



INTERNATIONAL
ACCREDITATION
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CERTIFICATE OF ACCREDITATION

This is to attest that

AL HOTY ANALYTICAL SERVICES W.L.L CALIBRATION DEPARTMENT

YARD NO 304 ROAD 4306 BLOCK 343
MANAMA, KINGDOM OF BAHRAIN

Calibration Laboratory CL-132

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 September 18, 2023

Expiration Date June 1, 2024



A handwritten signature in black ink that reads "Raj Nathan".

President

Visit www.iasonline.org for current accreditation information.

SCOPE OF ACCREDITATION

International Accreditation Service, Inc.

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AL HOTY ANALYTICAL SERVICES W.L.L CALIBRATION DEPARTMENT

www.alhotybahrain.com

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Contact Phone + 973 17727450

Accredited to ISO/IEC 17025:2017

Effective Date September 18, 2023

CALIBRATION AND MEASUREMENT CAPABILITY (CMC)*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY ^{1,2} (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
<i>Dimensional</i>			
Dial Calipers, Vernier Calipers, Digital Calipers	0 mm to 300 mm 300 mm to 600 mm 600 mm to 1000 mm	6.7 µm 7.8 µm 9.8 µm	Using Slip Gauge Set Grade 'K', Caliper Checker & Slip Gauge Accessories by comparison Method as per SOP: CP-D-01 ISO 13385-1 ASME B89.1.14
Dial Depth Gauge, Vernier Depth Gauge, Digital Depth Gauge	0 mm to 600 mm	7.7 µm	Using Slip Gauge Set Grade 'K', by comparison Method as per SOP: CP-D-02 ISO 13385-2
Inside Dial Gauge, Inside Dial Caliper, Outside Dial Gauge, Outside Dial Caliper	0 mm to 300 mm	5.6 µm	Using Slip Gauge Set Grade 'K', & Slip Gauge Accessories by comparison Method as per SOP: CP-D-03 ISO 13385-1 ASME B89.1.14
Outside Micrometers	0 mm to 600 mm 600 mm to 1000 mm	5.8 µm 14 µm	Using Slip Gauge Set Grade 'K', by comparison Method as per SOP: CP-D-04 ISO 3611
Inside Micrometers	0 mm to 600 mm	7.8 µm	Using Slip Gauge Set Grade 'K', & Slip Gauge Accessories by comparison Method as per SOP: CP-D-05 IS-2966

* 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.

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Depth Micrometers	Up to 600 mm	10 µm	Using Slip Gauge Set Grade 'K', Caliper Checker & Slip Gauge Accessories by comparison Method as per SOP: CP-D-06 BS 6468
Coating Thickness Gauge (Ferrous & Non-Ferrous)	25 µm to 1028 µm	2.4 µm	Using Master Foils by comparison Method as per SOP: CP-D-07
Feeler Gauge	Up to 2 mm	3 µm	Using Digimatic Micrometer by comparison Method as per SOP: CP-D-08
Dial / Digital Thickness Gauges	0.5 mm to 50 mm	1.5 µm	Using Slip Gauge Set Grade 'K', by comparison Method as per SOP: CP-D-10 IS 3719
Dial Height Gauge, Vernier Height Gauge, Digital Height Gauge	Up to 1000 mm	12 µm	Using Slip Gauge Set Grade 'K', Caliper Checker & Slip Gauge Accessories by comparison Method as per SOP: CP-D-12 ISO 13225
Dial Indicators	Up to 10 mm 10 mm to 100 mm	3.1 µm 5.8 µm	Using Dial Indicator Calibrator by comparison Method as per SOP: CP-D-13 IS 2092
Test sieve	0.045 mm to 75 mm	8 µm	Using Profile projector ACCU-TECH VT-300 by direct measurement as per SOP: CP-D-09 ISO 3310-1,2
Bevel Protractor/Digital Protractor/Angle Meter	0° to 360°	5'	Using Profile Projector by Comparison Method as per SOP: CP-D-16 IS 4239
Jigs and Fixtures	Linear: up to 200 mm Angular: 0° to 360°	8 µm 3.5'	Using Profile Projector by Comparison Method as per SOP: CP-D-18
Profile Projector (Linear and Angular)	Up to 300 mm 0° to 360°	4 µm 7"	Using Slip Gauge Set Grade 'K', Angle Gauge Block, Digital Caliper by comparison method as per SOP: CP-D-15 JIS B 7184

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Mechanical			
Pressure Gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters, Pressure Relief Valve	0.1 bar to 7 bar 7 bar to 70 bar 70 bar to 700 bar 700 bar to 2000 bar 2000 bar to 4136 bar	0.011 bar 0.036 % 0.031 % 0.2 % 0.1 %	Using Pressure Calibrator, Dead Weight Tester by Direct / Comparison Method as per SOP: CP-P-01, 02, 03, 04, 07 DKD-R 6-1
Low Pressure (Pneumatic), Low pressure Gauge, Low pressure Calibrator, Maghnelic Gauge, Low Pressure Transmitter	-2000 mmH ₂ O to -1 mmH ₂ O 1 mmH ₂ O to 2000 mmH ₂ O	0.15 % 0.15 %	Using Low Pressure Calibrator by Comparison Method as per SOP: CP-P-06 DKD-R 6-1
Absolute Pressure (Pneumatic) Absolute Pressure Gauge, Manometer, Barometer, Pressure Calibrators, Pressure Transmitters	200 mbar to 2000 mbar	0.037 %	Using Absolute Pressure Calibrator by Comparison Method as per SOP: CP-P-05 for Barometer, CP-P-06 for Manometer, CP-P-02 for Pressure/Vacuum Calibrator, CP-P-03 for Pressure/Vacuum Transmitter DKD-R 6-1
Dial Vacuum Gauges, Digital Vacuum Gauges, Digital Vacuum Calibrators, Vacuum Switches, Vacuum, Transmitters	-1 mbar to -0.9 bar	0.18 %	Using Pressure Calibrator, by Comparison Method as per SOP: CP-P-01 for Pressure/Vacuum Gauges, CP-P-02 for Pressure/Vacuum Calibrator, CP-P-03 for Pressure/Vacuum Transmitter, CP-P-06 for Pressure/Vacuum Switch DKD-R 6-1
Weights	1 mg to 100 mg 100 mg to 10 g 10 g to 50 g 50 g to 200 g 200 g to 1000 g	0.014 mg 0.03 mg 0.08 mg 0.22 mg 1.8 mg	Using E2 Class Weights & Balances by Comparison Method as per SOP: CP-M-01 OIML R-111-1,2 (E)
	2 kg, 5 kg and 10 kg 20 kg	15 mg 0.13 g	Using F1 Class Weights & Balances by Comparison Method as per SOP: CP-M-01 OIML R-111-1,2 (E)
Weighing Balance	0 g to 200 g 0 g to 500 g 0 kg to 2 kg	0.15 mg 1.2 mg 9.8 mg	Using E2 Class Weights, SOP: CP-M-02 OIML R-76-1 OIML R-76-2 OIML R 47

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Weighing Balance (continued)	0 kg to 40 kg 0 kg to 300 kg	0.1 g 6.1 g	Using E2 & F1 Class Weights, SOP: CP-M-02 OIML R-76-1 OIML R.76-2 OIML R 47
	0 kg to 3000 kg	0.58 kg	Using F1 & M1 Class Weights, SOP: CP-M-02 OIML R-76-1, OIML R 76-2, OIML R 47
Weighbridge	2000 kg to 60000 kg	18 kg	Using M2-3, Class Weights, SOP: CP-M-05 OIML R-76-1, OIML R 76-2, OIML R 47
Volume	10 µL to 10 mL 10 mL to 100 mL 100 mL to 200 mL 200 mL to 1000 mL	0.6 µL 6.8 µL 9.5 µL 0.83 mL	Using Balances by Gravimetric Method as per SOP: CP-M-03 ASTM E542
Torque Wrench, Torque Screw Driver, Torque Dial Gauge	10 lbf·in to 100 lbf·in 100 lbf·in to 100 lbf·ft 100 lbf·ft to 1000 lbf·ft	1.9 % 1.5 % 1.4 %	Using Torque Wrench Calibrator by Comparison Method as per SOP: CP-MH-01 ISO 6789-1,2
Compression Force	10 kN to 3000 kN	0.29 %	Using Load Cell with Indicator by Comparison Method as per SOP: CP-MH-02 ISO 7500-1
Dynamometer	100 kg to 50000 kg	1.1 %	Using Universal Testing Machine by Comparison method ASTM E74
Sound Level Meter	94 dB and 114 dB (1 kHz)	0.76 dB	Using Sound Level Calibrator by Direct Method as per SOP: CP-MH-03 OIML R 58
Speed (RPM) Tachometer (Non-Contact)	60 rpm to 600 rpm 600 rpm to 60000 rpm 60000 rpm to 200000 rpm	0.1 % 0.032 % 0.02 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-MH-09 Calibration Guideline Sanas TR 45
Rotational Speed	1 rpm to 10000 rpm	0.022 %	Using Digital Tachometer by Direct Method as per SOP: CP-MH-10 Calibration Guideline Sanas TR 45

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Stressing Jack	Up to 30 metric ton	0.5 %	Using Load Cell with Indicator by Comparison method as per SOP: CP-MH-14 ISO 7500-1
Thermal			
Thermocouple – Measure			Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-03 Calibration Guideline EURAMET CG-11
Type B	600 °C to 800 °C 800 °C to 1000 °C 1000 °C to 1550 °C 1550 °C to 1820 °C	0.44 °C 0.34 °C 0.30 °C 0.33 °C	
Type C	0 °C to 150 °C 150 °C to 650 °C 650 °C to 1000 °C 1000 °C to 1800 °C 1800 °C to 2316 °C	0.30 °C 0.26 °C 0.31 °C 0.50 °C 0.84 °C	
Type E	-250 °C to -100 °C -100 °C to -25 °C -25 °C to 350 °C 350 °C to 650 °C 650 °C to 1000 °C	0.50 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C	
Type J	-210 °C to -100 °C -100 °C to -30 °C -30 °C to 150 °C 150 °C to 760 °C 760 °C to 1200 °C	0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C	
Type K	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.33 °C 0.28 °C 0.22 °C 0.16 °C 0.12 °C	
Type L	-200 °C to -100 °C -100 °C to 800 °C 800 °C to 900 °C	0.37 °C 0.26 °C 0.17 °C	
Type N	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 410 °C 410 °C to 1300 °C	0.40 °C 0.22 °C 0.19 °C 0.18 °C 0.27 °C	

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Thermocouple – Measure (continued)			Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-03
Type R	0 °C to 250 °C 250 °C to 400 °C 400 °C to 1000 °C 1000 °C to 1767 °C	0.57 °C 0.35 °C 0.33 °C 0.40 °C	Calibration Guideline EURAMET CG-11
Type S	0 °C to 250 °C 250 °C to 1000 °C 1000 °C to 1400 °C 1400 °C to 1767 °C	0.47 °C 0.36 °C 0.37 °C 0.46 °C	
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	0.63 °C 0.24 °C 0.16 °C 0.14 °C	
Type U	-200 °C to 0 °C 0 °C to 600 °C	0.56 °C 0.27 °C	
RTD Measure			Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-03
Pt 100 (385)	-200 °C to 100 °C 100 °C to 600 °C	0.12 °C 0.29 °C	Calibration Guideline EURAMET CG-11
Pt 200 (385)	-200 °C to 100 °C 100 °C to 600 °C	0.12 °C 0.31 °C	
Pt 500 (385)	-200 °C to 100 °C 100 °C to 600 °C	0.12 °C 0.28 °C	
Pt 1000 (385)	-200 °C to 100 °C 100 °C to 600 °C	0.11 °C 0.26 °C	
Thermocouple Simulation – Generate			Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-03
Type B	600 °C to 800 °C 800 °C to 1000 °C 1000 °C to 1550 °C 1550 °C to 1820 °C	0.44 °C 0.34 °C 0.30 °C 0.33 °C	Calibration Guideline EURAMET CG-11
Type C	0 °C to 150 °C 150 °C to 650 °C 650 °C to 1000 °C 1000 °C to 1800 °C 1800 °C to 2316 °C	0.30 °C 0.26 °C 0.31 °C 0.50 °C 0.84 °C	

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Thermocouple Simulation – Generate continued			Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-03
Type E	-250 °C to -100 °C -100 °C to -25 °C -25 °C to 350 °C 350 °C to 650 °C 650 °C to 1000 °C	0.50 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C	Calibration Guideline EURAMET CG-11
Type J	-210 °C to -100 °C -100 °C to -30 °C -30 °C to 150 °C 150 °C to 760 °C 760 °C to 1200 °C	0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C	
Type K	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.33 °C 0.28 °C 0.22 °C 0.16 °C 0.08 °C	
Type L	-200 °C to -100 °C -100 °C to 800 °C 800 °C to 900 °C	0.37 °C 0.26 °C 0.17 °C	
Type N	-200 °C to -100 °C -100 °C to -25 °C -25 °C to 120 °C 120 °C to 410 °C 410 °C to 1300 °C	0.40 °C 0.22 °C 0.19 °C 0.18 °C 0.27 °C	
Type R	0 °C to 250 °C 250 °C to 400 °C 400 °C to 1000 °C 1000 °C to 1767 °C	0.57 °C 0.35 °C 0.33 °C 0.40 °C	
Type S	0 °C to 250 °C 250 °C to 1000 °C 1000 °C to 1400 °C 1400 °C to 1767 °C	0.47 °C 0.36 °C 0.37 °C 0.46 °C	
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	0.63 °C 0.24 °C 0.16 °C 0.14 °C	
Type U	-200 °C to 0 °C 0 °C to 600 °C	0.56 °C 0.27 °C	

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RTD Simulation – Generate (PT-385, 100 Ω)	-200 °C to 800 °C	0.09 °C	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-03 Calibration Guideline EURAMET CG-11
RTD Simulation – Generate (PT-385) by resistance method up to 3.2 kΩ	-200 °C to 600 °C	0.076 °C	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-03 Calibration Guideline EURAMET CG-11
RTD / Thermocouple / Temp. Indicator with sensor / Temperature Gauges	-20 °C to 150 °C	0.06 °C	Using Digital Reference Thermometer & Liquid Bath by Comparison Method as per SOP: CP-T-01 for RTD/Thermocouple, CP-T-02 for Temperature Gauge, CP-T-03 for Temperature Indicator with sensor. IEC 60584, IEC 60571, DKD-R 5-1
Liquid-in-Glass Thermometer	-20 °C to 150 °C	0.18 °C	Using Digital Reference Thermometer & Liquid Bath by Comparison Method as per SOP: CP-T-02 OIML R 133
Temperature Bath / Dry Block	-20 °C to 0 °C 0 °C to 600 °C 600 °C to 1200 °C	0.05 °C 0.14 °C 1.6 °C	Using Dig. Reference Thermometer / Thermocouple & Precision Multimeter by Comparison Method as per SOP: CP-T-05 DKD-R 5-7
Infrared Thermometer / Thermal Imager / Pyrometer	30 °C to 550 °C	1.2 °C	Using PRT with Radiation Source by Comparison Method as per SOP: CP-T-07 MSL Technical guide 22, IEC 62492-1
Chiller / Autoclave/Freezer / Refrigerator / Incubator / Oven / Chamber / Furnace	-80 °C to 0 °C 0 °C to 600 °C 600 °C to 1200 °C	0.074 °C 0.18 °C 1.7 °C	Using Dig. Reference Thermometer / Thermocouple & Data Logger by Comparison Method as per SOP: CP-T-08 DKD R 5-7 IEC 60068-3-5

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Humidity Measure ⁴	20 %RH to 90 %RH @ 10 °C to 50 °C	1.0 %RH	Using Standard Thermo Hygrometer by Comparison Method as per SOP: CP-T-09 & 10 IEC 60068-3-6, IEC 60417-6162
Electrical – DC/LF			
DC Voltage – Measure ⁴	10 mV to 100 mV 0.1 V to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	0.026 % 0.0042 % 0.0039 % 0.0057 % 0.0063 %	Using Digital Precision Multimeter (6½) by Direct Method as per SOP: CP-E-03 IEC 60051 IS 13875-1, 2
DC Current - Measure ⁴	10 µA to 100 µA 0.1 mA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 400 mA 0.4 A to 1 A 1 A to 3 A 3 A to 10 A	0.2 % 0.09 % 0.08 % 0.07 % 0.09 % 0.12 % 0.21 % 0.28 %	Using Digital Precision Multimeter (6½) by Direct Method as per SOP: CP-E-03 IEC 60051 IS 13875-1,2
DC Resistance - Measure ⁴	Up 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 0.1 GΩ to 1 GΩ	0.17 % 0.018 % 0.014 % 0.014 % 0.015 % 0.016 % 0.085 % 0.94 % 2.3 %	Using Digital Precision Multimeter (6½) by Direct Method as per SOP: CP-E-03 IEC 60051 IS 13875-1,2
AC Voltage - Measure ⁴ @ 50/60 Hz	10 mV to 100 mV 0.1 V to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	0.13 % 0.11 % 0.11 % 0.11 % 0.10 %	Using Digital Precision Multimeter (6½) by Direct Method as per SOP: CP-E-03 IEC 60051 IS 13875-1,2
DC High Voltage - Measure ⁴	1 kV to 40 kV	2 %	Using High Voltage Divider as per SOP: CP-E-11 IEC 60060-2,3
AC High Voltage – Measure ⁴ @ 50/60 Hz	1 kV to 25 kV	5.8 %	Using High Voltage Probe with Digital Multimeter by Direct Method as per SOP: CP-E-11 IEC 60060-2,3

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AC Current - Measure ⁴ @ 50/60 Hz	30 µA to 100 µA 0.1 mA to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 400 mA 0.4 A to 1 A 1 A to 3 A 3 A to 10 A	0.32 % 0.21 % 0.26 % 0.18 % 0.24 % 0.19 % 0.29 % 0.26 %	Using Digital Precision Multimeter (6½) by Direct Method as per SOP: CP-E-03 IEC 60051 IS 13875-1,2
Capacitance - Measure ⁴	1 nF to 10 nF 10 nF to 100 nF 100 nF to 1 µF 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 % 0.6 % 0.47 % 0.93 % 1.3 % 0.91 % 0.75 % 1.9 %	Using Digital Precision Multimeter (6½) by Direct Method as per SOP: CP-E-03 IEC 60051 IS 13875-1,2
DC Voltage – Generate ³	0.1 mV to 1 mV 0 mV to 10 mV 10 mV to 330 mV 0.33 V to 3.3 V 3.3 V to 33 V 33 V to 330 V 330 V to 1000 V	1.1 % 0.24 % 0.024 % 0.0023 % 0.0024 % 0.0028 % 0.0024 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-01 IEC 60051 IS 13875-1,2
DC Current – Generate ³	0 µA to 330 µA 0.33 mA to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA 0.33 A to 1.1 A 1.1 A to 3 A 3 A to 11 A 11 A to 20 A	0.025 % 0.014 % 0.014 % 0.013 % 0.028 % 0.046 % 0.063 % 0.12 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-01 IEC 60051 IS 13875-1,2
	20 A to 150 A 150 A to 1000 A	0.70 % 0.65 %	
DC Resistance - Generate ³ Fixed Points	50 µΩ 100 µΩ 150 µΩ 200 µΩ 0.5 mΩ 1 mΩ 1.5 mΩ 2 mΩ 5 mΩ 10 mΩ	0.94 % 0.93 % 0.93 % 0.93 % 0.61 % 0.59 % 0.59 % 0.65 % 0.27 % 0.25 %	Using Micro ohm Calibrator (Time Electronics 5070) by Direct Method as per SOP: CP-E-05 IEC 60051 IS 13875-1,2

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DC Resistance - Generate ³ Fixed Points (continued)	15 mΩ	0.24 %	Using Micro ohm Calibrator (Time Electronics 5070) by Direct Method as per SOP: CP-E-05 IEC 60051 IS 13875-1,2
	20 mΩ	0.38 %	
	50 mΩ	0.18 %	
	100 mΩ	0.14 %	
	150 mΩ	0.13 %	
	200 mΩ	0.13 %	
	0.5 Ω	0.18 %	
	1 Ω	0.14 %	
	1.5 Ω	0.13 %	
DC Resistance – Generate ³	0 μΩ to 11 Ω	0.016 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-01 IEC 60051 IS 13875-1,2
	11 Ω to 33 Ω	0.009 %	
	33 Ω to 110 Ω	0.007 %	
	110 Ω to 330 Ω	0.005 %	
	0.33 kΩ to 1.1 kΩ	0.007 %	
	1.1 kΩ to 3.3 kΩ	0.005 %	
	3.3 kΩ to 11 kΩ	0.007 %	
	11 kΩ to 33 kΩ	0.005 %	
	33 kΩ to 110 kΩ	0.007 %	
	110 kΩ to 330 kΩ	0.005 %	
	0.33 MΩ to 1.1 MΩ	0.007 %	
	1.1 MΩ to 3.3 MΩ	0.010 %	
	3.3 MΩ to 11 MΩ	0.017 %	
	11 MΩ to 33 MΩ	0.038 %	
	33 MΩ to 110 MΩ	0.062 %	
110 MΩ to 330 MΩ	0.38 %		
	330 MΩ to 900 MΩ	1.2 %	Using Insulation Tester Calibrator (Time Electronics 5069) by Direct Method SOP: CP-E-01 & CP-E-04 IEC 60051 IS 13875-1,2
	900 MΩ to 9 GΩ	1.2 %	
	9 GΩ to 100 GΩ	5.8 %	
AC Voltage – Generate ³	1 mV to 33 mV (10 Hz to 45 Hz) (45 Hz to 10 kHz) (10 kHz to 20 kHz)	0.12 % 0.15 % 0.05 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-01 IEC 60051 IS 13875-1,2
	33 mV to 330 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)	0.04 % 0.02 % 0.03 % 0.05 % 0.11 %	
	0.33 V to 3.3 V (10 Hz to 45 Hz) (45 Hz to 10 kHz) (10 kHz to 20 kHz)	0.04 % 0.02 % 0.03 %	

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MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY ^{1,2} (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
AC Voltage – Generate ³ (continued)	(20 kHz to 50 kHz)	0.04 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-01 IEC 60051 IS 13875-1,2
	(50 kHz to 100 kHz)	0.09 %	
	3.3 V to 33 V		
	(10 Hz to 45 Hz)	0.04 %	
	(45 Hz to 10 kHz)	0.02 %	
	(10 kHz to 20 kHz)	0.03 %	
	(20 kHz to 50 kHz)	0.04 %	
	(50 kHz to 100 kHz)	0.11 %	
	33 V to 330 V		
	(45 Hz to 1 kHz)	0.023 %	
(1 kHz to 10 kHz)	0.026 %		
(10 kHz to 20 kHz)	0.032 %		
330 V to 1020 V			
(45 Hz to 1 kHz)	0.036 %		
AC Current – Generate ³	33 µA to 330 µA		Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-01 IEC 60051 IS 13875-1,2
	(10 Hz to 20 Hz)	0.27 %	
	(20 Hz to 45 Hz)	0.21 %	
	(45 Hz to 1 kHz)	0.18 %	
	(1 kHz to 5 kHz)	0.40 %	
	0.33 mA to 3.3 mA		
	(10 Hz to 20 Hz)	0.24 %	
	(20 Hz to 45 Hz)	0.15 %	
	(45 Hz to 1 kHz)	0.12 %	
	3.3 mA to 33 mA		
	(10 Hz to 20 Hz)	0.24 %	
	(20 Hz to 45 Hz)	0.15 %	
	(45 Hz to 1 kHz)	0.12 %	
	(1 kHz to 5 kHz)	0.14 %	
	33 mA to 330 mA		
	(10 Hz to 20 Hz)	0.24 %	
	(20 Hz to 45 Hz)	0.15 %	
	(45 Hz to 1 kHz)	0.11 %	
	(1 kHz to 5 kHz)	0.16 %	
	0.33 A to 1.1 A		
(10 Hz to 45 Hz)	0.24 %		
(45 Hz to 1 kHz)	0.12 %		
(1 kHz to 5 kHz)	0.81 %		
(5 kHz to 10 kHz)	3.4 %		

SCOPE OF ACCREDITATION

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AC Current – Generate ³ continued	1.1 A to 3 A (10 Hz to 45 Hz) (45 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz)	0.24 % 0.13 % 0.74 % 3.1 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-01 IEC 60051 IS 13875-1,2
	3 A to 11 A (45 Hz to 100 Hz) (100 Hz to 1 kHz) (1 kHz to 5 kHz)	0.10 % 0.14 % 3.5 %	
	11 A to 20.5 A (45 Hz to 100 Hz) (100 Hz to 1 kHz) (1 kHz to 5 kHz)	0.19 % 0.22 % 3.5 %	
	20 A to 150 A (45 Hz to 65 Hz)	0.88 %	
	150 A to 1000 A (45 Hz to 65 Hz)	0.78 %	Using Current Coil by Comparison Method as per SOP: CP-E-02 IEC 60051 IS 13875-1,2
	Capacitance - Generate ³	0.19 nF to 1.1 nF (10 Hz to 10 kHz)	1.2 %
	1.1 nF to 3.3 nF (10 Hz to 3 kHz)	0.93 %	
	3.3 nF to 11 µF (10 Hz to 150 Hz)	0.40 %	
	11 µF to 110 µF (0 Hz to 80 Hz)	0.63 %	
	110 µF to 11 mF (0 Hz to 2 Hz)	0.63 %	
	11 mF to 33 mF (0 Hz to 0.6 Hz)	0.97 %	
	33 mF to 110 mF (0 Hz to 0.2 Hz)	1.4 %	
DC Power - Generate ³	1 mW to 1 W	0.60 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-09 IS 1248, IS 13875-1,2
	1 W to 330 W	0.60 %	
	330 W to 3 kW	0.21 %	
	3 kW to 20 kW	0.09 %	
AC Power - Generate ³	45 to 65 Hz, UPF (1 mW to 1 W)	1.3 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-09 IS 13875 part1.2
	(1 W to 330 W)	1.3 %	
	(330 W to 3 kW)	1.4 %	

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	(3 kW to 20 kW)	0.26 %	IEC 61557
Phase - Generate ³ @ 10 Hz to 65 Hz	0° to 90°	0.35°	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-09 IS 1248 IS 13875-1,2 IEC 61557
Power Factor @3V/2A, 50 Hz	0.2 PF to UPF lead/lag	0.006 PF	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-09 IS 1248 IS 13875-1,2
Time and Frequency			
Frequency - Measure ⁴	10 Hz to 40 Hz 40 Hz to 300 kHz 300 kHz to 1 MHz	0.038 % 0.023 % 0.060 %	Using Digital Precision Multimeter (6½) by Direct Method as per SOP: CP-E-03
Frequency - Generate ³	1 Hz to 10 Hz 10 Hz to 2 MHz	0.058 % 0.012 %	Using Multi-Function Calibrator (Fluke 5520A) by Direct Method as per SOP: CP-E-01 IS 1248 IS 13875-1,2
Stopwatch	10 s to 24 h	1 s per 2 h	Using Digital Stop Watcht by Comparison Method as per SOP CP-E-15 MSL Technical Guide V2.0, NIST 960-12
Chemical			
pH Meter	4 pH 7 pH 10 pH	0.016 pH 0.016 pH 0.016 pH	Using Certified Reference Buffer Solutions by Direct Method as per SOP: CP-MH-08 IEC 60746-1,2

¹The 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.

²When 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.

³Capability is suitable for the calibration of measuring devices in the stated ranges.

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

Notes:

1. PF indicates Power Factor expressed in units.
2. UPF= Unity Power Factor