CERTIFICATE OF ACCREDITATION

This is to attest that

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DOHA, STATE OF QATAR

Calibration Laboratory CL-258

has met the requirements of AC204, *IAS Accreditation Criteria for Calibration Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories.* This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date March 12, 2023

Expiration Date January 1, 2025

President

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Contact Name Jerrin Jacob **Contact Phone** +974 30948438

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CALIBRATION AND MEASUREMENT CAPABILITY (CMC)*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Dimensional			
Plain Plug Gauges	Up to Φ 70 mm	4 µm	Using Universal Length Measuring Machine by direct method
Thread Plug Gauge	M3 to M70	8 µm	Using Universal Length Measuring Machine by direct method
Taper Plug Gauge	Φ 100 mm	3.6 µm	Using Universal Length Measuring Machine by direct method
Thread Ring Gauge	M3 to M50	29 µm	Using Universal Length Measuring Machine by direct method
Plain Ring Gauge	3 mm to Φ 70 mm	0.8 µm	Using Universal Length Measuring Machine by direct method
Snap Gauge	Up to 70 mm	12 µm	Using Universal Length Measuring Machine by direct method
Plunger Dial	0 mm to 25 mm 25 mm to 50 mm	1.4 µm 0.40 µm	Using Universal Length Measuring Machine by direct method
Lever Dial	Up to 1 mm	1 µm	Using Universal Length Measuring Machine by direct method
Digital caliper	Up to 300 mm 300 mm to 600 mm	16 µm 17 µm	Using Gauge Block & Caliper Checker by direct method
External Micrometer	Up to 25 mm	12 µm	Using Gauge Block by direct method
Measuring scale and measuring tape	Up to 1000 mm 1000 mm to 2000 mm	8.7 µm 15 µm	Using Steel & Tape Measuring Machine by direct method

** If information in this CMC is presented in non-SI units, the conversion factors stated in NIST Special Publication 811 "Guide for the Use of the International System of Units (SI)" apply.*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
	2000 mm to 3000 mm 3000 mm to 4000 mm 4000 mm to 5000 mm	22 µm 28 µm 51 µm	
Theodolite (Angles in horizontal and vertical planes)	0° to 90° 0 gon to 100 gon	1.9” 0.6 mgon	Using Survey Total Station by direct method
Feeler gauge	Up to 1 mm	2.4 µm	Using Master Digital Micrometer by direct method
Height Gauge	Up to 600 mm	8 µm	Using Caliper Checker by direct method
Coating Thickness Gauge • Ferrous • Non-Ferrous	 Up to 2895 µm Up to 2895 µm	 1.4 µm 2.0 µm	Using Elcometer Scale 2 calibration foil set by direct method
Laser Distance Meter	Up to 2000 mm	1.9 mm	Using Gauge Block by direct method
Mechanical			
Analytical/Weighing Balance	Up to 220 g 220 g to 3 kg 3 kg to 10 kg 10 kg to 60 kg 60 kg to 500 kg	0.8 mg 14 mg 140 mg 2 g 0.058 kg	Using E1/E2/ M1 class weights by direct method
Mass (Weights)	1 mg to 20 mg 50 mg to 200 g 500 g 1 kg to 2 kg 5 kg to 10 kg 10 kg to 20 kg	0.01 mg 2 mg 28 mg 170 mg 170 mg 166 mg	Using E1/E2 class standard weights and weighing balance by comparison method
Torque Wrench	1 N·m to 10 N·m 10 N·m to 2000 N·m 2000 N·m to 3000 N·m	0.05 N·m 0.78 % 0.97 %	Using Torque tester by direct method
Air Flow Anemometer	0 m/s to 5 m/s 5 m/s to 45 m/s	1.3 m/s 1.8 m/s	Using Wind Tunnel & Air flow meter by comparison method
Vibration Meter	1 m/s^2 to 20 m/s^2	3.5 %	Using Vibration Calibrator and Vibration meter by comparison method
Hydraulic Pressure Gauge	1 bar to 700 bar 700 bar to 1200 bar	0.085 % 0.017 %	Using Hydraulic Dead Weight Tester by direct method
Hydraulic Pressure Gauge	1 bar to 700 bar	0.12 %	Using Test Gauge and hydraulic test pump by comparison method
Vacuum Gauge	-0.87 bar to 7 bar	0.6 mbar	Using Test Gauge and pneumatic low pressure test pump by comparison method

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Pneumatic Pressure Gauge	0 bar to 7 bar	0.6 mbar	Using Test Gauge and pneumatic low pressure test pump by Comparison method
Volume	0.1 µL to 1 µL 1 µL to 10 µL 10 µL to 100 µL 100 µL to 1000 µL 1 mL to 500 mL 500 mL to 2000 mL	0.00098 µL 0.001 µL 0.002 µL 0.0036 % 0.025 % 0.008 %	Using Micro Balance & Analytical Balance by Direct method
Fume Hood & Bio Safety Cabinet	Air flow: 0 m/s to 2 m/s Sound level: 0 dB to 80 dB Illumination: 0 lux to 600 lux	 0.31 m/s 0.66 dB 3 lux	Using Anemometer, Particle counter, Sound Level meter and Photometer by Direct method
Sound Level Meter (1 kHz)	94 dB 114 dB	0.64 dB 0.65 dB	Using Sound Level Calibrator by direct method
Force-compression testing machine	30 kN to 300 kN 300 kN to 900 kN 900 kN to 1500 kN 1500 kN to 1800 kN 1800 kN to 3000 kN	0.11 kN 1.1 kN 1.2 kN 1.3 kN 1.9 kN	Using Master Load Cell by comparison method
Spring Balances/ Force Gauge/ Push Pull Gauge (Pull Mode only)	Up to 20 kg	7 g	Using hook weight
Sound level calibrator	94 dB & 114 dB (at 1kHz)	0.65 dB	Using Sound Level Meter by direct method
Thermal			
Humidity Chamber, Environmental Chamber, Climatic Chamber	35 %RH to 75 %RH @ 25 °C	3 %RH	Using Humidity Meter & Digital Thermometer by direct method (Single sensor)
IR Thermometer/ Pyrometer	-15 °C to 120 °C 50 °C to 500 °C	0.70 °C 1.2 °C	Using Precision Infrared Calibrator & Portable Infrared Calibrator by direct method
Temperature Indicator, Controller with sensor, Temperature Gauge, Digital Thermometer, Glass Thermometer, RTDs & Thermocouple Sensor with or without readout	-95 °C to 660 °C	0.07 °C	Digital Thermometer and Probe and Temp furnace /bath by comparison method

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Refrigerator, Freezer, Water Bath, Incubator, Cold Storage Room, Chiller	-80 °C to 150 °C	0.42 °C	Using Multichannel Data logger with 9 sensors method (mapping)
Oven/ Sterilizer	25 °C to 300 °C	1.4 °C	Using Multichannel Data logger with 9 sensors method (mapping)
Autoclave • Temperature • Pressure	 Up to 140 °C Up to 70 psi	 0.15 °C 0.51 psi	Using single sensor wireless datalogger by direct method
Muffle Furnace	200 °C to 1200 °C	2.8 °C	Using Multichannel Data logger with 9 sensors method (mapping)
Temperature and Humidity Indicator with Sensor/ Hygrometer/ Humidity Sensor and RH Data Logger	20 %RH to 80 %RH @23 °C to 25 °C	3.5 %RH	Using Hygrometry Bench & Digital Humidity/ Temperature Meter by comparison method
Electrical – DC/LF			
AC Current Measure[4] (50 Hz to 1 kHz)	10 µA to 100 µA 100 µA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 400 mA 400 mA to 1 A 1 A to 3 A 3 A to 10 A 10 A to 20 A	0.37 % 0.25 % 0.25 % 0.25 % 0.25 % 0.25 % 0.25 % 0.25 % 0.30 %	Using 6½ & 7½ Digit Precision Multimeter by Direct methods
AC Voltage Measure[4] (50 Hz to 1 kHz)	100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	0.12 % 0.11 % 0.11 % 0.11 %	Using 6½ & 7½ Digit Precision Multimeter by Direct methods
DC Current – Measure[4]	100 µA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 400 mA 400 mA to 1 A 1 A to 3 A 3 A to 10 A 10 A to 20 A	0.09 % 0.08 % 0.08 % 0.07 % 0.09 % 0.15 % 0.19 % 0.11 %	Using 6½ & 7½ Digit Precision Multimeter by Direct methods
DC Voltage – Measure[4]	0 mV to 1 mV 1 mV to 10 mV 10 mV to 100 mV 0.1 V to 10 V 10 V to 1000 V	4.3 µV + 0.49 % 0.1 % 0.01 % 0.004 % 0.006 %	Using 6½ & 7½ Digit Precision Multimeter by Direct methods
Capacitance – Measure[4]	1 nF to 10 nF 10 nF to 100 nF 100 nF to 1 µF	5.4 % 1.8 % 1.8 %	Using 6½ & 7½ Digit Precision Multimeter by Direct methods

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Capacitance – Measure[4] (cont'd.)	1 µF to 10 µF 10 µF to 100 µF 100 µF to 1 mF 1 mF to 10 mF 10 mF to 100 mF	1.8 % 1.8 % 1.8 % 1.8 % 4.7 %	
DC Resistance – Measure[4]	1 Ω to 10 Ω 10 Ω to 100 Ω 0.1 kΩ to 1 kΩ 1 kΩ to 10 kΩ 10 kΩ to 100 kΩ 0.1 MΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1000 MΩ	0.05 % 0.05 % 0.02 % 0.02 % 0.02 % 0.02 % 0.05 % 0.94 % 2.4 %	Using 6½ & 7½ Digit Precision Multimeter by Direct methods
Frequency – Measure[4]	3 Hz to 1 MHz	0.12 %	Using 6½ & 7½ Digit Precision Multimeter by Direct methods
AC Current – Source[3] (50 Hz to 1 kHz)	10 µA to 32.999 µA 33 µA to 329.99 µA 329.99 µA to 3.29999 mA 3.3 mA to 33 mA 33 mA to 329.999 mA 330 mA to 1.09999 A 1.1 A to 3 A 3 A to 10 A 10 A to 20.5 A	0.65 % 0.50 % 0.18 % 0.12 % 0.12 % 0.07 % 0.15 % 0.15 % 0.17 %	Using Muti-product Electrical Calibrator by direct method
AC Current – Source[3] (50 Hz - 400 Hz)	20 A to 1000 A	0.35 %	Using Muti-product Electrical Calibrator with current coil by direct method
AC Voltage – Source[3] (10 Hz to 10 kHz)	1.0 mV to 30 mV 30 mV to 300 mV 0.30 V to 3.0 V 3 V to 30.0 V 30 V to 300 V 300 V to 1020 V	0.14 % 0.02 % 0.02 % 0.02 % 0.02 % 0.04 %	Using Muti-product Electrical Calibrator by direct method
DC Current – Source[3]	100 µA to 300 µA 300 µA to 3.29999 mA 3.29 mA to 32.9999 mA 32.9999 mA to 330 mA 330 mA to 1.09999 A 1.1 A to 2.99999 A 2.9999 A to 10 A 10 A to 20.0 A 20 A to 1000 A	0.041% 0.03 % 0.02 % 0.02 % 0.04 % 0.05 % 0.07 % 0.12 % 0.43 %	Using Muti-product Electrical Calibrator with current coil by direct method

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
DC Voltage – Source[3]	100 µV to 329.99 mV 329.9999 mV to 3.299999 V 3.299999 V to 32.9999 V 32.9999 V to 329.9999 V 329.9999 V to 1000.000 V	0.09 % 0.003 % 0.002 % 0.003 % 0.003 %	Using Muti-product Electrical Calibrator by direct method
DC Resistance – Source[3] DC Resistance – Source[3] (continued)	0.01 Ω to 1 Ω 1 Ω to 10.99 Ω 10 Ω to 32.9999 Ω 33 Ω to 109.9999 Ω 110 Ω to 329.9999 Ω 330 Ω to 32.99999 kΩ 33 kΩ to 329.99999 kΩ 330 kΩ to 1.099999 MΩ 1.1 MΩ to 3.299999 MΩ 3.3 MΩ to 10.99999 MΩ 10.9 MΩ to 33 MΩ 33 MΩ to 109 MΩ 109 MΩ to 290 MΩ 290 MΩ to 1.09 GΩ	0.005 Ω 0.06 Ω 0.03 % 0.01 % 0.005 % 0.004 % 0.006 % 0.004 % 0.01 % 0.02 % 0.04 % 0.07 % 0.36 % 1.7 %	Using Muti-product Electrical Calibrator by direct method Using Muti-product Electrical Calibrator by direct method
Capacitance – Source[3] (1 kHz)	220 pF to 399.9 pF 399.9 pF to 1.1 nF 1.1 nF to 3.2999 nF 3.3 nF to 11.00 nF 11 nF to 33 nF 33 nF to 110 nF 110 nF to 333 nF 333 nF to 1.1 µF 1.1 µF to 3.3 µF 3.3 µF to 11 µF 11 µF to 33 µF 33 µF to 110 µF 110 µF to 333 µF 333 µF to 1.1 mF 1.1 mF to 3.3 mF 3.3 mF to 11 mF 11 mF to 33 mF 33 mF to 110 mF	5.9 % 1.6 % 0.97 % 0.40 % 0.68 % 0.40 % 0.44 % 0.61 % 0.46 % 0.41 % 0.60 % 0.85 % 0.65 % 0.65 % 0.90 % 1.2 % 1.6 % 1.4 %	Using Muti-product Electrical Calibrator by direct method
Frequency– Source[3]	1 Hz to 1 MHz	0.003 %	Using Muti-product Electrical Calibrator by direct method
Simulated Temperature – Source Thermocouples Type R Type S Type E Type J Type K	 0 °C to 1760 °C 0 °C to 1760 °C -50 °C to 995 °C -180 °C to 1199 °C -200 °C to 1372 °C	 0.68 °C 0.56 °C 0.28 °C 0.34 °C 0.48 °C	Using Muti-product Electrical Calibrator by direct method

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Simulated Temperature – Source (cont'd.)			Using Muti-product Electrical Calibrator by direct method
Thermocouples			
Type N	-200 °C to 1295 °C	0.48 °C	
Type T	-200 °C to 395 °C	0.74 °C	
Type B	600 °C to 1800 °C	0.40 °C	
Type C	0 °C to 2300 °C	0.35 °C	
Type L	-200 °C to 900 °C	0.24 °C	
Type U	-200°C to 600 °C	0.34 °C	
RTD			
PT 100	-200 °C to 800 °C	0.11 °C	
PT 200	-40 °C to 630 °C	0.24 °C	
PT 500	-190 °C to 630 °C	0.24 °C	
PT 1000	-70 °C to 500 °C	0.24 °C	
Simulated Temperature - Measure			Using Process Calibrator by direct method
Thermocouples			
Type R	-20 °C to 1760 °C	0.68 °C	
Type S	-20 °C to 1760 °C	0.56 °C	
Type E	-200 °C to 1000 °C	0.36 °C	
Type J	-180 °C to 1199 °C	0.34 °C	
Type K	-200 °C to 1372 °C	0.48 °C	
Type N	-200 °C to 1295 °C	0.48 °C	
Type T	-200 °C to 395 °C	0.74 °C	
Type B	600 °C to 1800 °C	0.40 °C	
Type C	0 °C to 2300 °C	0.35 °C	
Type L	-200 °C to 900 °C	0.25 °C	
Type U	-200°C to 600 °C	0.34°C	
RTD			
PT 100	-200 °C to 800 °C	0.10 °C	
PT 200	-200 °C to 630 °C	0.24 °C	
PT 500	-190 °C to 630 °C	0.24 °C	
PT 1000	-200 °C to 500 °C	0.24 °C	
High Resistance	100 kΩ to 1000 kΩ	0.14 %	Using Electrical Safety Tester Calibrator by Direct method
	1000 kΩ to 10 MΩ	0.48 %	
	10 MΩ to 500 MΩ	0.18 %	
	500 MΩ to 10 GΩ	0.51 %	
	10 GΩ to 100 GΩ	0.76 %	
Ground Bond Resistance / Loop Impedance	Fixed Value		Using Electrical Safety Tester Calibrator by Direct method
	350.9 mΩ	1.2 %	
	489.8 mΩ	0.92 %	
	890.5 mΩ	0.93 %	
	1706.5 mΩ	0.53 %	
	4.591 Ω	0.25 %	
	8.634 Ω	0.15 %	
	16.991 Ω	0.12 %	
	46.51 Ω	0.10 %	

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Leakage Current	1 mA to 5 mA 5 mA to 20 mA	0.69 % 0.34 %	Using Electrical Safety Tester Calibrator by Direct method
RCD trip current	10 mA to 100 mA 100 mA to 1000 mA	0.21 % 0.62 %	Using Electrical Safety Tester Calibrator by Direct method
RCD trip time	10 ms to 300 ms	0.16 %	Using Electrical Safety Tester Calibrator by Direct method
AC High Voltage - Measure	1 kV to 55 kV (50 Hz)	0.58 %	Using Precision HV Meter & Precision HV Bench Top Probe by direct method
DC High Voltage Measure	1 kV to 70 kV	0.13 %	Using Precision HV Meter & Precision HV Bench Top Probe by direct method
Time and Frequency			
Time Measurement Devices	6 s to 3600 s	0.24 s	Using master stopwatch by comparison method
Tachometer (Rotational Speed)	Contact type: 6 rpm to 100 rpm 100 rpm to 1000 rpm 1000 rpm to 6000 rpm	 1 rpm 2 rpm 1.8 rpm	Using Tachometer Calibrator by direct method
	Non-Contact type: 10 rpm to 1000 rpm 1000 rpm to 50000 rpm 50000 rpm to 90000 rpm	 0.99 rpm 2.6 rpm 4.5 rpm	Using Tachometer Calibrator by direct method
Optical Radiation			
Lux Meter	1 lux to 12000 lux	5.7 %	Using Lux Calibrator by direct method
Chemical/Gas			
Chemical PH meter	4 pH 7 pH 10 pH	0.022 pH 0.022 pH 0.022 pH	Using Standard Buffer Solution by direct method D1293-18
Conductivity Meter	84 µS/cm 1413 µS/cm 12880 µS/cm	0.7 µS/cm 2.7 µS/cm 12.4 µS/cm	Using Standard Conductivity Solution by direct method
Gas Detector • CO • O_2 • LEL • H_2S	 100 ppm 18.0 % 50 % 25 ppm	 2.1 ppm 2.1 % 2.1 % 0.5 ppm	Using standard reference gas by direct method

[1]The uncertainty covered by the Calibration and Measurement Capability (CMC) is expressed as the expanded uncertainty having a coverage probability of approximately 95 %. It is the smallest measurement uncertainty that a laboratory can achieve within its scope of accreditation when performing calibrations of a best existing device. The measurement uncertainty reported on a calibration certificate may be greater than that provided in the CMC due to the behavior of the calibration item and other factors that may contribute to the uncertainty of a specific calibration.

[2]When uncertainty is stated in relative terms (such as percent, a multiplier expressed as a decimal fraction or in scientific notation), it is in relation to instrument reading or instrument output, as appropriate, unless otherwise indicated.

[3]Capability is suitable for the calibration of devices intended to measure the indicated quantity in the stated ranges.

[4]Capability is suitable for the calibration of devices intended to generate the indicated quantity in the stated ranges.

Φ = diameter
gon = gradian (1 gon = 0.9°)
mgon = milligradian