,5 \times 10^{-4}$ $2,5 \times 10^{-5}$	HP 5351B or HP 5335A or HP 5345A + HP 58503A Frequency Counters + GPS Time Base

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Frequency – Measure, Square Signal	>100 Hz to 1 kHz	$3,7 \times 10^{-7}$	HP 5351B or HP 5335A or HP 5345A + HP 58503A Frequency Counters + GPS Time Base
	>1 kHz to 500 MHz	$4,7 \times 10^{-11}$	HP 5351B or HP 5335A or HP 5345A + HP 58503A Frequency Counters + GPS Time Base
	1 mHz to 1 Hz	$3,0 \times 10^{-6}$	HP 5351B or HP 5335A or HP 5345A + HP 105B Frequency Counters + Quartz Oscillator
	>1 Hz to 1 kHz	$3,7 \times 10^{-7}$	HP 5351B or HP 5335A or HP 5345A + HP 105B Frequency Counters + Quartz Oscillator
	>1 kHz to 500 MHz	$2,0 \times 10^{-9}$	HP 5351B or HP 5335A or HP 5345A + HP 105B Frequency Counters + Quartz Oscillator

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Frequency – Measure, Sinusoidal Signal	>100 Hz to 1 kHz	$1,9 \times 10^{-9}$	HP 5351B or HP 5335A or HP 5345A + HP 58503A Frequency Counters + GPS Time Base
	>1 kHz to 1 MHz	$4,3 \times 10^{-10}$	HP 5351B or HP 5335A or HP 5345A + HP 58503A Frequency Counters + GPS Time Base
	>1 to 100 MHz	$1,9 \times 10^{-11}$	
	>100 to 500 MHz	$3,7 \times 10^{-11}$	
1 mHz to 1 Hz	$3,0 \times 10^{-3}$	HP 5351B or HP 5335A or HP 5345A + HP 105B Frequency Counters + Quartz Oscillator	
	>1 Hz to 1 kHz	$3,0 \times 10^{-6}$	HP 5351B or HP 5335A or HP 5345A + NP 105B Frequency Counters + Quartz Oscillator
Frequency – Measure, Sinusoidal Signal	>1 kHz to 500 MHz	$4,7 \times 10^{-9}$	HP 5351B or HP 5335A or HP 5345A + HP 105B Frequency Counters + Quartz Oscillator

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Frequency – Generate Pulse, Sinusoidal and Square Signals	1 mHz to 500 MHz	$4,3 \times 10^{-11}$	HP 8673B or HP 3325A or HP 3325B or HP 8663A or Tek TG501 + HP 58503A Synthesized Frequency/Waveform Generator/Time Mark Generator + GPS Time Base
	1 mHz to 500 MHz	$3,0 \times 10^{-10}$	HP 8673B or HP 3325A or HP 3325B or HP 8663A or Tek TG501 + HP 105 B Synthesized Frequency/Waveform Generator/Time Mark Generator + Quartz Oscillator
Period – Measure Pulse Signal	1,25 ns to 1000 s	$4,7 \times 10^{-11}$	HP 5345A or HP 5335A + HP 58503A Period Counters + GPS Time Base
	1,25 ns to 1000 s	$2,0 \times 10^{-9}$	HP 5345A or HP 5335a + HP 105B Period Counters + Quartz Oscillator

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Period – Measure Square Signal	>1 s to 1,000 s	$3,0 \times 10^{-4}$	HP 5345A or HP 5335A + HP 58503A Period Counters + GPS Time Base
	> 1 ms to 1 s	$3,0 \times 10^{-7}$	HP 5345A or HP 5335A + HP 58503A Period Counters + GPS Time Base
	1.25 ns to 1 ms	$4,7 \times 10^{-11}$	HP 5345A or HP 5335A + HP 58503A Period Counters + GPS Time Base
	>1 s to 1,000 s	$3,0 \times 10^{-4}$	HP 5345A or HP 5335A + HP 105B Period Counters + Quartz Oscillator
	>1 ms to 1 s	$3,0 \times 10^{-7}$	HP 5345A or HP 5335A + HP 105B Period Counters + Quartz Oscillator
	1.25 ns to 1 ms	$2,0 \times 10^{-9}$	HP 5345A or HP 5335A + HP 105B Period Counters + Quartz Oscillator
Period – Measure Sinusoidal Signal	>1 s to 1,000 s	$2,8 \times 10^{-3}$	HP 5345A opr HP 5335A + HP 58503A Period Counters + GPS Time Base

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Period – Measure Sinusoidal Signal	>1 ms to 1 s	$3,0 \times 10^{-6}$	HP 5345A or HP 5335A + HP 58503A Period Counters + GPS Time Base
	1.25 ns to 1 ms	$6,1 \times 10^{-11}$	HP 5345A or HP 5335A + HP 58503A Period Counters + GPS Time Base
	>1 ms to 1,000 s	$3,0 \times 10^{-3}$	HP 5345A or HP 5335A + HP 105B Period Counters + Quartz Oscillator
	>1 ms to 1 s	$3,0 \times 10^{-6}$	HP 5345A or HP 5335A + HP 105B Period Counters + Quartz Oscillator
	1.25 ns to 1 ms	$2,0 \times 10^{-9}$	HP 5345A or HP 5335A + HP 105B Period Counters + Quartz Oscillator

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Period – Generate Pulse, Sinusoidal and Square Signals	1 ns to 1,000 s	$4,3 \times 10^{-11}$	HP 3325A or HP 3325B or HP 8663A or Tek TG50-1 + HP 58503A Synthesized Frequency/Waveform Generator/Time Mark Generator + GPS Time Base
	1000 s to 1 ns	$3,0 \times 10^{-10}$	HP 3325A or HP 3325B or HP 8663A or Tek TG501 + HP 105B Synthesized Frequency/Waveform Generator/Time Mark Generator + Quartz Oscillator
Time Interval – Measure	1,25 ns to 86400 s	$5,8 \times 10^{-11}$	HP 5345A or HP 5335A + HP 58503A TI Counters + GPS Time Base
	1,25 ns to 86400 s	$2,5 \times 10^{-9}$	HP 5345A or HP 5335A + HP 105B TI Counters + Quartz Oscillator

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Time Interval – Generate	1,25 ns to 86400 s	$4,3n \times 10^{-11}$	HP 3325A or HP 3325B or HP 8663A or Tek TG501 or INYMET C/G86400 + HP 58503A Synthesized Frequency/Waveform Generator/Time Mark Generator/Pulse Generator + GPS time Base
	1,25 ns to 86400 s	$3,0 \times 10^{-10}$	HP 3325A or HP 3325B or HP 8663A or Tek TG501 or INYMET C/G86400n + HP 105B Synthesized Frequency/Waveform Generator/Time Mark Generator/Pulse Generator + Quartz Oscillator
Timers – Measure	Up to 36,000 s	0,58 mS	HP 5335A or 5345A + HP 58503A GPS
Power at Low Frequency – Measure	-40 dBm to +30 dBm 10 Hz to 1 MHz @ 50 Ω	0,01 dBm	FLUKE 8506A
	-40 dBm to +30 dBm 10 Hz to 1 MHz @ 75 Ω	0,01 dBm	FLUKE 8506A
Power at Low Frequency – Measure	-40 dBm to +30 dBm 10 Hz to 1 MHz @ 600Ω	0,01 dBm	FLUKE 8506A

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Power at Low Frequency – Generate	-40 dBm to +30 dBm 10 Hz to 1 MHz @ 50Ω	0,01 dBm	FLUKE 5700A
	-40 dBm to +30 dBm 10 Hz to 1 MHz @ 75Ω	0,01 dBm	FLUKE 5700A
	-40 dBm to +30 dBm 10 Hz to 1 MHz @ 600Ω	0,01 dBm	FLUKE 5700A
Bandwidth – Measure	DC to 500 mHz	5%	Tek CG5011 or Tek PG506 or Tek SG503 or Tek SG504 + HP 5335A Calibration Generators/Wide Band Generators + Frequency Counter
<i>RF/Microwave and Electromagnetics</i> Frequency – Measure, Pulse Signal	>500 MHz to 18 GHz	$4,7 \times 10^{-11}$	HP 5351B or HP 5335A or HP 5345A + HP 58503A Frequency Counters + GPS Time Base
	>500 MHz to 18 GHz	$2,0 \times 10^{-9}$	HP 5351B or HP 5335A or HP 5345A + HP 105B Frequency Counters + Quartz Oscillator

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Frequency – Measure, Square Signal	>500 MHz to 18 GHz	$4,7 \times 10^{-11}$	HP 5351B or HP 5335A or HP 5345A + HP 58503A Frequency Counters + GPS Time Base
	>500 MHz to 18 GHz	$2,0 \times 10^{-9}$	HP 5351B or HP 5335A or HP 5345A + HP 105B Frequency Counters + Quartz Oscillator
Frequency – Measure, Sinusoidal Signal	>500 MHz to 18 GHz	$4,7 \times 10^{-11}$	HP 5351B or HP 5335A or HP 5345A + HP 58503A Frequency Counters + GPS Time Base
	>500 MHz to 18 GHz	$2,0 \times 10^{-9}$	HP 5351B or HP 5335A or HP 5345A + HP 105B Frequency Counters + Quartz Oscillator

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Frequency – Generate Pulse, Sinusoidal and Square Signals	>500 MHz to 18 GHz	$4,3 \times 10^{-11}$	HP 8673B or HP 3325A or HP3325B or HP 8663A or Tek TG501 + HP 58503A Synthesized Frequency/Waveform Generator/Time Mark Generator + GPS Time Base
	>500 MHz to 18 GHz	$3,0 \times 10^{-10}$	HP 8673B or HP 3325A or HP 3325B or HP 8663A or Tek TG501 + HP 105B Synthesized Frequency/Waveform Generator/Time Mark Generator + Quartz Oscillator
RF Power – Measure	-60 dBm to -30 dBm 10 MHz to 18 GHz	0,32 dBm	HP 436A + HP 8481D Power Meter + Sensor Head or 8901B + 8481D
	-20 dBm to +20 dBm 10 MHz to 4,2 GHz	0,1 dBm	HP 436A + HP 8482A Power Meter + Sensor Head
	-30 dBm to +20 dBm 50 MHz to 18 GHz	0,2 dBm	HP 436A + HP 8485A Power Meter + Sensor Head

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Bandwidth – Measure	>500 mHz to 18 GHz	5%	Tek CG5011 or Tek PG506 or Tek SG503 or Tek SG504 + HP 5335A Calibration Generators/Wide Band Generators + Frequency Counter
	> 1 GHz to 2,5 GHz	0,2 dBm	HP 8663A + HP 436A + HP 8482A Synthesizer + Power Meter + Sensor Head
<i>Optical Radiation</i> Optical Power – Measure	-70 dBm to +10 dBm 1330 nm y 1550 nm	0,2 dBm	W&G OLA-25 + W&G OLP-25 Optical Power Attenuator + Optical Power Meter
Optical Power – Generate	-70 dBm to +10 dBm 1330 nm y 1550 nm	0,2 dBm	W&G OLS-25 + W&G OLA-25 + W&G OLP-25 Optical Power Generator + Optical Power Attenuator + Optical Power Meter

¹ “Best Measurement Capability” is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or of nearly ideal measuring instruments. Best Measurement Capabilities are expressed as uncertainties at approximately the 95% level of confidence, usually using a coverage factor of $k=2$. The measurement uncertainty of a specific calibration performed by the laboratory may be greater than the least uncertainty due to the behavior of the customer’s device, to the environment (if the calibration is performed in the field), and to influences from the circumstances of the specific calibration.

NOTE: Calibration parameters are performed primarily on-site at customer locations. The uncertainty of scale/balance calibration is highly dependent on local conditions, such as scale resolution and sensitivity, scale cleanliness, local gravity, temperature and humidity, dust, vibration, etc.; therefore, any statement of uncertainty is misleading. The class of the best weights used by the laboratory is shown in the Technique column. Use of weights in combination, whether in the same class or different classes, will increase measurement uncertainty resulting from the additive effect of weight tolerances, as defined in ASTM E 617.

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