



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

KALIBRIXCAL S.A. DE C.V. A TRESICAL COMPANY  
Av. Colinas del Cimatario No 381,  
Col. Colinas del Cimatario  
CP 76090, Santiago de Querétaro, Querétaro, México  
Alejandro Maturino Raya Phone: 52 442 2480250

CALIBRATION

Valid To: December 31, 2020

Certificate Number: 4872.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1, 8</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2, 4</sup> (±)	Comments
Cylindrical Gages – Plain Rings  Class X, Y, Z, ZZ, or Unmarked	(2 to 200) mm	(0.5 + 0.0017L) μm	Method: direct comparison  Master reference(s): ULM, ring gages
Cylindrical Gages – Plain Plugs, Discs, Pins  Class X, Y, Z, ZZ, or Unmarked	Up to 20 mm (>20 to 200) mm	0.5 μm (0.5 + 0.0024L) μm	Method: direct comparison  Master reference(s): ULM, gage blocks

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
Pitch Diameter (External) – Straight Thread, Taper Threads	(1 to 100) mm	1.4 μm	Method: direct comparison  Master reference(s): ULM, gage blocks, thread wires
Pitch Diameter (Internal) – Straight Thread, Taper Threads	(2.6 to 100) mm	2.0 μm	Method: direct comparison  Master reference(s): ULM, ring gages, spheres
Shims, Snap, Thickness Gages	Up to 10 mm (1 to 100) mm	0.5 μm 0.9 μm	Method: direct comparison  Master reference(s): ULM, gage blocks
End Rods/Standards, Micrometer Setting Standards	(25 to 600) mm	$(0.33 + 0.002L)$ μm	Method: direct comparison  Master reference(s): ULM, gage blocks
Bore Gages <sup>3</sup>	(2 to 500) mm	$(2 + 0.01L)$ μm	Method: direct comparison  Master reference(s): ULM, gauge blocks, ring gages

Parameter/Equipment	Range	CMC <sup>2,4</sup> ( $\pm$ )	Comments
Micrometers <sup>3</sup> – Outside, Interior, Depth	Up to 600 mm	$(1.4 + 0.005L) \mu\text{m}$	Method: direct comparison Master reference(s): gage blocks, step gage
Calipers <sup>3</sup>	Up to 1016 mm	$(8 + 0.008L) \mu\text{m}$	Method: direct comparison Master reference(s): gage blocks, step gage, ring gage
Length Indicator (Dial, Test, LVDT, Transducer)	Up to 102 mm (Resolution of 0.001 mm)	$(1.0 + 0.03L) \mu\text{m}$	Method: direct comparison Master reference(s): gage blocks, indicator calibrator
Height Gages <sup>3</sup>	Up to 600 mm	$(1.7 + 0.005L) \mu\text{m}$	Method: direct comparison Master reference(s): step gage, gage blocks
Squares	Up to 500 mm	$(5.7 + 0.0059L) \mu\text{m}$	Method: direct comparison Master reference(s): master square, LVDT
Splines – Internal	Up to 100 mm	2.9 $\mu\text{m}$	Method: direct comparison Master reference(s): ULM, spheres, ring gages
External	Up to 100 mm	2.3 $\mu\text{m}$	

Parameter/Equipment	Range	CMC <sup>2, 4, 5, 6</sup> ( $\pm$ )	Comments
Surface Plate Flatness <sup>3</sup>	(160 x 100) mm to (3658 x 1828) mm	$(2.0 + 0.003D) \mu\text{m}$	Method: differential level
Optical Comparators <sup>3</sup> –			
Length	X = 250 mm Y = 250 mm	$(2.3 + 0.01L) \mu\text{m}$	Method: direct comparison
Amplification	5X, 10X, 20X	0.018 % of reading	Master reference(s): master glass scales
Angle	(0 to 360) <sup>o</sup>	2.3"	

Parameter/Equipment	Range	CMC <sup>2, 4</sup> ( $\pm$ )	Comments
Fixtures and Functional Gages (X,Y) and Sieves	Up to 200 mm	$(2.7 + 0.0011L) \mu\text{m}$	Method: direct comparison  Master reference(s): Vision System Tesa V-200gl
Fixtures and Functional Gages- Angle	0 to 360 <sup>o</sup>	0.04 <sup>o</sup>	Method: direct comparison  Master reference(s): Vision System Tesa V-200gl
Fixtures and Functional Gages	Up to 600mm	$(3.0 + 0.0052L) \mu\text{m}$	Method: direct comparison  Master reference(s): Llear Height Gauge

Parameter/Equipment	Range	CMC <sup>2</sup> (±)		Comments
Gage Blocks –				
Steel	(0.5 to 10.16) mm (10.16 to 25.4) mm (25.4 to 50.8) mm (50.8 to 76.2) mm (76.2 to 101.6) mm	<i>lc</i> 0.043 μm 0.050 μm 0.068 μm 0.091 μm 0.12 μm	<i>v</i> 0.017 μm 0.018 μm 0.023 μm 0.028 μm 0.034 μm	Master reference(s): Tesa gage block comparator, gage blocks
Ceramic	(0.5 to 10.16) mm (10.16 to 25.4) mm (25.4 to 50.8) mm (50.8 to 76.2) mm (76.2 to 101.6) mm	0.045 μm 0.051 μm 0.069 μm 0.092 μm 0.12 μm	0.021 μm 0.023 μm 0.027 μm 0.034 μm 0.042 μm	<i>lc</i> = uncertainty at the reference point <i>v</i> = uncertainty on parallelism (variation in length)
Carbide	(0.5 to 10.16) mm (10.16 to 25.4) mm (25.4 to 50.8) mm (50.8 to 76.2) mm (76.2 to 101.6) mm	0.044 μm 0.051 μm 0.068 μm 0.10 μm 0.13 μm	0.017 μm 0.018 μm 0.023 μm 0.028 μm 0.035 μm	
Long Gage Blocks – Materials	(102 to 150) mm (150 to 200) mm (200 to 250) mm (250 to 300) mm (300 to 400) mm (400 to 508) mm	0.33 μm 0.40 μm 0.47 μm 0.51 μm 0.63 μm 0.75 μm	0.11 μm 0.11 μm 0.13 μm 0.15 μm 0.20 μm 0.24 μm	Master reference(s): ULM. gage blocks

## II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
DC Voltage – Generate	0 mV to <0.33 V (0.33 to <3.3) V (3.3 to <33) V (33 to <330) V (330 to 1000) V	15 ppm + 1 μV 9.5 ppm + 2 μV 11 ppm + 20 μV 15 ppm + 150 μV 14 ppm + 1500 μV	Fluke 5520A
DC Voltage – Measure	(10 to <100) mV (0.1 to <1) V (1 to <10) V (10 to <100) V (100 to 1000) V	9 ppm + 0.5 μV 8 ppm + 1.6 μV 8 ppm + 13 μV 10 ppm + 150 μV 10 ppm + 1.5 mV	Agilent 3458A

Parameter/Equipment	Range	CMC <sup>2,7</sup> ( $\pm$ )	Comments
DC Current – Generate	(33 to <330) $\mu$ A (0.33 to <3.3) mA (3.3 to <33) mA (33 to <330) mA (0.33 to <1.1) A (1.1 to <3) A (3 to <11) A (11 to 20) A	110 ppm + 0.02 $\mu$ A 85 ppm + 0.05 $\mu$ A 90 ppm + 0.25 $\mu$ A 90 ppm + 2.5 $\mu$ A 160 ppm + 40 $\mu$ A 290 ppm + 40 $\mu$ A 380 ppm + 0.50 mA 740 ppm + 0.75 mA	Fluke 5520A
Clamp	(20 to <55) A (55 to <150) A (150 to <550) A (550 to <1000) A	0.20 % + 2 mA 0.20 % + 15 mA 0.20 % + 50 mA 0.20 % + 50 mA	Fluke 5520A with 50 turn coil
DC Current – Measure	(10 to <100) nA (0.1 to <1) $\mu$ A (1 to <10) $\mu$ A (10 to <100) $\mu$ A (0.1 to <1) mA (1 to <10) mA (10 to <100) mA 0.1 mA to 1 A	30 ppm + 47 pA 20 ppm + 50 pA 20 ppm + 150 pA 20 ppm + 1.2 nA 20 ppm + 9 nA 20 ppm + 90 nA 35 ppm + 1.1 $\mu$ A 110 ppm + 25 $\mu$ A	Agilent 3458A
DC Power – Generate	0.010 89 mW to <336.6 W 336.6 W to <3.06 kW (3.06 to 20.4) kW	0.018 % 0.017 % 0.055 %	Fluke 5520A
Resistance – Generate	(1.1 to <11) $\Omega$ (11 to <33) $\Omega$ (33 to <110) $\Omega$ (110 to <330) $\Omega$ (0.33 to <1.1) k $\Omega$ (1.1 to <3.3) k $\Omega$ (3.3 to <11) k $\Omega$ (11 to <33) k $\Omega$ (33 to <110) k $\Omega$ (110 to <330) k $\Omega$ (0.33 to <1.1) M $\Omega$ (1.1 to <3.3) M $\Omega$ (3.3 to <11) M $\Omega$ (11 to <33) M $\Omega$ (33 to <110) M $\Omega$ (110 to <330) M $\Omega$ (0.33 to 1.1) G $\Omega$	5 ppm + 0.001 $\Omega$ 15 ppm + 0.0015 $\Omega$ 21 ppm + 0.0014 $\Omega$ 22 ppm + 0.002 $\Omega$ 22 ppm + 0.002 $\Omega$ 22 ppm + 0.02 $\Omega$ 22 ppm + 0.02 $\Omega$ 22 ppm + 0.2 $\Omega$ 22 ppm + 0.2 $\Omega$ 26 ppm + 2 $\Omega$ 21 ppm + 2 $\Omega$ 44 ppm + 30 $\Omega$ 95 ppm + 50 $\Omega$ 180 ppm + 2.5 k $\Omega$ 380 ppm + 3 k $\Omega$ 0.23 % + 0.1 M $\Omega$ 1.1 % + 0.5 M $\Omega$	Fluke 5520A

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Resistance – Measure	(1 to <10) Ω (10 to <100) Ω (0.1 to <1) kΩ (1 to <10) kΩ (10 to <100) kΩ (0.1 to <1) MΩ (1 to <10) MΩ (10 to <100) MΩ (0.1 to <1) GΩ	15 ppm + 90 μΩ 12 ppm + 0.80 mΩ 10 ppm + 1.5 mΩ 10 ppm + 15 mΩ 10 ppm + 0.70 Ω 15 ppm + 5 Ω 50 ppm + 0.2 kΩ 0.05 % + 9 kΩ 0.6 % + 1 kΩ	Agilent 3458A

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Voltage – Generate			
(3.3 to <33) mV	45 Hz to 10 kHz	100 ppm + 6 μV	Fluke 5520A
(33 to <330) mV	45 Hz to <10 kHz (10 to <20) kHz (20 to <50) kHz	110 ppm + 8 μV 120 ppm + 8 μV 270 ppm + 8 μV	
(0.33 to <3.3) V	45 Hz to <10 kHz (10 to <20) kHz (20 to <50) kHz (50 to <100) kHz	120 ppm + 60 μV 150 ppm + 60 μV 230 ppm + 50 μV 550 ppm + 130 μV	
(3.3 to < 33) V	45 Hz to <10 kHz (10 to <20) kHz (20 to <50) kHz (50 to 100) kHz	120 ppm + 0.60 mV 190 ppm + 0.60 mV 280 ppm + 0.60 mV 680 ppm + 1.6 mV	
(33 to <330) V	45 Hz to <1 kHz (1 to <10) kHz (10 to <20) kHz	150 ppm + 2 mV 160 ppm + 6 mV 200 ppm + 6 mV	
(330 to <1000) V	45 Hz to <1 kHz (1 to <5) kHz (5 to 10) kHz	240 ppm + 10 mV 200 ppm + 10 mV 240 ppm + 10 mV	

Parameter/Range	Frequency	CMC <sup>2,7</sup> ( $\pm$ )	Comments
AC Voltage – Measure			
(1 to <10) mV	(1 to 40) Hz 40 Hz to <1 kHz (1 to <20) kHz (20 to <100) kHz	0.035 % + 4 $\mu$ V 0.030 % + 1.6 $\mu$ V 0.040 % + 1.7 $\mu$ V 0.12 % + 8 $\mu$ V	Agilent 3458A
(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	75 ppm + 6 $\mu$ V 75 ppm + 3 $\mu$ V 0.020 % + 4 $\mu$ V 0.035 % + 7 $\mu$ V 0.082% + 15 $\mu$ V 0.3 % + 60 $\mu$ V 1.0 % + 170 $\mu$ V	
(0.1 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 1 MHz	70 ppm + 60 $\mu$ V 70 ppm + 30 $\mu$ V 0.014 % + 40 $\mu$ V 0.030 % + 70 $\mu$ V 0.081 % + 150 $\mu$ V 0.3 % + 0.6 mV 1.0 % + 2 mV	
(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	70 ppm + 0.60 mV 70 ppm + 0.30 mV 0.016 % + 0.40 mV 0.030 % + 0.70 mV 0.081 % + 1.5 mV 0.3 % + 6 mV 1.0 % + 20 mV	
(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	0.020 % + 8 mV 0.021 % + 5 mV 0.021 % + 5 mV 0.035 % + 8 mV 0.12 % + 20 mV 0.40 % + 70 mV 1.5 % + 150 mV	
(100 to 700) V	(1 to 40) Hz 40 Hz to <1 kHz (1 to <20) kHz (20 to <50) kHz (50 to <100) kHz	0.040 % + 0.12 V 0.040 % + 0.08 V 0.060 % + 0.11 V 0.12 % + 0.21 V 0.30 % + 0.40 V	



Parameter/Range	Frequency	CMC <sup>2,7</sup> ( $\pm$ )	Comments
AC Current – Generate			
(33 to <330) $\mu$ A	(20 to <45) Hz 45 Hz to <1 kHz (1 to <5) kHz (5 to 10) kHz	0.11% + 0.1 $\mu$ A 0.090 % + 0.1 $\mu$ A 0.22 % + 0.15 $\mu$ A 0.62 % + 0.2 $\mu$ A	Fluke 5520A
(0.33 to <3.3) mA	(20 to <45) Hz 45 Hz to <1 kHz (1 to <5) kHz (5 to 10) kHz	0.094 % + 0.15 $\mu$ A 0.076 % + 0.15 $\mu$ A 0.16 % + 0.20 $\mu$ A 0.37 % + 0.30 $\mu$ A	
(3.3 to <33) mA	(20 to <45) Hz 45 Hz to <1 kHz (1 to <5) kHz (5 to 10) kHz	0.069 % + 2 $\mu$ A 0.030 % + 2 $\mu$ A 0.060 % + 2 $\mu$ A 0.15 % + 3 $\mu$ A	
(33 to <330) mA	(20 to <45) Hz 45 Hz to <1 kHz (1 to <5) kHz (5 to 10) kHz	0.070 % + 20 $\mu$ A 0.030 % + 20 $\mu$ A 0.072 % + 50 $\mu$ A 0.15 % + 0.1 mA	
(0.33 to <1.1) A	(10 to <45) Hz 45 Hz to <1 kHz (1 to <5) kHz	0.14 % + 0.1 mA 0.037 % + 0.1 mA 0.45 % + 1 mA	
(1.1 to <3) A	(10 to <45) Hz 45 Hz to <1 kHz (1 to <5) kHz	0.14 % + 0.1 mA 0.045 % + 0.1 mA 0.45 % + 1 mA	
(3 to <11) A	(45 to < 100) Hz 100 Hz to < 1 kHz (1 to 5) kHz	0.043 % + 2 mA 0.074 % + 2 mA 2.3 % + 2 mA	
(11 to 20) A	(45 to < 100) Hz 100 Hz to < 1 kHz (1 to 5) kHz	0.085 % + 5 mA 0.11 % + 5 mA 2.3 % + 5 mA	
Clamp			
(20 to <55) A (55 to <150) A (150 to <550) A (550 to <1000) A	(45 to 65) Hz	0.24 % + 3 mA 0.24 % + 25 mA 0.25 % + 90 mA 0.25 % + 90 mA	Fluke 5520A with 50 turn coil

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Current – Measure			
(10 to <100) µA	(20 to <45) Hz (45 to <100) Hz 100 Hz to 1 kHz	0.15 % + 60 nA 0.07 % + 40 nA 0.07 % + 40 nA	Agilent 3458A
(0.1 to <1) mA	(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	0.15 % + 0.50 µA 0.061 % + 0.32 µA 0.031 % + 0.28 µA 0.061 % + 0.32 µA 0.40 % + 1.1 µA 0.55 % + 2.6 µA	
(1 to <10) mA	(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	0.15 % + 4.5 µA 0.061 % + 3.2 µA 0.031 % + 2.8 µA 0.061 % + 3.2 µA 0.40 % + 11 µA 0.55 % + 26 µA	
(10 to <100) mA	(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	0.15 % + 45 µA 0.061 % + 32 µA 0.031 % + 28 µA 0.061 % + 32 µA 0.40 % + 0.11 mA 0.55 % + 0.26 mA	
(0.1 to <1) A	(20 to <45) Hz (45 to <100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.16 % + 0.45 mA 0.080 % + 0.35 mA 0.10 % + 0.35 mA 0.30 % + 0.65 mA 1.0 % + 1.5 mA	
AC Power – Generate			
(PF = 1)			Fluke 5520A
(0.108 9 to <2.97) mW	(45 to 65) Hz	0.13 %	
(2.97 to <10.89) mW		0.080 %	
(10.89 to <29.7) mW		0.11 %	
(29.7 to <108.9) mW		0.077 %	
108.9 mW to <0.297 W		8.2 mW	
(0.297 to <0.726) W		8.2 mW	
(0.726 to <1.485) W		8.2 mW	

Parameter/Range	Frequency	CMC <sup>2,7</sup> (±)	Comments
AC Power – Generate (cont)			Fluke 5520A
(PF = 1)			
(1.485 to <6.6) W	(45 to 65) Hz	8.2 mW	
(6.6 to <9.18) W		0.093 %	
(9.18 to <33.66) W		0.062 %	
(33.66 to <91.18) W		0.093 %	
(91.18 to <336.6) W		0.062 %	
(336.6 to <918) W		0.085 %	
9.18 W to <2.244 kW		0.070 %	
(2.244 to <4.59) kW		0.093 %	
(4.59 to 20.4) kW		0.078 %	
(PF = 0.5)			
(0.108 9 to <2.97) mW	(45 to 65) Hz	0.26 %	
(2.97 to < 10.89) mW		0.25 %	
(10.89 to <29.7) mW		0.26 %	
(29.7 to <108.9) mW		0.25 %	
108.9 mW to <0.297 W		8.2 mW	
(0.297 to <0.726) W		8.2 mW	
(0.726 to <1.485) W		8.2 mW	
(1.485 to <6.6) W		8.2 mW	
(6.6 to <9.18) W		0.25 %	
(9.18 to <33.66) W		0.24 %	
(33.66 to <91.18) W		0.25 %	
(91.18 to <336.6) W		0.24 %	
(336.6 to <918) W		0.25 %	
(9.18 to <2.244) kW		0.24 %	
(2.244 to <4.59) kW		0.25 %	
(4.59 to 20.4) kW		0.25 %	

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Capacitance – Generate	(0.19 to <0.40) nF	0.69 % + 6.5 pF	Fluke 5520A
	(0.40 to <1.1) nF	0.70 % + 6 pF	
	(1.1 to <3.3) nF	0.70 % + 4 pF	
	(3.3 to <11) nF	0.30 % + 4 pF	
	(11 to <33) nF	0.35 % + 60 pF	
	(33 to <110) nF	0.31 % + 40 pF	
	(110 to <330) nF	0.31 % + 0.10 nF	
	(0.33 to <1.1) μF	0.25 % + 0.40 nF	

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Capacitance – Generate (cont)	(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	0.25 % + 1 nF 0.25 % + 4 nF 0.40 % + 5 nF 0.45 % + 20 nF 0.45 % + 30 nF 0.45 % + 0.20 μF 0.45 % + 0.30 μF 0.45 % + 2 μF 0.48 % + 30 μF 0.84 % + 0.1 mF	Fluke 5520A
Electrical Calibration of Thermocouple Indicators –			
Type B	(600 to 1820) °C	0.21 °C	Fluke 5520A
Type C	(0 to 2316) °C	0.18 °C	
Type E	(-250 to 1000) °C	0.11 °C	
Type J	(-210 to 1200) °C	0.11 °C	
Type K	(-200 to 1372) °C	0.12 °C	
Type L	(-200 to 900) °C	0.13 °C	
Type N	(-200 to 1300) °C	0.13 °C	
Type R	(0 to 1767) °C	0.23 °C	
Type S	(0 to 1767) °C	0.25 °C	
Type T	(-250 to 400) °C	0.11 °C	
Type U	(-200 to 600) °C	0.19 °C	
Electrical Calibration of RTDs –			
Pt 385, 100 Ω	(-200 to 800) °C	0.034 °C	Fluke 5520A
Pt 3926, 100 Ω	(-200 to 630) °C	0.034 °C	
Pt 3916, 100 Ω	(-200 to 630) °C	0.027 °C	
Pt 385, 200 Ω	(-200 to 630) °C	0.027 °C	

Parameter/Equipment	Range	CMC <sup>2,7</sup> (±)	Comments
Electrical Calibration of RTDs – (cont)			
Pt 385, 500 Ω	(-200 to 630) °C	0.027 °C	Fluke 5520A
Pt 385, 1 000 Ω	(-200 to 630) °C	0.021 °C	
PtNi 385, 120 Ω	(-80 to 260) °C	0.054 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.20 °C	

### III. Mechanical

Parameter/Equipment	Range	CMC <sup>2,9</sup> (±)	Comments
Pressure – Measuring Equipment <sup>3</sup>	(>6.90 to 103.43) kPa (>103.43 to 2068.43) kPa (>2060.07 to 20 684.09) kPa (>20 623.24 to 68 947.76) kPa	0.073 kPa 0.10 kPa 4.8 kPa 8.0 kPa	Method: direct comparison  Crystal nVision indicator and pressure modules
Negative Pressure <sup>3</sup> (Relative Vacuum)	(-68.949 to -6.897) kPa	0.051 kPa	Additel ADT681-05-DP1-INH2O
Differential Pressure <sup>3</sup>	(-249.089 to 249.089) Pa	0.62 Pa	
Torque <sup>3</sup> Wrenches	(0.6 to 3) N·m (>3 to 6) N·m (>6 to 10) N·m (>10 to 30) N·m (>30 to 100) N·m (>100 to 300) N·m (>300 to 700) N·m	0.014 N·m 0.039 N·m 0.035 N·m 0.18 N·m 0.95 N·m 0.75 N·m 0.71 N·m	Method: direct comparison  Torque calibrator with transducers

IV. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2,9</sup> (±)	Comments
Temperature – Measuring Equipment <sup>3</sup>	(25 to 300) °C (>300 to 630) °C	0.092 °C 0.17 °C	PT 100 RTD and indicator
Liquid-in-Glass	(25 to 300) °C (>300 to 500) °C	0.43 °C 0.83 °C	PT 100 RTD and indicator, dry well
IR Thermometers <sup>3</sup> – (Infrared)	(50 to 300) °C (>300 to 500) °C	2.1 °C 3.2 °C	Black Body radiator, PT 100 RTD and indicator
Environmental Chambers <sup>3</sup> – System Accuracy Test (SAT)	(-100 to 0) °C (>0 to 300) °C (>300 to 600) °C (>600 to 800) °C (>800 to 1200) °C	1.1 °C 1.0 °C 1.0 °C 1.0 °C 1.5 °C	AMS2750, CQI-9, requirements of the customer. Process calibrator and standard thermocouples
Environmental Chambers <sup>3</sup> – Uniformity Surveys (TUS)	(-100 to 0) °C (>0 to 500) °C (>500 to 1200) °C	1.1 °C 1.0 °C 1.5 °C	AMS2750, CQI-9, requirements of the customer. Data logger calibrator and standard thermocouples

V. Time & Frequency

Parameter/Range	Frequency	CMC <sup>2</sup> (±)	Comments
Frequency – Generate			
(1 to 5) V <sub>p-p</sub>	(0.01 to 119.99) Hz (120.0 to 1199.9) Hz (1.200 to 11.999) kHz (12.00 to 49.99) kHz	5.8 mHz 58 mHz 0.58 Hz 5.8 Hz	Fluke 5520A / SC1100
5 mV <sub>p-p</sub> to 5.5 V <sub>p-p</sub>	50 kHz to <100 MHz (100 to <300) MHz (300 to 500) MHz	5.8 kHz 5.8 kHz 5.8 kHz	

- 
- <sup>1</sup> This laboratory offers commercial calibration and field calibration services, where noted.
- <sup>2</sup> Calibration and Measurement Uncertainty (CMC) 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 nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at 95.45 % level of confidence, with a coverage factor of  $k = 2$ . The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.
- <sup>3</sup> Field calibration service is available for this calibration and this laboratory meets A2LA *R104 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.
- <sup>4</sup> In the statement of CMC,  $L$  is the numerical value of the nominal length of the device measured in millimeters.
- <sup>5</sup> In the statement of CMC,  $D$  is the numerical value of the diagonal length of the device measured in millimeters.
- <sup>6</sup> In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.
- <sup>7</sup> The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.
- <sup>8</sup> This scope meets A2LA's *P112 Flexible Scope Policy*.
- <sup>9</sup> The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.



## *Accredited Laboratory*

A2LA has accredited

**KALIBRIXCAL S.A. DE C.V. A TRESICAL COMPANY**

*Santiago de Querétaro, MEXICO*

for technical competence in the field of

**Calibration**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).



Presented this 14<sup>th</sup> day of December 2018.

A blue ink signature of the Senior Director of Accreditation Services.

Senior Director, Accreditation Services  
For the Accreditation Council  
Certificate Number 4872.01  
Valid to December 31, 2020

*For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.*