CERTIFICATE OF ACCREDITATION

This is to attest that

CALIBRATION LABORATORY W.L.L.

SY46 – C101
THE COMMERCIAL AVENUE, 3321, STATE OF QATAR

Calibration Laboratory CL-224

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 July 14, 2021

Expiration Date August 1, 2023

President

Visit www.iasonline.org for current accreditation information.

SCOPE OF ACCREDITATION

International Accreditation Service, Inc.

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Accredited to ISO/IEC 17025:2017 *Effective Date July 14, 2021*

CALIBRATION AND MEASUREMENT CAPABILITY (CMC)*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION PROCEDURE AND/OR STANDARD EQUIPMENT USED
Dimensional			
Vernier Caliper	Up to 300 mm	7.5 µm	Procedure: CL-CM-M-1.1 0 Grade Gauge Block Set as per IS 3651
External Micrometer	Up to 25 mm 25 mm to 150 mm	1.5 µm 7 µm	Procedure: CL-CM-M-1.2 0 Grade Gauge Block Set as per IS 2967
Dial Gauge	Up to 25 mm	7 µm	Procedure: CL-CM-M-1.4 Dial Gauge Calibrator as per IS 2092
Measuring Tape /Scales	Up to 50 m	6 µm	Procedure: CL-CM-M-1.3 Tape-Scale Measuring Machine as per OIML R 35-1
Feeler gauge	0.03 mm to 0.5 mm	6.2 µm	Procedure: CL-CM-M-2.1 Using micrometer NPL GPG 40 & BS 957
Thickness gauge	Up to 1 mm	2.6 µm	Procedure: CL-CM-M-2.1 Using micrometer NPL GPG 40
Sieves	2 mm to 125 mm	0.009 mm	Procedure: CL-CM-M-2.5 Using caliper and Procedure: CL-CM-M-2.7 Using optical microscope ASTM E11
	0.063 mm to 1.8 mm	3.6 µm	
Coating Thickness Tester (Elcometer, ferrous and non-ferrous)	0.048 mm 0.098 mm 0.252 mm 0.510 mm 1.02 mm 1.53 mm	6.4 % 3.6 % 2.3 % 2.0 % 2.0 % 2.0 %	Procedure: CL-CM-M-2.2 Using coating thickness standards ASTM D7091

** 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 PROCEDURE AND/OR STANDARD EQUIPMENT USED
Length Measurement[5]	Up to 25 mm	2.7 µm	Procedure: CL-CM-M-2.0 Using micrometer NPL GPG 40
	Up to 300 mm	0.075 mm	Procedure: CL-CM-M-1.9 Using caliper IS 3651
Mechanical			
Hydraulic Pressure - Pressure Gauge	0.1 bar to 700 bar	0.013% FS	Procedure: CL-CM-M-1.7 Pressure Calibrator based on/ DKD R-6-1
Pneumatic Pressure - Pressure Gauge	0.1 bar to 200 bar	0.03% FS	Procedure: CL-CM-M-1.7 Pressure Calibrator based on DKD R-6-1
Weighing Balance	1 mg to 50 g 50 g to 200 g 200 g to 1000 g 1 kg to 20 kg	0.04 mg 0.07mg 0.006 g 0.6 g	Procedure: CL-CM-M-1.6 E2 Class Weights OIML R-76
	20 kg to 200 kg	11 g	Procedure: CL-CM-M-1.6 M1 Class Weights as per OIML R -76
Weights	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g	0.058 mg 0.058 mg 0.058 mg 0.058 mg 0.058 mg 0.058 mg 0.058 mg 0.058 mg 0.058 mg 0.058 mg 0.058 mg 0.01mg 0.058 mg 0.058 mg 0.058 mg 0.12 mg 0.14 mg	Procedure: CL-CM-M-1.5 Using E2 Class Weights & High Precision Balance as per OIML R 111
	500 g 1 kg	0.98 mg 1 mg	Procedure: CL-CM-M-1.5 Using E2 Class Weights & High Precision Balance as per OIML R 111
	2 kg 5 kg 10 kg 20 kg	9.8 mg 10 mg 12 mg 79 mg	Procedure: CL-CM-M-1.5 Using E2 & F Class Weights & Mass Comparator as per OIML R 111

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION PROCEDURE AND/OR STANDARD EQUIPMENT USED
Force Compression / Tension (Proving Ring, \Compression / UTM Machine)	0 kN to15 kN 15 kN to100 kN 100 kN to 3000 kN	0.42 % + 0.004 kN 0.03 % 0.04 %	Procedure: CL-CM-M-1.8 Using Reference Morehouse Load Cells C-9402 and C-9596 with Readout ISO 7500-1
Vacuum Pressure (Pressure Gauge, Dial/Digital)	0 bar to -0.8 bar	9.6 mbar	Procedure: CL-CM-M-1.7 Pressure Calibrator based on DKD R-6-1
Thermal			
Contact Type Temperature Probes (RTD, Thermocouple with/without indicator)	-30 °C to 150 °C	0.082 °C	Procedure: CL-CM-T-1.1 Comparison with Fluke Reference RTD 5628 & Fluke 1524 Reference Thermometer with Fluke Metrology Well 9171/ Fluke 7013 micro-bath as source as per Euramet cg-08
	150 °C to 1200 °C	3.1 °C	Procedure: CL-CM-T-1.1 Comparison with Fluke S-type Thermocouple 5650 & Fluke 1524 Reference Thermometer with Fluke 9150 Calibrator as per cg-08
Dryblock / Temperature Bath / Furnace	-35 °C to 200 °C 200 °C to 600 °C 600 °C to 1200 °C	0.03 °C 0.13 °C 1.3 °C	Procedure: CL-CM-T-1.2 Using Reference PRT 5628 / S type TCS 5650 with reference thermometer Fluke 1524 as per DKD-R-5-7 & Euramet Cg-20
Non-Contact Temperature Sensor (IR Thermometer)	35 °C to 330 °C 330 °C to 500 °C	1.6 °C 1.7 °C	Procedure: CL-CM-T-1.3 Using Fluke 4181 IR Calibrator as per MSL Technical Guide 22 & Manufacturer Specification
Humidity Sensor/ Thermohygrometer /Loggers/ Recorders	10 %RH to 95 %RH @18 °C to 23 °C -40 °C to 70 °C	0.90 %RH 0.21 °C	Procedure: CL-CM-T-1.4 Using Fluke 5128 A Humidity Generator as per Manufacturer Specification
Humidity Cabinets	20 %RH to 80 %RH 81 %RH to 95 %RH	2.8 %RH 3.9 %RH	Procedure: CL-CM-T-1.5Using Extech RHT-20 Humidity and Temperature Data Logger as per DKD-R 5-7 and Euramet cg-20

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION PROCEDURE AND/OR STANDARD EQUIPMENT USED
Oven, Chiller, Freezer	-30 °C to 150 °C 151 ˚C to 250 ˚C	1.8 ˚C 3.3 ˚C	Procedure: CL-CM-T-1.2 Using Fluke 2638A Hydra Series III Data Acquisition System with Multi point sensors
Electrical – DC/LF			
AC Voltage Source[3] @ 50 Hz to 10 kHz	1.0 mV to 32.999 mV 33 mV to 329.999 mV 0.33 V to 3.29999 V 3.3 V to 32.9999 V 33 V to 329.999 V 330 V to 1020 V	0.033 % 0.029 % 0.029 % 0.026 % 0.031 % 0.028 %	Procedure: CL-CM-E-1.2 DIRECT METHOD WITH FLUKE 5522A
DC Voltage Source[3]	0 V 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 1020 V	0.53 % + 0.4 µV 0.0023 % 0.0012 % 0.0046 % 0.014 %	Procedure: CL-CM-E-1.1 DIRECT METHOD WITH FLUKE 5522A
DC Current Source[3]	0 A to 32.9999 mA 33 mA to 329.999 mA 330 mA to 1.09999 A 1.1 A to 2.99999 A 3 A to 10.9999 A 11 A to 20 A 20 A to 1000 A	0.011 % + 6 nA 0.035 % 0.036 % 0.073 % 0.092 % 0.28 % 0.57 %	Procedure: CL-CM-E-1.3 DIRECT METHOD WITH FLUKE 5522A with Current Coil
AC Current Source[3] @ 60 Hz	29 µA to 329.99 µA 0.33 mA to 3.2999 mA 3.3 mA to 32.9999 mA 33 mA to 329.999 mA 0.33 A to 1.09999 A 1.1 A to 2.99999 A 3 A to 10.9999 A 11 A to 20 A 20 A to 1000 A	0.12 % 0.08 % 0.039 % 0.036 % 0.052% 0.34 % 0.1 % 0.14 % 0.23 %	Procedure: CL-CM-E-1.4 DIRECT METHOD WITH FLUKE 5522A with Current Coil
DC Resistance Source[3]	0 Ω to 10.999 Ω 11 Ω to 32.999 Ω 33 Ω to 109.999 Ω 110 Ω to 329.999 Ω 330 kΩ to 1.09999 kΩ 1.1 kΩ to 3.29999 kΩ 3.3 kΩ to 10.9999 kΩ 11 kΩ to 32.9999 kΩ 33 kΩ to 109.999 kΩ 110 kΩ to 329.999 kΩ 0.33 MΩ to 1.09999 MΩ 1.1 MΩ to 3.29999 MΩ 3.3 MΩ to 10.9999 MΩ 11 MΩ to 32.9999 MΩ	0.079 % + 73 µΩ 0.037 % 0.013 % 0.0035 % 0.0039 % 0.0068 % 0.0029 % 0.0045 % 0.0031 % 0.0048 % 0.0035 % 0.0081 % 0.013 % 0.028 %	Procedure: CL-CM-E-1.5 DIRECT METHOD WITH FLUKE 5522A

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION PROCEDURE AND/OR STANDARD EQUIPMENT USED
DC Resistance Source[3] continued	33 MΩ to 109.999 MΩ 110 MΩ to 329.999 MΩ 330 MΩ to 1100.00 MΩ	0.075 % 0.29 % 0.041 %	Procedure: CL-CM-E-1.5 DIRECT METHOD WITH FLUKE 5522A
Capacitance Source[3,5] @ 1kHz	1.1 nF to 3.299 nF 3.3nF to 10.999 nF 31 nF to 109.999 nF 110 nF to 329.999 nF 0.33 µF to 1.0999 µF 1.1 µF to 3.2999 µF 3.3 µF to 10.999 µF 11 µF to 32.999 µF 33 µF to 109.999 µF 110 µF to 329.999 µF 0.33 mF to 1.0999 mF 1.1 mF to 3.2999 mF 3.3 mF to 10.999 mF 11 mF to 32.999 mF 33 mF to 110 mF	1.2 % 0.28 % 0.28 % 0.091 % 0.28 % 0.33 % 0.28 % 0.42 % 0.45 % 0.45 % 0.42 % 0.45 % 0.43 % 0.66 % 0.91 %	Procedure: CL-CM-E-1.6 DIRECT METHOD WITH FLUKE 5522A
Temperature Simulation of Thermocouples (Source): Type E Type J Type K Type T Type S Type N RTD	 -200 °C to 1000 °C -200 °C to 1200 °C -200 °C to 1370 °C -200 °C to 400 °C 0 °C to 1700 °C -200 °C to 1200 °C -200 °C to 800 °C	 0.57 °C 0.31 °C 0.31 °C 0.72 °C 0.54 °C 0.46 °C 0.11 °C	Procedure: CL-CM-E-1.7, CL-CM-E-1.8 DIRECT METHOD WITH FLUKE 5522A CALIBRATOR
Temperature Simulation of Thermocouples (Measure): Type E Type J Type K Type T Type S Type N RTD	 -100 °C to 1000 °C -100 °C to 1200 °C -100 °C to 1370 °C -100 °C to 400 °C 100 °C to 1700 °C -100 °C to 1200 °C -200 °C to 800 °C	 0.52 °C 0.60 °C 0.60 °C 0.47 °C 0.68 °C 0.50 °C 0.26 °C	Procedure: CL-CM-E-2.7 DIRECT METHOD WITH FLUKE 2638A and FLUKE 8846A 6 1/2 DIGIT DMM
DC Voltage Measure[4]	0 V to 100 mV 0.100 V to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	0.025 % + 2.0 µV 0.022 % 0.021 % 0.021 % 0.022 %	Procedure: CL-CM-E-2.1 DIRECT METHOD WITH FLUKE 8846A 6 1/2 DIGIT DMM
AC Voltage Measure[4]	(50 Hz) 0.100 V to 1 V 1 V to 10 V	 0.069 % 0.069 %	Procedure: CL-CM-E-2.2

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION PROCEDURE AND/OR STANDARD EQUIPMENT USED
AC Voltage Measure[4] continued	10 V to 100 V 100 V to 1000 V (10 kHz) 0.100 V to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	0.069 % 0.065 % 0.069 % 0.069 % 0.069 % 0.065 %	DIRECT METHOD WITH FLUKE 8846A 6 1/2 DIGIT DMM Procedure: CL-CM-E-2.2 DIRECT METHOD WITH FLUKE 8846A 6 1/2 DIGIT DMM
DC Current Measure[4]	0.100 mA to 10 mA 10 mA to 100 mA 0.100 A to 1 A 1 A to 3 A 3 A to 10 A	0.054 % 0.043 % 0.054 % 0.091 % 0.14 %	Procedure: CL-CM-E-2.3 DIRECT METHOD WITH FLUKE 8846A 6 1/2 DIGIT DMM
AC Current Measure[4]	(50 Hz to 1 kHz) 0.100 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 3 A 3 A to 10 A	 0.16 % 0.11 % 0.13 % 0.11 % 0.19 %	Procedure: CL-CM-E-2.4 DIRECT METHOD WITH FLUKE 8846A 6 1/2 DIGIT DMM
DC Resistance Measure[4]	1 Ω to 100 Ω 0.100 kΩ to 1 kΩ 1 kΩ to 100 kΩ 0.100 MΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 0.100 GΩ to 1 GΩ	0.033 % 0.022 % 0.022 % 0.022 % 0.035 % 0.63 % 3.3 %	Procedure: CL-CM-E-2.5 DIRECT METHOD WITH FLUKE 8846A 6 1/2 DIGIT DMM
Capacitance Measure[4]	1 nF to 100 nF 0.100 µF to 1 µF 1 µF to 100 µF 0.100 mF to 1 mF 1 mF to 100 mF	0.63 % 0.63 % 0.68 % 0.69 % 1 %	Procedure: CL-CM-E-2.6 DIRECT METHOD WITH FLUKE 8846A 6 1/2 DIGIT DMM
Time and Frequency			
Frequency Measure[4]	1 Hz to 100 Hz 101 Hz to 100 kHz 100 kHz to 200 kHz 200 kHz to 750 kHz 750 kHz to 1 kHz	0.14 % 0.0095 % 0.029 % 0.014 % 0.011 %	Procedure: CL-CM-E-2.8 DIRECT METHOD WITH FLUKE 8846A 6 1/2 DIGIT DMM
Frequency Source[3]	100 Hz to 100 kHz	0.0002 %	Procedure: CL-CM-E-1.9 DIRECT METHOD WITH FLUKE 5522A CALIBRATOR
Tachometer	6000 rpm to 99999 rpm	1.2 rpm	Procedure: CL-CM-M-2.4 Using 5522A Multiproduct Calibrator with LED Lights Comparison method

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION PROCEDURE AND/OR STANDARD EQUIPMENT USED
Rotational speed	0 rpm to 2000 rpm 2001 rpm to 3600 rpm 3600 rpm to 10000 rpm	1 rpm 1.5 rpm 4.8 rpm	Procedure: CL-CM-M-2.3 Tachometer ASTM F2046
Stopwatch	0 min to 30 min 0.5 h to 10 h 10 h to 24 h	0.02 s 0.5 s 2 s	Procedure: CL-CM-M-2.6 Master Stopwatch NIST 960-12

[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.

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

[5]Capability is suitable for the calibration of various types of test equipment and fixtures requiring the calibration of length, width or diameter.