

Laboratory **Electro Meter Corporation, P-5, CIT Road, Scheme- LV, Moulali, Kolkata, West Bengal**

Accreditation Standard **ISO/IEC 17025: 2005**

Certificate Number **CC-2147 (In lieu of C-0115, C-0116, C-0117)** Page **1 of 24**

Validity **29.10.2017 to 28.10.2019** Last Amended on **07.02.2018**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO-TECHNICAL CALIBRATION</u>				
I.	SOURCE			
1.	DC Voltage [#]	100 μ V to 1 mV 1 mV to 100 mV 100 mV to 1 V 1 V to 1000 V	1.14 % to 0.12 % 0.12 % to 0.002 % 0.002 % to 0.001 % 0.001 % to 0.0014 %	Using Multifunction Calibrator (5520A) / Reference Multimeter (8508A) by Direct / Comparison method
2.	DC Current [#]	1 μ A to 200 μ A 200 μ A to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 20 A	0.08 % to 0.004 % 0.004 % 0.004 % to 0.014 % 0.014 % to 0.042 % 0.042 % to 0.094 %	Using Multifunction Calibrator (5520A) / Reference Multimeter (8508A) by Comparison method
	DC High Current [#]	20 A to 1000 A	0.094 % to 0.85 %	Using Multifunction Calibrator (5520A) with 50 turn coil by Direct method
3.	Resistance [#]	1 Ω to 32.9 Ω 32.9 Ω to 329.9 Ω 329.9 Ω to 1.09 k Ω 1.09 k Ω to 109.9 k Ω 109.9 k Ω to 1.09 M Ω 1.09 M Ω to 10.9 M Ω 10.9 M Ω to 109.9 M Ω 109.9 M Ω to 1 G Ω	0.012 % to 0.0035 % 0.0035 % to 0.004 % 0.004 % 0.004 % to 0.0031 % 0.0031 % to 0.004 % 0.004 % to 0.015 % 0.015 % to 0.06 % 0.06 % to 0.24 %	Using Multifunction Calibrator (5520A) By Direct Method
		1 G Ω to 100 G Ω 100 G Ω to 1T Ω	0.24 % to 1.25 % 1.25 % to 4.6 %	Using High Resistance Box by Direct Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
		0.1 Ω to 100 k Ω	0.61 % to 0.06 %	Using Low Resistance Box (7400) by Direct Method
4.	AC Voltage #	50 Hz to 10 kHz 1 mV to 200 mV 200 mV to 1000 V 10 kHz to 20 kHz 1 mV to 200 mV 200 mV to 300 V	0.55 % to 0.02 % 0.02 % to 0.022 % 1 % to 0.05 % 0.05 % to 0.04 %	Using Multifunction Calibrator (5520A) / Reference Multimeter (8508A) by Comparison method
5.	Frequency#	0.5 Hz to 45 Hz 45 Hz to 1 MHz 1 MHz to 600 MHz	1.132 % to 0.0125 % 0.0125 % to 0.0057 % 0.0057 % to 0.0012 %	Using Multifunction Calibrator (5520A) by Direct method
6.	A C Current#	50 Hz to 10 kHz 33 μ A to 200 μ A 200 μ A to 200 mA 200 mA to 2 A 2 A to 20 A	0.15 % to 0.08 % 0.08 % 0.08 % to 0.13 % 0.13 % to 0.15 %	Using Multifunction Calibrator (5520A) / Reference Multimeter (8508A) by Comparison method
	A C High Current#	20 A to 1000 A	0.15 % to 0.9 %	Using Multifunction Calibrator (5520A) with 50 turn coil. by Direct method
7.	Phase Angle # (Lead / Lag)	0 $^{\circ}$ to 90 $^{\circ}$	0.36 $^{\circ}$ to 0.081 $^{\circ}$	Using Multifunction Calibrator (5520A) by Direct method
8.	Time#	1 s to 10 s 10 s to 1000 s 1000 s to 9900 s	0.21 % to 0.026 % 0.026 % to 0.0002 % 0.0002 % to 0.00011 %	Using Time Calibrator by Direct method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
9.	A C Power# 1 Phase, 50 Hz	Voltage: 0.1 V to 600 V Current: 0.03 A to 20 A 0.2 pf to 1.0 pf	1.93 % to 0.75 %	Using Multifunction Calibrator (5520A) by Direct method
		Voltage: 50 V to 600 V Current: 20 A to 1000 A 0.2 pf to 1.0 pf	0.15 % to 0.61 %	Using Multifunction Calibrator (5520A) with 50 turn coil by Direct Method
10.	Inductance #	1 kHz 10 μ H to 10 H	6.64 % to 2.29 %	Using Decade Inductance Box
11.	Capacitance#	1 kHz 100 pF to 10 nF 10 nF to 10 μ F 10 μ F to 90 μ F	6.8 % to 1.19 % 1.19 % to 5.7 % 5.7 %	Using Capacitance Box by Direct method
12.	Oscilloscope#	1 mV to 100 V 2ns to 5 s \leq 600 MHz	4.9 % to 0.06 % 0.065 % to 0.621 % 2 %	Using Multifunction Calibrator (5520A) by Direct method
13.	Temperature Indicator/ Controller / Recorder / Transmitter # (Simulation) (Ω) RTD K Type J Type E Type T Type N Type	(-) 200 $^{\circ}$ C to 0 $^{\circ}$ C 0 $^{\circ}$ C to 800 $^{\circ}$ C (-) 200 $^{\circ}$ C to 0 $^{\circ}$ C 0 $^{\circ}$ C to 1350 $^{\circ}$ C (-) 200 $^{\circ}$ C to 0 $^{\circ}$ C 0 $^{\circ}$ C to 1200 $^{\circ}$ C (-) 250 $^{\circ}$ C to 0 $^{\circ}$ C 0 $^{\circ}$ C to 1000 $^{\circ}$ C (-) 200 $^{\circ}$ C to 0 $^{\circ}$ C 0 $^{\circ}$ C to 400 $^{\circ}$ C (-) 200 $^{\circ}$ C to 0 $^{\circ}$ C 0 $^{\circ}$ C to 1300 $^{\circ}$ C	0.01 $^{\circ}$ C 0.14 $^{\circ}$ C 0.10 $^{\circ}$ C 0.10 $^{\circ}$ C 0.10 $^{\circ}$ C 0.19 $^{\circ}$ C	Using Multifunction Calibrator (5520A) By Direct Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	R Type S Type B Type	0 °C to 1700 °C 0 °C to 1700 °C 600 °C to 1800 °C	0.24 °C 0.24 °C 0.20 °C	
14.	Power Factor [#] (Lead / Lag)	0.2 pf to 1 pf	1.1 % to 0.23 %	Using Multifunction Calibrator (5520A) by Direct method
15.	High Voltage (AC) [#]	1 kV to 25 kV	2.26 %	Using H V Source / AC / DC HV Divider by Comparison method
16.	High Voltage (DC) [#]	1 kV to 50 kV	1.75 %	
17.	Micro Ohm Meter / Contact Resistance Meter / Winding Resistance Meter [#]	50 $\mu\Omega$ to 200 $\mu\Omega$ / 200 A 50 $\mu\Omega$ to 2 m Ω / 100 A 50 $\mu\Omega$ to 20 m Ω / 30 A 50 $\mu\Omega$ to 200 m Ω / 10 A 50 $\mu\Omega$ to 2 Ω / 3 A 10 m Ω to 90 m Ω / 4 A 10 m Ω to 0.9 Ω / 1.6 A 10 m Ω to 9 Ω / 0.8 A 10 m Ω to 90 Ω / 0.25 A 10 m Ω to 0.9 k Ω / 80 mA 10 m Ω to 9 k Ω / 23 mA 10 m Ω to 20 k Ω / 7 Ma	1.05% to 0.15 % 3 % to 1 %	Using Micro Ohm Meter Calibrator by Direct method Using Low Resistance Box (7400) byDirect method
II.	MEASURE			
1.	DC Voltage ^{\$}	0.5 mV to 1 mV 1 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	0.027 % to 0.014 % 0.014 % to 0.00082 % 0.00082 % to 0.00047 % 0.0047 % 0.0047 % to 0.00064 % 0.00065 %	Using Reference Multimeter (8508A) by Direct method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
2.	DC Current [§]	1 μ A to 10 μ A 10 μ A to 100 μ A 100 μ A to 1 mA 1 mA to 100 mA 100 mA to 1 A 1 A to 20 A	0.0745 % to 0.017 % 0.017 % to 0.0024 % 0.0024 % 0.0024 % to 0.0068 % 0.0068 % to 0.022 % 0.022 % to 0.046 %	Using Reference Multimeter (8508A) by Direct method
	DC High Current [§]	20 A to 1000 A	0.05 % to 1.17 %	Using Analog Precision Multimeter & AC / DC Current Probe by Direct method
3.	Resistance [§] (2 wire nad 4 wire)	0.1 Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 100 k Ω 100 k Ω to 1 M Ω 1M Ω to 10 M Ω 10 M Ω to 100 M Ω 100 M Ω to 1 G Ω	0.06 % 0.06 % to 0.0012 % 0.0012 % to 0.0011 % 0.0011 % 0.0011 % to 0.0014 % 0.0014 % to 0.00112 % 0.0112 % to 0.0157 % 0.0157 % to 0.36 %	Using Reference Multimeter (8508A) by Direct method
4.	AC Voltage [§]	50 Hz to 1 kHz 1 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	0.496 % to 0.0166 % 0.0166 % to 0.093 % 0.093 % to 0.0124 % 0.0124 % to 0.024 % 0.024 % to 0.0124 %	Using Reference Multimeter (8508A) by Direct method
	AC Voltage [§]	20 kHz 1 mV to 300 V	0.955 % to 0.032 %	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
5.	AC Current [§]	50 Hz to 10 kHz 33 μ A to 100 μ A 100 μ A to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 50 Hz to 5 kHz 1 A to 10 A 10 A to 20 A	0.11 % to 0.053 % 0.053 % to 0.06 % 0.06 % to 0.055 % 0.055 % 0.055 % to 0.093 % 0.093 % to 0.32 % 0.32 % to 0.296 %	Using Reference Multimeter (8508A) by Direct method
	AC High Current [§]	> 20 A to 1000 A	0.30 % to 1.2 %	Using Precision Multimeter & AC /DC Current Probe by Direct method
6.	Frequency [§]	1 Hz to 10 MHz	0.57 % to 0.057 %	Using Frequency Counter by Direct method
7.	Phase Angle [§] (Lead / Lag)	0 ° to 90 °	2.63 ° to 0.57 °	Using Multifunction Calibrator (5520A) by Direct method
8.	D C High Voltage [§]	> 1 kV to 50 kV	1.747 % to 2.081 %	Using High Voltage Probe & Digital Multimeter by Direct method
9.	A C High Voltage [§]	50 Hz > 1 kV to 25 kV	2.328 % to 2.292 %	Using High Voltage Probe & Digital Multimeter by Direct method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
10.	A C Energy 1 phase [§]	50 Hz 240 V, 1 A & 5 A 240 V / 30 A 0.5 PF to UPF	1.134 % to 1.81 %	Using Accucheck LT+ by Direct method
11.	A C Energy 3 phase [§]	50 Hz Current 1 A & 5 A, 30 A 0.5 PF to UPF 50 Hz 3 Phase 110 V Current up to 5 A, 0.5 PF to UPF	0.233 % 0.265 %	Using Accucheck LT+ by Direct method
12.	A C Power 3 phase [§]	50 Hz 3 x 240 V & 110 V 3 x 1 A, 5 A, 30 A 0.2 PF to 1 PF	1.94 % to 0.75 %	Using Accucheck LT+ & HT+ by Direct method
13.	A C Resistance [§]	100 Hz, 1 kHz 1 Ω to 10 k Ω	1.42% to 0.58%	Using Digital LCR meter by Direct method
14.	Capacitance [§]	100 Hz, 1 kHz 100 pF to 1000 μ F	1.42% to 1.25%	Using Digital LCR meter by Direct method
15.	Inductance [§]	100 Hz, 1kHz 100 μ H to 1H	1.42% to 0.4%	Using Digital LCR meter by Direct method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
16.	Temperature Controller / Indicator / Transmitter [§] (Simulation Method) (Ω) RTD	(-) 200 °C to 800 °C	0.01 °C	Using Reference Multimeter (8508A) by Direct method
	K Type	(-) 200 °C to 1350 °C	0.10 °C	Using Precision Multimeter (5075) by Direct method
	J Type	(-) 210 °C to 1200 °C	0.05 °C	
	E Type	(-) 250 °C to 1000 °C	0.07 °C	
	T Type	(-) 200 °C to 400 °C	0.08 °C	
	N Type	(-) 200 °C to 1300 °C	0.14 °C	
	R Type	0 °C to 1700 °C	0.13 °C	
	S Type	0 °C to 1700 °C	0.14 °C	
B Type	600 °C to 1800 °C	0.13 °C		
17.	DC Voltage*	1 mV to 10 mV	0.04 % to 0.006 %	Using Precision Multimeter (5075) by Direct method
		10 mV to 100 mV	0.006 % to 0.0035 %	
		100 mV to 1 V	0.0035 % to 0.0022 %	
		1 V to 100 V	0.0022 % to 0.0035 %	
		100 V to 1000 V	0.0036 %	
18.	DC Current*	3 μ A to 10 μ A	0.04 % to 0.027 %	Using Precision Multimeter (5075) by Direct method
		10 μ A to 100 μ A	0.027 % to 0.013 %	
100 μ A to 1 mA		0.013 % to 0.012 %		
1 mA to 100 mA		0.012 %		
100 mA to 1 A		0.012 % to 0.023 %		
1 A to 10 A		0.023 % to 0.09 %		
10 A to 20 A		0.09 % to 0.1 %		
	DC High Current*	>20 A to 1000 A	1.2 %	Using Precision Multimeter (5075) & AC/DC Current Probe by Direct method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
19.	Resistance * (2-Wire & 4-Wire)	0.1 Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 k Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω 100 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω 100 M Ω to 1 G Ω	0.06 % to 0.014 % 0.014 % to 0.0048 % 0.0048 % to 0.004 % 0.004 % 0.004 % 0.004 % to 0.0053 % 0.0053 % to 0.011 % 0.011 % to 0.018 % 0.018 % to 0.125 % 0.125 % to 1.0 %	Using Precision Multimeter (5075) by Direct method
20.	A C Resistance*	100 Hz, 1 kHz 1 Ω to 10 k Ω	1.42 to 0.58	Using Digital LCR meter by Direct method
21.	Capacitance*	100 Hz, 1 kHz 100 pF to 1000 μ F	1.42 to 1.25	Using Digital LCR meter by Direct method
22.	Inductance*	100 Hz, 1kHz 100 μ H to 1H	1.42 to 0.4	Using Digital LCR meter by Direct method
23.	A C Voltage *	50 Hz to 1 kHz 1 mV to 100 mV 100 mV to 1 V 1 V to 300 V 300 V to 1000 V	0.53 % to 0.12 % 0.12 % 0.12 % to 0.84 % 0.93 %	Using Precision Multimeter (5075) by Direct method
24.	A C Current *	50 Hz to 1 kHz 30 μ A to 300 μ A 300 μ A to 300 mA 300 mA to 1 A 1 A to 20 A	0.29 % to 0.27 % 0.27 % 0.27 % to 0.91 % 0.91 % to 0.11 %	Using Precision Multimeter (5075) by Direct method
	A C High Current *	50 Hz >20 A to 1000 A	1.2 %	Using Precision Multimeter (5075) & AC/DC Current Probe by Direct method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
25.	Frequency*	10 Hz to 10 MHz	0.57 % to 0.057 %	Using Frequency Counter by Direct method
26.	Phase Angle * (Lead / Lag)	0 ° to 90 °	2.63 ° to 0.57 °	Using Phase Angle Meter by Direct method
27.	D C High Voltage*	> 1 kV to 50 kV	1.793 % to 2.30 %	Using H V Divider with kV Meter by Direct method
28.	A C High Voltage*	50 Hz > 1 kV to 30 kV > 30 kV to 80 kV	2.72 % to 2.29 % 2.29 % to 2.27 %	Using H V Divider with kV Meter by Direct method
29.	A C Energy 1 phase*	50 Hz 240 V / 1 A, 5 A & 30 A 0.5 PF to UPF	1.134 % to 1.81 %	Using Accucheck LT+ by Direct method
30.	A C Energy 3 phase *	50 Hz Volt 3 x 240 V Current 1 A & 5 A 0.5 PF to UPF	0.233 %	Using Accucheck LT+ by Direct method
		50 Hz 3 Phase 110 V Current up to 5 A, 0.5 PF to UPF	0.265 %	Using Accucheck HT+ by Direct method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
31.	Temperature Controller / Indicator / Transmitter* (Simulation Method) (Ω) RTD K Type J Type E Type T Type N Type R Type S Type B Type	(-) 200 °C to 800 °C (-) 200 °C to 1350 °C (-) 200 °C to 1200 °C (-) 250 °C to 1000 °C (-) 200 °C to 400 °C (-) 200 °C to 1300 °C 0 °C to 1700 °C 0 °C to 1700 °C 600 °C to 1800 °C	0.06 °C 0.10 °C 0.05 °C 0.07 °C 0.08 °C 0.14 °C 0.13 °C 0.14 °C 0.13 °C	Using Precision Multimeter (5075) by Direct method
32.	A C Power 3 phase*	3 x 240 V & 110 V 3 x 1 A, 5 A & 30 A 0.2 PF to 1 PF 50 Hz	1.94 % to 0.75 %	by Direct method Using Accucheck LT+ & HT+

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MECHANICAL CALIBRATION

I.	DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)			
1.	Gauge Block [§]	0.5 mm to 10 mm 10 mm to 25 mm 25 mm to 50 mm 50 mm to 100 mm	0.15 μ m 0.20 μ m 0.20 μ m 0.48 μ m	Using K grade Gauge Block
2.	Plain Plug Gauge [§]	3 mm to 200 mm	3.60 μ m	Using ULM
3.	Feeler Gauge [§]	0.05 mm to 1.0 mm Upto 2 mm	2.97 μ m	Using Digital Micrometer
4.	Radius Gauge [§]	1 mm to 25 mm	4.30 μ m	Using Profile Projector
5.	Measuring Scale [§]	Upto 1000 mm	59.00 μ m	Using Digital Linear Scale Calibrator
6.	Setting Rod / Length Bar [§] (Length)	25 mm to 200 mm 200 mm to 500 mm	3.00 μ m 7.40 μ m	Using ULM
7.	Test Sieve [§]	38 μ m to 50 mm 50 mm to 125 mm	5.00 μ m 21.60 μ m	Using Profile Projector & Digital Caliper by Comparison Method
8.	Thread Plug Gauge [§] (Effective Dia)	M3 to M100 (3 mm to 100 mm)	9.80 μ m	Using ULM
9.	Caliper [§] (Vernier / Dial / Digital) L.C: 0.01 mm	0 mm to 1000 mm	12.00 μ m	Using K grade Gauge Block

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10.	Height Gauge [§] L.C: 0.01 mm	0 mm to 600 mm Upto 1000 mm	14.00 μ m 15.50 μ m	Using Gauge Block & Long Slip Gauge Block
11.	Depth Gauge [§] (Vernier / Dial / Digital) LC: 0.01 mm LC : 0.02 mm	Upto 300 mm > 300 mm to 600 mm	14.40 μ m 17.00 μ m	Using Gauge Block
12.	External Micrometer [§] (All Type) LC: 0.001 mm LC: 0.01 mm	0 mm to 100 mm > 100 mm to 600 mm	1.70 μ m 4.70 μ m	Using Gauge Block
13.	Internal Micrometer [§] (Stick type) LC: 0.001 mm	50 mm to 600 mm	7.90 μ m	Using Slip Gauge Block
14.	Depth Micrometer [§] LC: 0.01 mm	0 to 300 mm	4.21 μ m	Using Gauge Block
15.	Dial Indicator [§] (Plunger type) LC: 0.001 mm	0 mm to 25 mm	6.42 μ m	Using Micrometer Drum
16.	Dial Indicator [§] (Lever type) LC: 0.001 mm	0 mm to 0.8 mm	6.42 μ m	Using Micrometer Drum
17.	Bore Gauge [§]	0 mm to 2 mm	2.60 μ m	Using Micrometer Drum
18.	Angle / Bevel Protractor [§] / Combination Set LC: 5 min (Angle)	0 ° to 180 °	3.3 min arc	Using Profile Pojector

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
19.	Pitch Gauge [§]	Pitch 0.4 mm to 6.0 mm Angle 55° to 60 °	5.00 μ m 4 min of arc	Using Profile Pojector
20.	Dial Thickness Gauge [§]	0 mm to 50 mm	5.74 μ m	Using Gauge Block
21.	Hegman Gauge [§]	0 mm to 1 mm	2.40 μ m	Using Electronic Probe
22.	Standard Foils [§]	0 mm to 2 mm	3.90 μ m	Using Digital Micrometer
23.	Steel Tape [§]	Upto 200 m	59 \sqrt{L} , L is in m	Using Digital Linear Scale with indicator
24.	Spirit Level / Frame type Level [§] LC: 0.02 mm/m	300 mm	39.10 μ m	Using Gauge Block & Sine Bar
25.	Coating Thickness Gauge [§]	Upto 2 mm	4.00 μ m	Using Foils
26.	Pistol Caliper [§] LC: 0.01 mm	Upto 100 mm	20.00 μ m	Using Gauge Block
27.	Pi Tape [§]	Upto 3 m	301.00 μ m	Using Digital Linear Scale with indicator
28.	Internal Caliper [§] (Dial / Digimatic) LC: 0.01 mm	Upto 150 mm	7.90 μ m	Using Gauge Block
29.	Cylindrical Measuring Pin [§]	Upto 20 mm	2.91 μ m	Using ULM
30.	Snap Gauge [§]	3 mm to 300 mm	9.00 μ m	Using ULM
31.	Plain Ring Gauge /	5 mm to 200 mm	3.70 μ m	Using ULM

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Electro Meter Corporation, P-5, CIT Road, Scheme- LV, Moulali,
Kolkata, West Bengal

Accreditation Standard ISO/IEC 17025: 2005

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	Cylindrical Setting Master [§]			
32.	Angle Gauge Block [§]	0 ° to 90 °	4.9" of arc	Using sine bar, slip gauge, electronic comparator
33.	Profile Projector & Microscope [§] Linear (LC: 0.001 mm) Angle Magnification	X Axis = 0 mm to 150 mm Y Axis = 0 mm to 100 mm 0 ° to 360 ° 10x to 50x	6.00 μ m 2' of arc 0.20%	Using Glass Scale, Angle Gauge Block & Digital Caliper
34.	Straight Edge [§]	Upto 1000 mm	15.00 μ m	Using Gauge Block, Electronic Comparator, Electronic Level
35.	Sine Bar [§] (200 mm)	Upto 45 °	3" of arc	Using Gauge Block, Lever Dial Gauge, Angle Gauge Block
36.	Caliper Checker / Step Gauge [§]	0 mm to 600 mm	8.00 μ m	Using Gauge Block, Electronic Comparator
37.	Thread Measuring Wire [§]	0.17 mm to 6.35 mm	1.30 μ m	Using ULM
38.	Electronic Comparator [§]	Upto 10 mm	0.50 μ m	Using Gauge Block, Electronic Comparator
39.	Dial Calibration Tester [§]	Upto 25 mm	1.00 μ m	Using Gauge Block, Electronic Comparator
40.	Micrometer Head / Drum [§]	Upto 25 mm	1.00 μ m	Using Gauge Block, Electronic Comparator
41.	Thread Ring Gauge [§]	6 mm to 200 mm	4.00 μ m	Using ULM & Ruby

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
				Probe

42.	Taper Plain Ring Gauge ^s (Angle Measurement)	Upto 5 °	3.7 " of arc	Using ULM, Gauge Block Set & Ruby Ball.
43.	Standard Wire Gauge ^s	0.19 mm to 10 mm	28 µm	Using Profile Projector
44.	Engineer's Square / Set Square / L Square / Tri Square ^s	100 x 150 mm	23 min of arc	
45.	Taper Plain Plug Gauge ^s (Half Angle)	Upto 5 °	1.6 " of arc	Using ULM
46.	Surface Plate [#]	5000 mm x 5000 mm	$0.7\sqrt{(L+W)/125}$ µm	Using Electronic Level
47.	Profile Projector & Microscope* Linear LC: 0.001 mm Angle Magnification	X Axis = 0 mm to 150 mm Y Axis = 0 mm to 100 mm 0 ° to 360 ° 10x to 50x	6.00 µm 2' of arc 0.20%	Using Glass Scale, Angle Gauge Block & Digital Caliper
II.	ACCELERATION AND SPEED			
1.	RPM [#] (Non Contact)	6 rpm to 30 rpm 30 rpm to 1000 rpm 1000 rpm to 30000 rpm 30000 rpm to 60000 rpm	1.886 % to 0.30 % 0.30 % to 0.09 % 0.009 % to 0.003 % 0.003 % to 0.0011 %	Using Multifunction Calibrator

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
III.	DENSITY AND VISCOSITY			
1.	Density Hydrometers ^s	0.600 g/ml to 1.000 g/ml	0.0006 g/ml	Using Standard Density Hydrometer and Liquids of known densities as per IS 3104 (Part I)
2.	Specific Gravity Hydrometers ^s	1.000 sp.gr to 2.000 sp.gr	0.0015 sp.gr	Using Standard Specific Gravity Hydrometer and Liquids of known densities as per IS 3104 (Part I)
3.	Capillary Viscometer (Measurement of Viscometer Constant)	Reverse Flow 0.002 mm ² /s ² to 20 mm ² /s ²	0.35% to 0.50%	Using Standard Newtonian liquids and Reverse Flow Viscometer as per ISO 3105
		Direct Flow 0.002 mm ² /s ² to 20 mm ² /s ²	0.35% to 0.50%	Using Standard Newtonian liquids and Direct Flow Viscometer (Modified Ostwald Viscometer) as per ISO 3105
4.	Ford Cup / Flow Cup	Size 1 to Size 5	1.51%	Using Standard Viscometer Oil and Newtonian liquids as per ASTM 1200D
5.	Kinematic Viscosity Of Newtonian Liquid	1 cSt to 10 cSt 10 cSt to 100 cSt 100 cSt to 1000 cSt 1000 cSt to 10000 cSt	0.36% 0.36% 0.40% 0.45%	Using Standard Newtonian liquids and Viscometer (Modified Ostwald Viscometer) as per ISO 3105 (Annex A).

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
IV.	ACOUSTICS			
1.	Sound [§]	94 dB @ 1kHz 114dB @ 1kHz	1.03% of rdg 1.00% of rdg	Using Sound Level Calibrator by direct method as per OIML-R-58
V.	UTM, Tension Creep and Torsion Testing Machine			
1.	Verification of Static Uniaxial Tsetting Machine♣ (UTM & TTM) (Tension only)	100 N to 1000 N 1000 N to 50 kN	0.52% 0.58%	Using Class – 0/0.5/1 Load Cells with Indicator as per IS 1828 (part 1) 2015 & ISO 7500-1 : 2004
VI.	TORQUE GENERATING DEVICES			
1.	Torque Wrench\$ (Type I/ Class B, C) & (Type II/ Class A, B)	3 Nm to 30 Nm >30 Nm to 300 Nm >300 Nm to 30000 Nm	0.10 Nm 5.30 Nm 43.0 Nm	Using Torque Sensor with Indicator Using Torque Wrench Calibration System based on IS/ISO 6789:2003 (RA 2013) in clockwise direction only
VII.	PRESSURE INDICATING DEVICES			
1.	Hydraulic Pressure-Dial / Digital Pressure Gauges and Calibrators, Pressure Transmitters, Pressure Switches [§]	1 bar to 55 bar >55 bar to 700 bar >700 bar to 1000 bar	0.0233 bar 0.159 bar 0.2545 bar	Using Dead Weight Tester by comparison method as per DKD-R-6-1
2.	Hydraulic Pressure Dial / Digital Pressure Gauges and Calibrators, Pressure Transmitters, Pressure Switches [#]	0 bar to 20 bar >20 bar to 1000 bar	0.0152 bar 0.3922 bar	Using Digital Pressure Gauge by comparison method as per DKD-R-6-1

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
3.	Pneumatic Pressure Dial / Digital Pressure Gauges and Calibrators, Pressure Transmitters, Pressure Switchs, Mercury Manometers, Magnehellic Gauges [#]	0 mmHg to 1000 mmHg 0 mmWc to 750 mmWc 0 bar to 2 bar 0 bar to 20 bar	0.588 mmHg 0.12% of rdg 0.00067 bar 0.03 bar	Using Mercury Manometer / Digital Pressure Gauge by comparison method as per DKD-R-6-1 Using Low Pressure Calibrator by comparison method as per DKD-R-6-1 Using Digital Pressure Gauge by comparison method as per DKD-R-6-1
4.	Pneumatic Pressure (Absolute Pressure) Dial / Digital Pressure Gauges, Pressure Transmitters, Pressure Switchs / Aneroid Barometer [#]	0 bar to 1.5 bar abs	0.0012 bar abs	Using Digital Pressure Gauge by comparison method as per DKD-R-6-1 and NABL 122-13
5.	Dial / Digital Vacuum Gauges / Indicators and Calibrators, Mercury Manometer, Vacuum Switchs, Vacuum Transmitters [#]	675 mmHg to 0 mmHg	0.608 mmHg	Using Digital Vacuum Gauge / Mercury Manometer by comparison method as per DKD-R-6-1

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
6.	Hydraulic Pressure Dead Weight Tester [§]	1 bar to 55 bar 20 bar to 1000 bar	0.017% of rdg 0.017% of rdg	Using Dead Weight Tester by Cross Float as per Euromet CG-3 comparison method
VIII.	WEIGHTS			
1.	Mass [§] (Weights)	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg	0.0022 mg 0.0022 mg 0.0022 mg 0.0022 mg 0.0022 mg 0.0022 mg 0.0022 mg 0.0022 mg 0.0022 mg 0.0032 mg 0.0041 mg 0.0052 mg 0.0090 mg 0.0107 mg 0.0124 mg 0.0202 mg 0.03181 mg 5.66 mg 5.68 mg 5.74 mg	Using E1 Class Standard Weights ABBA method as per OIML R-111:2004 and NABL 120-02, with Digital Weighing Balance up to 6 g of d: 0.001 mg . Digital Weighing Balance up to 200 g of d : 0.01 mg for calibration of E2 Class Weights and coarser Using E2 Class weights with Digital Weighing Balance up to 3 kg of d: 0.01 g for calibration of F2 Class Weights and coarser
		5 kg 10 kg 20 kg	566.36 mg 568.04 mg 574.68 mg	Using F2 Class weights with Digital Weighing Balance up to 30 kg of d: 0.1 g for calibration of M2 Class Weights and coarser

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
IX.	WEIGHING SCALE AND BALANCE			
1.	Electronic Weighing Balance# d \geq 0.001 mg d \geq 0.01 mg	1 mg to 6 g >6 g to 200 g	0.006 mg 0.031 mg	Using E1 Class Standard Weights 1 mg to 200 g for calibration of Class I Weighing Balances and coarser as per OIML R-76
	d \geq 0.001 g	>200 g to 3 kg	7.45 mg	Using E2 Class Standard Weights >200g to 3 kg for calibration of Class II Weighing Balances and coarser as per OIML R-76
	d \geq 0.001 kg d \geq 1 g	>3 kg to 20 kg >20 kg to 60 kg	0.574 g 5.66 g	Using F1 Class Standard Weights >3 kg to 60 kg for calibration of Class III Weighing Balances and coarser as per OIML R-76
	d \geq 2 g	>60 kg to 100 kg	6.02 g	Using F2 Class Standard Weights >60 kg to 100 kg for calibration of Class III Weighing Balances and coarser as per OIML R-76
X.	VOLUME			

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
1.	Piston Pipette [§]	1 μ l to 10 μ l >10 μ l to 20 μ l >20 μ l to 100 μ l >100 μ l to 500 μ l >500 μ l to 1000 μ l >1000 μ l to 10000 μ l	0.0032 μ l 0.0032 μ l 0.0056 μ l 0.0118 μ l 0.1150 μ l 1.1438 μ l	Micropipette & Digital Balance up to 6g / 200g readability 0.001 / 0.01 mg and distilled water of known density as per ISO/TR 20461
2.	Transfer Pipettes [§] (Graduated / Non Graduated)	0.1 ml to 25 ml >25 ml to 100 ml	2.5 μ l 2.5 μ l	Transfer Pipettes (Graduated / Non Graduated) & Digital Precision Balance and distilled water of known density as per ISO 4787 & ISO/TR 20461
3.	Glass Burette [§]	1 ml to 25 ml >25 ml to 100 ml	4.6 μ l 4.6 μ l	
4.	Measuring Cylinder/ Volumetric Flask/ Conical Flask / Beaker [§]	1 ml to 100 ml >100 ml to 2000 ml	15.0 μ l 60 μ l to 230 μ l	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	RTD Sensor & Thermocouple with / without indicator / recorder / Dial Thermometer / Thermostat [#]	(-) 80 °C to 20 °C (-)112 °F to 68 °F > 20 °C to 250 °C > 68 °F to 482 °F > 250 °C to 400 °C > 482 °F to 752 °F	0.16 °C 0.24 °C 0.36 °C	Using Alcohol / Water / Oil / Dry Block Bath And SPRT / RTD, DAS By Comparison Method
2.	RTD Sensor & Thermocouple with / without indicator / recorder / Dial Thermometer / Thermostat [#]	200 °C to 600 °C 392 °F to 1112 °F > 600 °C to 1200 °C > 1112 °F to 2192 °F	1.73 °C 2.58 °C	Using Dry Block Bath / Black Body Source And R Type Thermocouple With Cold Junction And DAS By Comparison Method
		> 1200 °C to 1500 °C > 2192 °F to 2732 °F	3.47 °C	B Type Thermocouple And DAS
3.	Glass Thermometer [§]	(-) 80 °C to 20 °C (-)112 °F to 68 °F > 20 °C to 250 °C > 68 °F to 482 °F > 250 °C to 500 °C > 482 °F to 932 °F	0.20 °C 0.20 °C 1.52 °C	Using Alcohol / Water / Oil / Salt Bath And SPRT / RTD, DAS By Comparison Method
4.	Humidity Sensor with / without indicator / Hygrometer [§]	15 % RH to 95 % RH at 25 °C	1.78 % RH at 25 °C	Using R H Generator System And Humidity Indicator By Comparison Method
5.	Non Contact type temperature indicator / controller / recorder / I R Thermometer / Laser Gun / Pyrometer [§]	500 °C to 1450 °C 932 °F to 2732 °F	3.75 °C	Using Black Body Source & Standard Non Contact Thermometer By Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
6.	Temperature Calibration of Thermal Chamber* (Deep Freezer / Refrigerator / Incubator / BOD / Autoclave / Oven / Furnace / Temp. Bath)	(-) 80 °C to 20 °C > 20 °C to 250 °C > 250 °C to 1200 °C	0.66 °C 0.90 °C 2.58 °C	Using Multi Point Measurement (9 channels) Using RTD / R type Thermocouple with Cold Junction, DAS Single point measurement by Comparison Method
II. SPECIFIC HEAT AND HUMIDITY				
1.	Humidity Chamber*	20 % RH to 95 % RH at 25 °C	1.8 % RH	Using Humidity Indicator By Comparison Method

* Measurement Capability is expressed as an uncertainty (\pm) at a confidence probability of 95%

\$Only in Permanent Laboratory

*Only for Site Calibration

The laboratory is also capable for site calibration however, the uncertainty at site depends on the prevailing actual environmental conditions and master equipment used.

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