



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION

Valid To: March 31, 2020

Certificate Number: 1400.05

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

I. Chemical Quantities

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
pH Indicator <sup>3</sup> –			
Instrumental Error	(0 to 14) pH units	0.0050 pH units	DC voltage
Linearity	(0 to 14) pH units	0.0060 pH units	
Repeatability	(0 to 14) pH units	0.0040 pH units	
pH Detector <sup>3</sup> –			
Instrumental Error	4 pH units, 9 pH units	0.40 mV/pH	Standard solutions
Linearity	4 pH units, 7 pH units, 9 pH units	0.90 mV	
Repeatability	4 pH units 7 pH units 9 pH units	0.90 mV 0.80 mV 1.9 mV	
pH Meters <sup>3</sup> –			
Three - Point Calibration Instrumental Error	4 pH units 7 pH units 9 pH units	0.022 pH units 0.023 pH units 0.030 pH units	Standard solutions

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
pH Meters <sup>3</sup> –  Two – Point Calibration Instrumental Error  One – Point Calibration Instrumental Error	4 pH units, 9 pH units, 7 pH units  4 pH units, 7 pH units, 9 pH units	0.024 pH units 0.013 pH units  0.19 pH units	Standard solutions
Analyzer of Atmospheres Concerned <sup>3</sup> –  Nitrogen Oxide  Carbon Monoxide  Sulfur Dioxide  Oxygen	(25 to 5000) parts in 10 <sup>6</sup>  (5 to 50000) parts in 10 <sup>6</sup>  (25 to 5000) parts in 10 <sup>6</sup>  (5 to 25) vol %	2.0 % of full scale  2.0 % of full scale  2.0 % of full scale  2.0 % of full scale	Standard gases

## II. Dimensional

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Outside Micrometers <sup>3</sup> –  (Resolution 0.1µm)	Up to 25 mm  Up to 50 mm (50 to 200) mm (200 to 300) mm (300 to 400) mm (400 to 500) mm (500 to 600) mm (600 to 700) mm (700 to 800) mm (800 to 900) mm (900 to 1000) mm	0.60 µm  2.0 µm 4.0 µm 6.0 µm 8.0 µm 9.0 µm 10 µm 12 µm 13 µm 15 µm 16 µm	Gauge blocks

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Calipers <sup>3</sup>	Up to 300 mm (300 to 500) mm (500 to 600) mm (600 to 1000) mm	0.030 mm 0.040 mm 0.050 mm 0.070 mm	Gauge blocks, step gauges
Height Gauges <sup>3</sup> –			
Resolution 0.01 mm	Up to 200 mm (200 to 500) mm (500 to 600) mm (600 to 1000) mm	0.020 mm 0.030 mm 0.040 mm 0.050 mm	Gauge blocks, step gauges
Resolution 0.001 mm	Up to 300 mm (300 to 600) mm (600 to 1000) mm	0.0090 mm 0.013 mm 0.018 mm	
Resolution 0.0001 mm	Up to 300 mm (300 to 600) mm (600 to 1000) mm	0.0092 mm 0.013 mm 0.018 mm	
Digital Indicators <sup>3</sup>	Up to 100 mm	3.0 µm	Gauge blocks
Depth Micrometer <sup>3</sup>	Up to 50 mm (50 to 150) mm (150 to 300) mm	3.0 µm 4.0 µm 7.0 µm	Gauge blocks, depth micro checker
Dial Gauges <sup>3</sup>	Up to 10 mm (10 to 25) mm (25 to 50) mm (50 to 100) mm	1.8 µm 1.9 µm 2.2 µm 3.2 µm	Gauge blocks, dial gauge tester
Depth Gauges <sup>3</sup>	Up to 300 mm (300 to 600) mm	0.040 mm 0.050 mm	Gauge blocks, step gauges, depth micro-checker
Inside Micrometers <sup>3</sup> –			
Calipers	Up to 200 mm (200 to 300) mm (300 to 400) mm (400 to 500) mm	5.0 µm 7.0 µm 8.0 µm 9.0 µm	Gauge blocks

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Inside Micrometers <sup>3</sup> –  Bar Inside	Up to 150 mm (150 to 200) mm (200 to 300) mm (300 to 400) mm (400 to 500) mm (500 to 600) mm (600 to 700) mm (700 to 800) mm (800 to 900) mm (900 to 1000) mm	4.0 µm 5.0 µm 7.0 µm 8.0 µm 10 µm 11 µm 12 µm 13 µm 15 µm 17 µm	Gauge blocks
Dial Caliper Gauges <sup>3</sup>	Up to 25 mm (25 to 80) mm (80 to 150) mm (150 to 200) mm	0.030 mm 0.040 mm 0.050 mm 0.060 mm	Gauge blocks
Standard Bars	Up to 50 mm (50 to 100) mm (100 to 200) mm (200 to 300) mm (300 to 400) mm (400 to 500) mm	0.80 µm 0.90 µm 1.1 µm 1.5 µm 1.8 µm 2.2 µm	Gauge blocks, electrical comparators
Thickness Gauges <sup>3</sup> –  Dial Resolution 0.1 mm  Digital Resolution 0.01 mm  Digital Resolution 0.001 mm	Up to 50 mm  Up to 50 mm  Up to 20 mm (20 to 50) mm	0.020 mm  0.020 mm  0.0020 mm 0.0030 mm	Gauge blocks
Cylinder Gauges <sup>3</sup>	Up to 1.6 mm	5.0 µm	Dial gauge tester, dial gauge  Note: range is the effective measuring range

III. Electrical – DC / Low Frequency

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Voltage – Generate <sup>3</sup>	(1 to 10) mV (10 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	0.065 % + 3.7 μV 0.013 % + 3.7 μV 71 μV/V + 6.1 μV 69 μV/V + 61 μV 76 μV/V + 0.61 mV 76 μV/V + 1.9 mV	Fluke calibrator
DC Voltage – Measure <sup>3</sup>	(1 to 10) mV (10 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V  (1 to 10) kV	0.050 % + 0.12 μV 60 μV/V + 0.12 μV 20 μV/V + 0.47 μV 18 μV/V + 2.4 μV 21 μV/V + 47 μV 22 μV/V + 470 μV  0.30 %	Multimeter      High voltage digital meter
DC Current – Generate <sup>3</sup>	(0.1 to 3) mA (3 to 30) mA (30 to 300) mA (0.3 to 2) A (2 to 10) A (10 to 20) A	0.026 % + 0.07 μA 0.016 % + 0.3 μA 0.020 % + 4 μA 0.040 % + 54 μA 0.076 % + 400 μA 0.13 % + 0.91 mA	Calibration of current measuring devices using:  Fluke calibrator
Simulated Current	(20 to 100) A (100 to 500) A (500 to 950) A	0.39 % + 110 mA 0.38 % + 110 mA 0.41 % + 120 mA	Calibrator with current coil



Parameter/Equipment	Range	CMC <sup>2,4</sup> ( $\pm$ )	Comments
DC Current – Measure <sup>3</sup>	(10 to 100) $\mu$ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 2) A (2 to 14) A	0.018 % + 0.012 nA 66 $\mu$ A/A + 0.047 nA 70 $\mu$ A/A + 0.47 nA 63 $\mu$ A/A + 4.7 nA 0.020 % + 1.2 $\mu$ A 0.019 % + 1.2 $\mu$ A 0.021 % + 24 $\mu$ A	Calibration of current generators using:  Multimeter with shunts
DC Resistance – Generate <sup>3</sup>			Calibration of resistance meters using:
Fixed Values	1 m $\Omega$ 0.01 $\Omega$ 0.1 $\Omega$ 1 $\Omega$ 10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$	0.016 % 0.014 % 0.014 % 0.011 % 0.011 % 0.010 % 0.010 % 0.010 % 0.010 % 0.011 %	Standard resistors using with multimeter and generator
Ranges	(0.1 to 1) $\Omega$ (1 to 10) $\Omega$ (10 to 100) $\Omega$ (0.1 to 1) k $\Omega$ (1 to 10) k $\Omega$ (10 to 100) k $\Omega$ (0.1 to 1) M $\Omega$ (1 to 100) M $\Omega$ (0.1 to 1) G $\Omega$ (1 to 10) G $\Omega$ (10 to 100) G $\Omega$	0.016 % 0.011 % 0.011 % 0.011 % 0.011 % 0.011 % 0.011 % 0.053 % 0.055 % 0.30 % 0.40 % 1.1 %	Decade resistors
	(1 to 11) $\Omega$ (11 to 33) $\Omega$ (0.033 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 $\Omega$	0.035 % 0.018 % 0.015 % 0.016 % 0.017 % 0.035 % 0.035 % 0.076 % 0.12 % 0.58 %	Calibrator (Simulated)

Parameter/Equipment	Range	CMC <sup>2,4</sup> (±)	Comments
DC Resistance – Measure <sup>3</sup>			Calibration of resistors using:
Fixed Values	0.01 Ω 0.1 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ	0.014 % 0.014 % 0.011 % 0.011 % 0.011 % 0.011 % 0.011 % 0.011 % 0.011 %	Multimeter with standard resistors
Ranges	(0.1 to 1) Ω (1 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ	0.014 % 0.011 % 0.011 % 0.011 % 0.011 % 0.011 % 0.012 %	

Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Voltage – Generate <sup>3</sup>			Calibration of AC voltmeters using:
(10 to 100) mV (0.1 to 1) V	50 Hz to 1 kHz	0.079 % + 25 μV 0.040 % + 73 μV	Fluke calibrator
(1 to 10) V (10 to 100) V (0.1 to 1) kV	50 Hz to 1 kHz	0.051 % + 0.73 mV 0.063 % + 8 mV 0.063 % + 97 mV	
(10 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (0.1 to 1) kV	(1 to 10) kHz	0.082 % + 25 μV 0.042 % + 73 μV 0.051 % + 0.73 mV 0.098 % + 19 mV 0.25 % + 0.61 V	



Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Voltage – Measure <sup>3</sup>			Calibration of voltage generators using:
(10 to 100) mV (0.1 to 0.3) V (0.3 to 1) V	50 Hz to 1 kHz (except 50, 60, 400 Hz)	0.032 % + 4.8 μV 0.021 % + 24 μV 0.021 % + 66 μV	Multimeter
(1 to 10) V (10 to 100) V (100 to 700) V	50 Hz to 1 kHz (except 50, 60, 400 Hz)	0.019 % + 0.26 mV 0.020 % + 2.6 mV 0.020 % + 33 mV	
(10 to 100) mV (100 to 300) mV	(1 to 10) kHz	0.032 % + 4.8 μV 0.027 % + 24 μV	
(0.3 to 1) V (1 to 10) V (10 to 100) V (100 to 700) V	(1 to 10) kHz	0.020% + 66 μV 0.020 % + 0.24 mV 0.020 % + 2.4 mV 0.020 % + 33 mV	
(10 to 100) mV (0.1 to 0.3) V (0.3 to 1) V	(50, 60, 400) Hz	0.032 % + 4.8 μV 0.022 % + 24 μV 0.020 % + 24 μV	
(1 to 10) V (10 to 100) V (100 to 700) V	(50, 60, 400) Hz	0.020 % + 0.24 mV 0.020 % + 2.4 mV 0.020 % + 33 mV	
(1 to 10) kV	(50, 60) Hz	0.6 %	High voltage digital meter





Parameter/Range	Frequency	CMC <sup>2,4</sup> (±)	Comments
AC Current – Generate <sup>3</sup>  100 μA to 3 mA (3 to 30) mA (30 to 100) mA (100 to 300) mA (0.3 to 2) A (2 to 10) A (10 to 20) A  (20 to 100) A (100 to 500) A (500 to 950) A	50 Hz to 1 kHz       (50, 60) Hz	0.13 % + 0.40 μA 0.12 % + 3.7 μA 0.12 % + 37 μA 0.12 % + 37 μA 0.13 % + 0.37 mA 0.13 % + 2.5 mA 0.15 % + 6.1 mA  0.39 % + 110 mA 0.38 % + 110 mA 0.41 % + 110 mA	Calibration of AC current measuring devices using:  Fluke calibrator      Calibrator with current coil (ex. clamp meter)
AC Current – Measure <sup>3</sup>  100 μA to 2 mA (2 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 2) A (2 to 14) A	50 Hz to 1 kHz	0.050 % + 24 nA 0.040 % + 0.24 μA 0.043 % + 2.4 μA 0.051 % + 48 μA 0.051 % + 96 μA 0.052 % + 0.96 mA	Calibration of current generators using:  Multimeter with shunts
AC Resistance – Generate <sup>3</sup>  Fixed Points 0.01 Ω 0.1 Ω 0.2 Ω 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ	50 Hz to 1 kHz         1 kHz	0.082 % 0.082 % 0.082 % 0.082 % 0.082 % 0.082 % 0.082 % 0.082 % 0.082 %	Calibration of AC resistance meters using:      Standard AC resistors



Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Electrical Calibration of Thermocouple Temperature Indicators <sup>3</sup> –			Calibration of temperature meters using:
Type K	(-200 to -170) °C (-170 to -100) °C (-100 to -20) °C (-20 to 1372) °C	0.67 °C 0.54 °C 0.50 °C 0.49 °C	Fluke calibrator
Type J	(-210 to -170) °C (-170 to -120) °C (-120 to -20) °C (-20 to 1200) °C	0.55 °C 0.50 °C 0.50 °C 0.50 °C	
Type E	(-250 to -220) °C (-220 to -180) °C (-180 to -70) °C (-70 to 1000) °C	0.63 °C 0.49 °C 0.44 °C 0.44 °C	
Type T	(-250 to -230) °C (-230 to -170) °C (-170 to -90) °C (-90 to -20) °C (-20 to 300) °C (300 to 400) °C	1.2 °C 0.65 °C 0.52 °C 0.47 °C 0.47 °C 0.47 °C	
Type R	(0 to 50) °C (50 to 250) °C (250 to 400) °C (400 to 800) °C (800 to 1760) °C	1.1 °C 0.82 °C 0.73 °C 0.66 °C 0.58 °C	
Type S	(0 to 50) °C (50 to 250) °C (250 to 400) °C (400 to 800) °C (800 to 1760) °C	1.1 °C 0.82 °C 0.69 °C 0.66 °C 0.66 °C	
Electrical Calibration of RTDs <sup>3</sup> –			
Pt385, 100 Ω and JPt100	(-200 to 850) °C	0.13 °C	Decade resistors



IV. Mechanical

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Scales & Balances <sup>3</sup> –	1 mg 2 mg (2 to 5) mg 5 mg (5 to 10) mg 10 mg 20 mg (20 to 50) mg 50 mg (50 to 100) mg 100 mg 200 mg (200 to 500) mg 500 mg (500 to 1000) mg 1 g 2 g (2 to 5) g 5 g (5 to 10) g 10 g 20 g (20 to 50) g 50 g (50 to 100) g 100 g (100 to 200) g 200 g (200 to 20 000) g (20 to 160) kg (160 to 300) kg	3600 µg/g 1800 µg/g 1800 µg/g 710 µg/g 1400 µg/g 470 µg/g 300 µg/g 360 µg/g 150 µg/g 220 µg/g 94 µg/g 59 µg/g 59 µg/g 30 µg/g 45 µg/g 18 µg/g 12 µg/g 12 µg/g 5.9 µg/g 8.7 µg/g 3.6 µg/g 2.4 µg/g 2.8 µg/g 1.2 µg/g 1.8 µg/g 1.0 µg/g 1.4 µg/g 1.0 µg/g 1.1 µg/g 30 µg/g 31 µg/g	Calibrations performed using reference weights
Vibration Meter –			
Acceleration (1 to 50) m/s <sup>2</sup>	(5 to 2000) Hz	3.0 % of measurement value	Secondary vibration calibration system
Velocity (1 to 50) mm/s	(5 to 2000) Hz	3.0 % of measurement value	
Displacement (0.1 to 10) mm	(5 to 160) Hz	3.0 % of measurement value	



Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Vibration Exciter <sup>3</sup> –			
Acceleration (1 to 200) m/s <sup>2</sup>	(5 to 10) Hz (10 to 5000) Hz	4.0 % of measurement value 3.0 % of measurement value	Secondary vibration calibration system
Velocity (0.01 to 1) m/s	(5 to 10) Hz (10 to 160) Hz (160 to 1000) Hz (1 to 3) kHz	6.0 % of measurement value 3.0 % of measurement value 7.0 % of measurement value 8.0 % of measurement value	
Displacement (1 to 10) mm	(5 to 10) Hz (10 to 20) Hz (20 to 40) Hz (40 to 80) Hz (80 to 160) Hz (160 to 315) Hz	3.0 % of measurement value 4.0 % of measurement value 4.0 % of measurement value 5.0 % of measurement value 9.0 % of measurement value 16 % of measurement value	
Frequency	(5 to 2000) Hz (2 to 4) kHz (4 to 5) kHz	0.02 Hz 0.03 Hz 0.04 Hz	Frequency counter
Pressure –			
Hydraulic – Gauge Pressure <sup>3</sup>	Up to 100 MPa	0.0042 MPa or 0.021 % of measurement value, whichever is largest	Dead-weight pressure balance, pressure calibrator
Air-Gauge Pressure <sup>3</sup>	(-95 to 0) kPa	0.035 kPa	
	(0 to 350) kPa	0.046 kPa or 0.022 % of measurement value, whichever is largest	
	(350 to 2000) kPa	0.15kPa or 0.030 % of measurement value, whichever is largest	
	(2000 to 7000) kPa	1.4 kPa	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Pressure – (cont)			
Dead-weight Pressure Balances			
Pressure Medium – Oil <sup>3</sup>	Up to 100 MPa	0.0048 MPa or 0.016 % of measurement value, whichever is largest	Dead-weight pressure balance, pressure calibrator
Pressure Medium – Air <sup>3</sup>	Up to 350 kPa	0.063 kPa or 0.030 % of measurement value, whichever is largest	
	(350 to 2000) kPa	0.30 kPa or 0.030 % of measurement value, whichever is largest	
	(2000 to 7000) kPa	2.0 kPa	
Liquid Column Monometer			
Liquid – Mercury <sup>3</sup>	Up to 220 kPa	0.15 kPa	
Liquid – Water <sup>3</sup>	Up to 20 kPa	0.050 kPa	
Volumetric Instrument –			
One Mark Pipettes	(0.5 to 2) ml (2 to 5) ml (5 to 10) ml (10 to 25) ml (25 to 50) ml (50 to 100) ml	0.010 ml 0.015 ml 0.020 ml 0.030 ml 0.050 ml 0.080 ml	Scales & balances, liquid-in-glass thermometer
Graduated pipettes	(0.1 to 1) ml (1 to 2) ml (2 to 5) ml (5 to 10) ml (10 to 25) ml (25 to 50) ml	0.010 ml 0.015 ml 0.030 ml 0.050 ml 0.10 ml 0.20 ml	
Burettes	(1 to 5) ml (5 to 10) ml (10 to 25) ml (25 to 50) ml (50 to 100) ml	0.010 ml 0.020 ml 0.030 ml 0.050 ml 0.10 ml	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Volumetric Instrument – (cont)			
One Mark Volumetric Flask	(5 to 10) ml (10 to 25) ml (25 to 50) ml (50 to 100) ml (100 to 250) ml (250 to 500) ml (500 to 1000) ml (1000 to 2000) ml	0.025 ml 0.040 ml 0.040 ml 0.060 ml 0.15 ml 0.25 ml 0.40 ml 0.60 ml	Scales & balances, liquid-in-glass thermometer
Graduated Measuring Cylinders	Up to 5 ml (5 to 25) ml (25 to 100) ml (100 to 200) ml (200 to 300) ml (300 to 500) ml (500 to 1000) ml (1000 to 2000) ml	0.10 ml 0.20 ml 0.50 ml 1.0 ml 1.5 ml 2.5 ml 5.0 ml 10 ml	
Torque Tools <sup>3</sup>	(0.2 to 500) N·m	0.70 % of reading	Torque wrench tester, torque analyzer
Indirect Verification of Rockwell Hardness Testing Machine <sup>3</sup> –			Indirect calibration method per JIS B 7726 (ISO 6508-2);
B scale	Low Medium High	0.87 HRB 0.79 HRB 0.63 HRB	Standard blocks
C scale	Low Medium High	0.67 HRC 0.54 HRC 0.41 HRC	
Direct Verification of Rockwell Hardness Testing Machine <sup>3</sup> –			Direct calibration method per JIS B 7726 (ISO 6508-2);
Verification of the Test force	(588.4 to 1471) N (60 to 150) kgf B scale C scale	1.8 N	Force-proving Instrument
Verification of the Measuring device	(0 to 200) µm B scale C scale	0.76 µm	Index master

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Indirect Verification of Micro Vickers Hardness Testing Machine <sup>3</sup>	(100 to 900) HV	5.1 HV	Indirect calibration method per JIS B 7725 (ISO 6507-2); standard blocks
Direct Verification of Micro Vickers Hardness Testing Machine <sup>3</sup> –  Verification of the Test Force  Verification of the Measuring Device	98.07 mN to 19.61 N (10 gf to 2 kgf)  (0 to 1) mm	0.046 N  1.3 µm	Direct calibration method per JIS B 7725 (ISO 6507-2);  Scale and balances, force-proving instrument  Stage micrometer
Indirect Verification of Vickers Hardness Testing Machine <sup>3</sup>	(100 to 900) HV	5.3 HV	Indirect calibration method per JIS B 7725 (ISO 6507-2);  Standard blocks
Direct Verification of Vickers Hardness Testing Machine <sup>3</sup> –  Verification of the Test force  Verification of the Measuring device	(19.61 to 490.3) N (2 to 50) kgf  (0 to 1) mm	1.0 N  1.3 µm	Direct calibration method per JIS B 7725 (ISO 6507-2);  Force-proving Instrument  Stage micrometer
Indirect Verification of Brinell Hardness Testing Machine <sup>3</sup>	(250 to 450) HBW  (100 to 250) HBW	8.8 HBW  6.4 HBW	Indirect calibration method per JIS B 7724 (ISO 6506-2);  Standard blocks

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Direct Verification of Brinell Hardness Testing Machine <sup>3</sup> –			Direct calibration method per JIS B 7724 (ISO 6507-2);
Verification of the Test force	(4.903 to 29.42) kN, (500 to 3000) kgf	0.095 kN	Force-proving Instrument
Verification of the Measuring device	(0 to 8) mm	6.6 µm	Stage micrometer
Uniaxial Testing Machine <sup>3</sup> –			Calibration method per JIS B 7721;
Tension Force	0.1 N to 100 kN	0.30 %	Force-proving instrument, load cell, and dead weight
Compression Force	0.1 N to 5 MN	0.30 %	

#### V. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Digital Thermometer –	(-50 to 350) °C	0.080 °C	Digital thermometer, ice point;
Surface Temperature Measurement Type	(-50 to 500) °C	1.6 °C	Calibration device
Liquid-in-glass Thermometer	(-50 to 350) °C	0.090 °C	Digital thermometer, ice point
Mechanical Thermometer	(-50 to 350) °C	0.20 °C	Digital thermometer, ice point
Temperature Test Chamber <sup>3</sup>	(-80 to 350) °C	0.20 °C	Digital thermometer



Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Hygrometer	(30) % RH	1.1 %	Optical dew point meter
	(>30 to 40) % RH	1.4 %	
	(>40 to 60) % RH	1.9 %	
	(>60 to 70) % RH	2.2 %	
	(>70 to 80) % RH	2.5 %	
	(>80 to 95) % RH	2.9 %	

## VI. Time & Frequency

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Frequency – Measure <sup>3</sup>	1 mHz to 1300 MHz	5 parts in 10 <sup>7</sup> Hz/Hz	Frequency counter 53220A
Frequency – Measuring Equipment <sup>3</sup>	1 mHz to 600 MHz	5 parts in 10 <sup>7</sup> Hz/Hz	Frequency counter 53220A

<sup>1</sup> This laboratory offers commercial and field calibration service.

<sup>2</sup> Calibration and Measurement Capability 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 approximately the 95 % level of confidence, usually using 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. CMC for the on-site calibrations assume that the environmental conditions are maintained as in the primary laboratory.

<sup>4</sup> Unless otherwise noted, in the statement of CMC uncertainty, % is the uncertainty percentage of the relative value of the reading, or the relative value of the reading plus floor specification.



## Accredited Laboratory

A2LA has accredited

# JAPAN QUALITY ASSURANCE ORGANIZATION KYUSHU TESTING OFFICE

*Fukuoka-ken, JAPAN*

for technical competence in the field of

## Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets *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 10<sup>th</sup> day of May 2018.

A handwritten signature in black ink, written over a horizontal line.

President and CEO  
For the Accreditation Council  
Certificate Number 1400.05  
Valid to March 31, 2020  
Revised on November 1, 2018

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