CERTIFICATE OF ACCREDITATION

This is to attest that

METROMAC CALIBRATION SERVICES WLL

B1-A6-13, GWC AL WUKAIR LOGISTIC PARK, BIRKAT AL AWAMER, P.O BOX: 200239,
AL WAKRAH, STATE OF QATAR

Calibration Laboratory CL-208

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 December 5, 2023

Expiration Date October 1, 2024

President

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SCOPE OF ACCREDITATION

International Accreditation Service, Inc.

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METROMAC CALIBRATION SERVICES WLL

Contact Name SUDHEESH V S **Contact Phone** +974-66883132

Accredited to ISO/IEC 17025:2017 *Effective Date December 5, 2023*

CALIBRATION AND MEASUREMENT CAPABILITY (CMC)*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Dimensional			
Dial Gauge	0 mm to 25 mm	2.9 µm	Dial Calibration Tester, Procedure MQS03 C133
Outside Micrometer	0 mm to 25 mm 25 mm to 50 mm 50 mm to 75 mm 75 mm to 100 mm	2.3 µm 2.7 µm 2.9 µm 3.5 µm	0 Grade Gauge Block Set, Procedure MQS03 C134
Caliper Digital	0 mm to 300 mm	15 µm	0 Grade Gauge Block Set, Procedure MQS03 C78
Caliper Analog	0 mm to 600 mm	30 µm	0 Grade Gauge Block Set, Procedure MQS03 C78
Feeler Gauge	0.01 mm to 1 mm	1.2 µm	Digital Micrometer, Procedure MQS03 C135
Steel Ruler	0 mm to 1000 mm	0.02 mm	Tape & Scale Calibrator Procedure MQS03 C155
Tape Meter	0 mm to 50000 mm	(0.28 + 0.00094 L) mm (where L is in meters)	Tape & Scale Calibrator Procedure MQS03 C155
Mechanical			
Pressure Measuring Devices - Pneumatic (Pressure gauges, Transducers, Switches, Pressure transmitters etc.)	0.001 bar to 3.5 bar 0.01 bar to 100 bar	0.02 % + 0.6 mbar 0.02 % + 6.6 mbar	Pressure Calibrator GE Druck CM1 Procedure MQS03 C99

** 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)
Pressure Measuring Devices - Hydraulic (Pressure gauges, Transducers, Switches, Pressure transmitters etc.)	100 bar to 1000 bar	0.31 bar	Digital pressure gauge Additel 681 Procedure MQS03 C98
	1000 bar to 2000 bar 2000 bar to 2400 bar	12 bar 29 bar	Digital pressure gauge Sika Type P Procedure MQS03 C98
	6 bar to 60 bar 60 bar to 1400 bar	0.008 bar 0.17 bar	Hydraulic dead weight tester DH-Budenberg CPB5800 Procedure MQS03 C98
Torque wrench	1.25 N m to 25 N m 25 N m to 400 N m 400 N m to 1500 N m	0.8 % 1.2 % 0.64 %	Flange Mouth Transducer with Indicator, Norbar / 50673 LOG Norbar / 50675.LOG Norbar / 50676.LOG Norbar / 43228 Procedure MQS03 C151
Platform Scale	0 kg to 300 kg	0.012 kg	M1 Class 20 kg weights Procedure MQS 03 C169
Analytical Balance	0 g to 220 g	0.0003 g	E2 Class weight set Procedure MQS 03 C169
Sound Level meter	94 dB and 114 dB	0.3 dB	Constant Sound Level Calibrator Procedure MQS03 C172
Thermal			
Digital Thermometer	-20 °C to 150 °C	0.054 °C	Digital thermometer ThermoProbe, Procedure MQS03 C101
Oven	25 °C to 250 °C	1.4 °C	Data logger HIOKI LR8401-20, Procedure MQS03 C104 (9 points)
Incubator	20 °C to 100 °C	0.65 °C	Data logger HIOKI LR8401-20 Procedure MQS03 C106 (9 points)
Refrigerators / Freezers	-30 °C to 20 °C	1.1 °C	Data logger HIOKI LR8401-20 Procedure MQS03 C105 (9 points)
Liquid baths	-30 °C to 250 °C	1.2 °C	Multifunction Calibrator Druck DPI 880 / Data logger HIOKI LR8401-20. Procedure MQS03 C108
Glass Thermometer 0.05 °C resolution 0.1 °C resolution 0.5 °C to 1 °C resolution	 36 °C to 102 °C -20 °C to 130 °C 130 °C to 400 °C	 0.07 °C 0.17 °C 1.2 °C	Digital Thermometer ThermoProbe, Fluke Calibration Bath. Procedure MQS03 C130

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Thermo-Hygrometer	10 °C to 70 °C 10 %RH to 95 %RH	0.5 °C 1.2 %RH	Binder Climate Chamber. Procedure MQS03 C131
Muffle furnace	100 ºC to 850 ºC 850 °C to 1100 ºC	2.7 ºC 4 ºC	Multifunction Calibrator, Druck, TC-N type. Procedure MQS03 C132
Electrical – DC/LF			
AC Voltage - Generate[3]	1.0 mV to 32.999 mV (10 Hz to 45 Hz) (45 Hz to 10 kHz) (10 kHz to 20 kHz) (20 kHz to 50 kHz) (50 kHz to 100 kHz) (100 kHz to 500 kHz) 33 mV to 329.999 mV (10 Hz to 45 Hz) (45 Hz to 10 kHz) (10 kHz to 20 kHz) 33 mV to 329.999 mV (20 kHz to 50 kHz) (50 kHz to 100 kHz) (100 kHz to 500 kHz) 0.33 V to 3.29999 V (10 Hz to 45 Hz) (45 Hz to 10 kHz) (10 kHz to 20 kHz) (20 kHz to 50 kHz) (50 kHz to 100 kHz) (100 kHz to 500 kHz) 3.3 V to 32.9999 V (10 Hz to 45 Hz) (45 Hz to 10 kHz) (10 kHz to 20 kHz) (20 kHz to 50 kHz) (50 kHz to 100 kHz) 33 V to 329.999 V (45 Hz to 1 kHz) (1 kHz to 10 kHz) (10 kHz to 20 kHz) (20 kHz to 50 kHz) (50 kHz to 100 kHz)	 0.55 x 10^{-3} + 6.5 µV 0.28 x 10^{-3} + 4.8 µV 0.29 x 10^{-3} + 4.3 µV 0.65 x 10^{-3} + 4.3 µV 1.9 x 10^{-3} + 7.4 µV 4.4 x 10^{-3} + 28 µV 0.27 x 10^{-3} + 12 µV 90 x 10^{-6} + 7.1 µV 99 x 10^{-6} + 7.1 µV 0.21 x 10^{-3} + 6.8 µV 0.48 x 10^{-3} + 19 µV 1.2 x 10^{-3} + 43 µV 0.16 x 10^{-3} + 73 µV 73 x 10^{-6} + 35 µV 0.11 x 10^{-3} + 42 µV 0.17 x 10^{-3} + 45 µV 0.40 x 10^{-3} + 84 µV 1.3 x 10^{-3} + 0.34 µV 0.16 x 10^{-3} + 0.78 mV 87 x 10^{-6} + 0.32 mV 0.14 x 10^{-3} + 0.46 mV 0.22 x 10^{-3} + 0.61 mV 0.57 x 10^{-3} + 1.3 mV 0.11 x 10^{-3} + 3.5 mV 0.11 x 10^{-3} + 4.6 mV 0.14 x 10^{-3} + 4.5 mV 0.44 x 10^{-3} + 11 mV 1.1 x 10^{-3} + 28 mV	Multifunction Calibrator, 5520A. Procedure MQS03 C103

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
AC Voltage - Generate[3] (continued)	330 V to 1000 V (45 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz)	0.16 x 10^{-3} + 49 mV 0.14 x 10^{-3} + 46 mV 0.17 x 10^{-3} + 44 mV	Multifunction Calibrator, 5520A. Procedure MQS03 C103
DC Voltage - Generate[3]	3 mV to 329.9999 mV 0.33 V to 3.299999 V 3.3 V to 32.99999 V 33 V to 329.9999 V 330 V to 1000 V	14 x 10^{-6} + 1.9 µV 7.2 x 10^{-6} + 2.7 µV 8.0 x 10^{-6} + 16 µV 12 x 10^{-6} + 0.16 mV 12 x 10^{-6} + 1.2 mV	Multifunction Calibrator, 5520A. Procedure MQS03 C103
DC Resistance - Generate[3]	0 Ω to 10.9999 Ω 11 Ω to 32.9999 Ω 33 Ω to 109.9999 Ω 110 Ω to 329.9999 Ω 330 Ω to 1.099999 kΩ 1.1 kΩ to 3.299999 kΩ 3.3 kΩ to 10.99999 kΩ 11 kΩ to 32.99999 kΩ 33 kΩ to 109.9999 kΩ 110 kΩ to 329.9999 kΩ 330 kΩ to 1.099999 MΩ 1.1 MΩ to 3.299999 MΩ 3.3 MΩ to 10.99999 MΩ 11 MΩ to 32.99999 MΩ 33 MΩ to 109.9999 MΩ 110 MΩ to 329.999 MΩ 330 MΩ to 1100 MΩ	33 x 10^{-6} + 5.6 mΩ 18 x 10^{-6} + 8.2 mΩ 17 x 10^{-6} + 8.2 mΩ 17 x 10^{-6} + 11 mΩ 16 x 10^{-6} + 11 mΩ 16 x 10^{-6} + 0.11 Ω 16 x 10^{-6} + 77 mΩ 16 x 10^{-6} + 0.55 Ω 16 x 10^{-6} + 0.58 Ω 20 x 10^{-6} + 6.5 Ω 20 x 10^{-6} + 17 Ω 36 x 10^{-6} + 0.14 kΩ 74 x 10^{-6} + 0.25 kΩ 0.14 x 10^{-3} + 1.5 kΩ 0.29 x 10^{-3} + 2.9 kΩ 1.7 x 10^{-3} + 56 kΩ 8.2 x 10^{-3} + 0.31 MΩ	Multifunction Calibrator, 5520A. Procedure MQS03 C103
DC Current - Generate[3]	3 µA to 329.999 µA 330 µA to 3.29999 mA 3.3 mA to 32.9999 mA 33 mA to 329.999 mA 330 mA to 2.99999 A 3 A to 10.9999 A 11 A to 20.5 A	86 x 10^{-6} + 12 nA 57 x 10^{-6} + 18 nA 57 x 10^{-6} + 0.12 µA 57 x 10^{-6} + 1.2 µA 0.12 x 10^{-3} + 22 µA 0.28 x 10^{-3} + 0.22 mA 0.56 x 10^{-3} + 0.52 mA	Multifunction Calibrator, 5520A. Procedure MQS03 C103
DC Clamp meter	16.5 A to 149.95 A 150 A to 1000 A	2.0 x 10^{-3} + 12 mA 2.1 x 10^{-3} + 40 mA	Multifunction Calibrator, 5520A, 50 Turncoil. Procedure MQS03 C103
AC Current - Generate[3]	29.00 µA to 329.99 µA (10 Hz to 20 Hz) (20 Hz to 45 Hz) (45 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz) (10 kHz to 30 kHz) 0.33 mA to 3.2999 mA (10 Hz to 20 Hz) (20 Hz to 45 Hz)	 1.2 x 10^{-3} + 77 nA 0.88 x 10^{-3} + 77 nA 0.77 x 10^{-3} + 65 nA 1.8 x 10^{-3} + 89 nA 4.5 x 10^{-3} + 0.12 µA 11 x 10^{-3} + 0.23 µA 1.2 x 10^{-3} + 0.48 µA 0.69 x 10^{-3} + 0.50 µA	Multifunction Calibrator, 5520A. Procedure MQS03 C103

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
AC Current - Generate[3] (continued)	(45 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz) (10 kHz to 30 kHz) 3.3 mA to 32.999 mA (10 Hz to 20 Hz) (20 Hz to 45 Hz) (45 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz) (10 kHz to 30 kHz) 33 mA to 329.99 mA (10 Hz to 20 Hz) (20 Hz to 45 Hz) (45 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz) (10 kHz to 30 kHz) 0.33 A to 2.99999 A (10 Hz to 45 Hz) (45 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz 3 A to 10.9999 A (45 Hz to 100 Hz) (100 Hz to 1 kHz) (1 kHz to 5 kHz) 11 A to 20.5 A (45 Hz to 100 Hz) (100 Hz to 1 kHz) (1 kHz to 5 kHz)	$0.60 \times 10^{-3} + 0.26$ µA $1.1 \times 10^{-3} + 0.24$ µA $2.8 \times 10^{-3} + 0.30$ µA $7.8 \times 10^{-3} + 0.85$ µA $1.0 \times 10^{-3} + 2.9$ µA $0.52 \times 10^{-3} + 2.7$ µA $0.25 \times 10^{-3} + 2.3$ µA $0.52 \times 10^{-3} + 1.7$ µA $1.3 \times 10^{-3} + 3.0$ µA $3.0 \times 10^{-3} + 6.3$ µA $1.0 \times 10^{-3} + 29$ µA $0.52 \times 10^{-3} + 27$ µA $0.30 \times 10^{-3} + 23$ µA $0.61 \times 10^{-3} + 34$ µA $1.3 \times 10^{-3} + 61$ µA $3.5 \times 10^{-3} + 0.12$ mA $0.97 \times 10^{-3} + 0.25$ mA $0.38 \times 10^{-3} + 0.20$ mA $3.2 \times 10^{-3} + 0.57$ mA $14 \times 10^{-3} + 2.7$ mA $0.43 \times 10^{-3} + 3.3$ mA $0.59 \times 10^{-3} + 3.0$ mA $14 \times 10^{-3} + 1.3$ mA $0.72 \times 10^{-3} + 6.9$ mA $0.86 \times 10^{-3} + 6.6$ mA $14 \times 10^{-3} + 3.3$ mA	Multifunction Calibrator, 5520A. Procedure MQS03 C103
AC Clamp meter	16.5 A to 149.9995 A (10 Hz to 100 Hz) (100 Hz to 440 Hz) 150 A to 1000 A (10 Hz to 100 Hz) (100 Hz to 440 Hz)	 $2.4 \times 10^{-3} + 20$ mA $6.6 \times 10^{-3} + 21$ mA $2.4 \times 10^{-3} + 71$ mA $8.5 \times 10^{-3} + 65$ mA	Multifunction Calibrator, 5520A, 50 Turncoil. Procedure MQS03 C103
Capacitance - Generate[3,4] @ 45 Hz	0.19 nF to 0.3999 nF 0.4 nF to 1.0999 nF 1.1 nF to 3.2999 nF 3.3 nF to 10.9999 nF 11 nF to 32.9999 nF	$2.7 \times 10^{-3} + 5.5$ pF $2.8 \times 10^{-3} + 5.5$ pF $3.0 \times 10^{-3} + 5.5$ pF $1.2 \times 10^{-3} + 9$ pF $1.4 \times 10^{-3} + 55$ pF	Multifunction Calibrator, 5520A. Procedure MQS03 C103

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Capacitance – Generate[3,4] @ 45 Hz (continued)	33 nF to 109.999 nF 110 nF to 329.999 nF 0.33 µF to 1.09999 µF 1.1 µF to 3.29999 µF 3.3 µF to 10.9999 µF 11 µF to 32.9999 µF 33 µF to 109.999 µF 110 µF to 329.999 µF) 0.33 mF to 1.09999 mF 1.1 mF to 3.2999 mF 3.3 mF to 10.9999 mF 11 mF to 32.9999 mF 33 mF to 110 mF	1.2×10^{-3} + 90 pF 1.4×10^{-3} + 0.18 nF 1.2×10^{-3} + 0.9 nF 1.4×10^{-3} + 1.8 nF 1.3×10^{-3} + 9 nF 2.3×10^{-3} + 18 nF 2.5×10^{-3} + 85 nF 2.6×10^{-3} + 0.2 µF 2.5×10^{-3} + 0.86 µF 2.6×10^{-3} + 1.9 µF 2.5×10^{-3} + 8.3 µF 4.2×10^{-3} + 18 µF 6×10^{-3} + 76 µF	Multifunction Calibrator, 5520A. Procedure MQS03 C103
Time and Frequency			
Frequency – Generate[3] (Voltage specified @ 50 V)	0.01 Hz to 119.99 Hz 120 Hz to 1199.9 Hz 1.2 kHz to 11.999 kHz 12 kHz to 119.99 kHz 120 kHz to 1199.9 kHz 1.2 MHz to 2 MHz	0.94×10^{-6} + 89 µHz 1.1×10^{-6} + 0.71 mHz 1.1×10^{-6} + 7.1 mHz 1.1×10^{-6} + 71 mHz 1.1×10^{-6} + 0.71 Hz 1.4×10^{-6} + 0.67 Hz	Multifunction Calibrator, 5520A. Procedure MQS03 C103
Centrifuge, Mixers, Orbit & Plate Shaker, MST Apparatus, Autoclaves Speed Timer	 0 rpm to 5000 rpm 0 min to 30 min	 1.6 rpm 0.7 s	Standard Tachometer, Digital Stopwatch. Procedure MQS03 C136
Stopwatch	Up to 8 h	0.14 s	Direct Comparison method by using stopwatch. Procedure MQS 03 C 171
Chemical/Gas			
Gas Detector Oxygen - O_2 Methane - CH_4 Sulphur Dioxide – SO_2 Carbon Monoxide – CO Carbon Monoxide - CO Ammonia – NH_3 Chlorine – CL_2 Hydrogen sulfide – H_2S Ethanol C_2H_5OH Carbon Dioxide CO_2	 18 % Vol 50 % LEL 10 parts in 10^6 100 parts in 10^6 300 parts in 10^6 25 parts in 10^6 5 parts in 10^6 25 parts in 10^6 0.082 % BrAC 2 % Vol	 0.37 % Vol 1.2 % LEL 0.22 parts in 10^6 2.1 parts in 10^6 6 parts in 10^6 0.77 parts in 10^6 0.5 parts in 10^6 0.51 parts in 10^6 0.0017 % BrAC 0.04 % Vol	Standard Gas Procedure / MQS03 C173

[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 measuring devices in the stated ranges.

Notes:
LEL = Lower Explosive Limit
Vol = Volume
BrAC = Breath Alcohol Concentration