

Laboratory N.C.L. Pvt. Ltd., B. D. Nagar, Meerut Road, Ghaziabad, Uttar Pradesh
 Accreditation Standard ISO/IEC 17025: 2005
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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO - TECHNICAL CALIBRATION</u>				
1.	SOURCE			
1.	DC Voltage ^s	1 mV to 30 mV 30 mV to 300 mV 300 mV to 1000 V	0.06 % to 1.4% 0.06 % to 0.03% 0.02 %	Using Fluke Calibrator
2.	AC Voltage ^s	50 Hz 10 mV to 30 mV 30 mV to 300 mV 300 mV to 1000 V	1.5 % to 0.66% 0.66 % to 0.02% 0.02 %	Using Fluke Calibrator
3.	DC Current ^s	10 μ A to 300 μ A 300 μ A to 3 mA 3 mA to 30 mA 30 mA to 300 mA 300 mA to 3 A 3 A to 20 A 20A to 500 A 500 A to 950 A	1.5 % to 0.13 % 0.13 % to 0.09 % 0.09 % to 0.07 % 0.07% 0.07% to 0.2% 0.24% to 0.9% 0.9% to 1.8% 1.8%	Using Fluke Calibrator
4.	AC Current ^s	50 Hz 30 μ A to 300 μ A 300 μ A to 3 mA 3 mA to 3 A 3 A to 10 A 10 A to 20 A 20A to 950 A	3.2 % to 0.6 % 0.6 % to 0.3 % 0.3% 0.3% to 0.4% 0.4% to 0.9% 0.9% to 1.1%	Using Fluke Calibrator
5.	Resistance 4 W 2 W	1 m Ω to 1 k Ω 1 Ω to 190 M Ω 190 M Ω to 2 G Ω 2 G Ω to 20 G Ω	3.71% to 1.75% 1.4% 1.4% to 3.7% 3.7% to 4.5%	Standard Resistance Box Fluke Calibrator HV Mega Ohm Box
6.	Frequency ^s	45 Hz to 1000 Hz	0.02%	Using Fluke Calibrator

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7.	Power & Energy [§] UPF, 50Hz (-) 0.1 PF to (-) 0.9 PF 0.1 PF to UPF (1- Phase & 3 Phase)	10 V to 300 V 0.1 A to 10 A 10 A to 120 A	1.76%	Fluke Calibrator
8.	Temperature Simulation [#] RTD (PT-100) Type J Type Thermocouple K Type Thermocouple R Type Thermocouple N Type Thermocouple S Type Thermocouple T Type Thermocouple	(-) 100°C to 650°C (-) 20°C - 750°C (-) 140°C to 0 °C 0 °C to 1300 °C 600°C to 1600°C 0°C to 1400°C 0°C to 1600°C 0°C to 1200°C	0.41°C 0.82°C 1.4°C 0.95 °C 1.8°C 1.1°C 1.8°C 1.1 °C	Using Fluke Process Calibrator
9.	Inductance [#]	10 μ H to 10 H	1.22%	Using Standard Inductance Box by Direct Method
10.	Capacitance [#]	1 nF to 1mF	2.2%	Using Standard Capacitance Box by Direct Method
11.	Power Factor [§] (Lag & Lead)	(-) 0.1 pF to + 0.1 pF	0.05pF	Using Multifunction Calibrator by Direct Method
12.	DC Power [§]	1 W to 12 kW 1 V to 600 V 1 A to 20 A	0.70%	Using Multifunction Calibrator by Direct Method

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13.	Resistance *	1 m Ω to 1 K Ω	1.4%	Using Standard Resistance Box by Direct Method
II.	MEASURE			
1.	DC Voltage [#]	1 mV to 100 mV 100 mV to 10 V 10 V to 1000 V	0.5% to 0.01% 0.01% to 0.007% 0.007% to 0.008%	Using Digital Precision Multimeter
2.	AC Voltage [#]	50 Hz 1 mV to 100mV 100 mV to 1000 V	4.75% 0.12%	Using Digital Precision Multimeter
3.	DC Current [#]	1 μ A to 10 μ A 10 μ A to 100 μ A 100 μ A to 10 A	0.4 % to 0.09 % 0.09% 0.09% to 0.2 %	Using Digital Precision Multimeter
4.	AC Current [#]	50 Hz 10 μ A to 10 A	0.25%	Using Digital Precision Multimeter
5.	Resistance [#]	1 Ω to 10 Ω 10 Ω to 1k Ω 1k 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	0.4% to 0.05% 0.04% to 0.02% 0.02 % to 0.01 % 0.014% to 0.05% 0.05 % to 1 % 1.0% to 2.3%	Using Digital Precision Multimeter
6.	Frequency [#]	10 Hz to 1 MHz	0.06% to 0.5%	Using Digital Precision Multimeter
7.	Capacitance [#]	1 nF to 1mF	1.17% to 0.014%	Using Digital Precision Multimeter

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8.	Time Interval [#]	1 s to 30 s 30 s to 60 min. 1 Hour to 24 Hours	0.62 s 0.62s - 1.6 s 3s – 1 min.	Using Stop Watch
9.	Power & Energy [#] (1 –Phase and 3-Phase) @ 50 Hz	230 V – 300 V 10 A to 120 A	2.7%	Using Energy Logger
10.	AC High Voltage*	1 kV to 20 kV	2.6% to 3.5 %	Using HV probe with DMM
11.	DC High Voltage*	1 kV to 30 kV	1.07% to 3.25%	by Direct Method

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<u>MECHANICAL CALIBRATION</u>				
I.	DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)			
1.	Caliper [§] (Dial/ Digital/Vernier Caliper) L.C.: 0.01 mm ^Φ	0 to 300 mm 300 to 600 mm 600 to 1000 mm	7.0 μ m 10.0 μ m 15.0 μ m	Using Slip Gauge Set with Accessories Using Caliper Checker
2.	Micrometer [§] L.C.: 0.001 mm ^Φ L.C.: 0.01 mm ^Φ	0 to 100 mm 100 to 300 mm 300 to 500 mm 500 to 1000 mm	1.6 μ m 2.5 μ m 9.0 μ m 14.0 μ m	Using Slip Gauge Set Using Slip Gauge Set and Steel Gauge Block
3.	Micrometer Setting Rods [§]	Up to 100 mm 100 to 200 mm 200 to 300 mm	1.3 μ m 2.5 μ m 3.5 μ m	Using Universal Length Measuring Machine (ULM) and Loose Slip Gauge
4.	Depth Micrometer [§] L.C.: 0.001 mm ^Φ	0 to 300 mm	3.0 μ m	Using Slip Gauge Set and Steel Gauge Block
5.	Inside Micrometer [§] Two Jaw & Sticks Type L.C.: 0.001 mm ^Φ	5 to 50 mm 50 to 300 mm 300 to 1000 mm	1.4 μ m 3.0 μ m 19.0 μ m	Using Slip Gauge Set with Accessories
6.	Inside Dial Caliper [§] L.C.: 0.001 mm ^Φ	5 to 300 mm	9.0 μ m	Using Slip Gauge and Accessories

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
7.	Dial Thickness Tester [§] L.C.: 0.001 mm ^ϕ	0 to 50 mm	1.0 μ m	Using Slip Gauge Set
8.	Height Gauge [§] L.C.: 0.01 mm ^ϕ	0 to 300 mm 0 to 450 mm 0 to 600 mm 0 to 1000 mm	10.3 μ m 13.0 μ m 17.40 μ m 23.2 μ m	Using Slip Gauge Set and Dial Test Indicator Caliper Checker and Dial Test Indicator
9.	Snap Gauge [§] (GO& NOGO)	3.0 to 100 mm 100 to 200 mm	2.0 μ m 4.0 μ m	Using Slip Gauge Set
10.	Plain Plug Gauges [§] (GO& NOGO) / Air Plug Gauge	\varnothing 1.0 to \varnothing 100 mm \varnothing 100 to \varnothing 200 mm	3.3 μ m 3.5 μ m	Using Length Measuring Machine (ULM)
11.	Thread Plug Gauge / Wear Check Plug Gauge [§]	\varnothing 1.0 to \varnothing 100 mm \varnothing 100 to \varnothing 200 mm	2.0 μ m 3.0 μ m	Using Length Measuring Machine (ULM)
12.	Setting Ring Gauge [§]	\varnothing 3.0 to \varnothing 100 mm \varnothing 100 to \varnothing 200 mm	3.3 μ m 4.0 μ m	Using Length Measuring Machine (ULM)
13.	Thread Ring Gauge / Wear Check Ring Gauge [§]	\varnothing 3.0 to \varnothing 100 mm	2.1 μ m	Using Length Measuring Machine (ULM)
14.	Bore Gauge [§] Travel Only (1 mm) L.C. 0.001 mm ^ϕ	Travel Only up to 1 mm	1.5 μ m	Using Length Measuring Machine (ULM)
15.	Dial Gauge [§] (Plunger Type) L.C. 0.001 mm ^ϕ	0 to 100 mm	1.5 μ m	Using Length Measuring Machine (ULM)

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16.	Dial Gauge [§] (Lever Type) L.C. 0.001 mm ^Φ	0 to 2.0 mm	1.5 μ m	Using Length Measuring Machine (ULM)
17.	Pin Gauge [§]	1.0 to 20 mm	1.2 μ m	Using Length Measuring Machine (ULM)
18.	Feeler Gauge [§]	Up to 1.0 mm	1.0 μ m	Using Length Measuring Machine (ULM)
19.	Coating Thickness Gauge [§]	0 to 100 μ m 100 to 700 μ m	4.0 μ m 4.0 μ m	Using Standard Foils
20.	Linear Height Gauge [§] L.C.: 0.001 mm	0 to 1000 mm	10.0 μ m	Using Slip Gauges, Caliper Checker and Accessories
21.	V- Block [§] Flatness Parallelism Symmetricity	Up to 300 mm	5.6 μ m	Using Digimatic Indicator, Test Mandrel and Angle Gauge
22.	Surface Plate #	Up to 2000X2000 mm	1.81 $\sqrt{L+W}/150$ μ m (L&W in mm)	Using Electronic Level
23.	Comparator Stand # Flatness	150 X 150 mm 300 X 300 mm	3.0 μ m 6.0 μ m	Using Dial Gauge With Stand & Electronic Level
24.	Depth Caliper [§] L.C. 0.01 mm ^Φ	0 to 300 mm	11.2 μ m	Using Slip Gauge Set
25.	Bevel Protector Angle Protector Combination Set [§] L.C. 1 Minute ^Φ	0° - 90° - 0°	4 Minute	Using Angle Gauge Set
26.	Test Foils [§]	0 to 2 mm	0.9 μ m	Using Length Measuring Machine (ULM)

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
27.	Three Wire Set [§]	0.71 to 6.35 mm	1.1 μ m	Using Length Measuring Machine (ULM)
28.	Test Mandrel [§] Run Out Diameter	Up to 150 mm	2.5 μ m 2.6 μ m	Using Length Measuring Machine (ULM) and Dial Test Indicator
29.	Straight Edge [§] Parallelism Straightness	Up to 500 mm	10.7 μ m 11.0 μ m	Using Dial Test Indicator and Slip Gauge Set
30.	Bench Centre [*] Parallelism Coaxiality	Up to 700 mm	12 μ m	Using Digimatic Indicator, Taper Mandrel, and Standard Mandrel
31.	Test Sieves [§]	Up to 100 mm	20 μ m	Using Digimatic Caliper
32.	Caliper Checker [§]	0 to 600 mm	8.2 μ m	Using Slip Gauge Blocks, Long Gauge Blocks, Dial Test Indicator
33.	Universal Length Measuring Machine/ Single Axis Machine [*]	0 to 100 mm	2.0 μ m	Using Slip Gauge Block
34.	Profile Projector/ Measuring Microscope [*] L.C. : 0.001 mm/ 1 Sec Linear Angle Magnification	Up to 300 mm 0 - 360° Up to 100X	5.8 μ m 15.2 Min. 0.40%	Using Glass Scale, Angle Gauge & Digimatic Caliper

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II.	TORQUE GENERATING DEVICES			
1.	Torque Wrench [§] (Type I- Class B & C) (Type II-Class A & B) Torque Screw Driver (Type A- Class D) (Type B- Class D&E)	0.5 Nm to 100 Nm 50 Nm to 500 Nm 0.5 to 5 Nm	1.7% 1.2% 2.1%	Using Digital Torque Sensor With Indicator
III.	DUROMETER			
2.	Rubber Hardness Tester [§]	100 Shore A 100 Shore D	1.3 Shore A 1.3 Shore D	Using Rubber Hardness Tester Calibrator
IV.	PRESSURE INDICATING DEVICES			
1.	Pressure Gauge # (Dial / Digital / Transmitter / Switch / Transducers)	0 to 100 bar 0 to 700 bar 0 to 1000 bar	0.42 bar 0.7 bar 3.44 bar	Based on DKD-R6-1 Using Precision Digital Gauges Comparison Method
2.	Low Pressure Gauge # (Dial / Digital / Transmitter / Switch / Manometer / Transducers)	0 to 2000 Pa 0 to 1 bar 0 to 10 bar	1.1 Pa 0.0012 bar 0.15 bar	Based on DKD-R6-1 Using Precision Digital Gauges Comparison Method
3.	Vacuum Gauge # (Dial / Digital / Transmitter / Switch / Transducers)	0 to (-) 0.90 bar	0.002 bar	Based on DKD-R6-1 Using Precision Digital Gauges Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
V.	UTM, TENSION CREEP AND TORSION TESTING MACHINE			
1.	Force Proving Instruments [§] (Load Cell, Integral Proving Ring, Dynamometer, Force Gauge etc.)	100 N to 2 KN	0.15%	Using Dead Weight Force Test Machine
2.	Uniaxial Static Testing Machines [*]			
	-Compression	1 N to 10 N 10 N to 1 KN 1 KN to 1000 KN	0.81% 0.50% 0.80%	Using Load Cell with Indicator
	Tension	10 N to 1 KN 1 KN to 100 KN	0.82% 0.80%	
VI.	ACCELERATION AND SPEED			
1.	RPM [*] Measurement of Centrifuge etc.	50 to 1000 rpm 1000 to 6000 rpm	1.7% 1.2%	Using Digital Tachometer (Non Contact)
VII.	ACOUSTICS			
1.	Sound Level Meter [§]	94 dB	0.5 dB	Using Sound Level Calibrator
VIII.	VOLUME			
1..	Micropipette (Piston Operated)	10 μ l to 100 μ l >100 μ l to 1000 μ l >1000 μ l to 10 ml	0.5 μ l 0.6 μ l 0.8 μ l	Using Precision Balance and Distilled Water of Known Density Gravimetric Method

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2.	Glassware Pipettes Burette	0.1 ml to 1.0 ml 1.0 to 10.0 ml 10.0 to 50 ml	0.3 μ l 0.8 μ l 8.2 μ l	Using Precision Balance and Distilled Water of Known Density Gravimetric Method
3.	Measuring Cylinder / Volumetric Flask/Graduated Jar / Can / Beaker etc.	0.1 to 10 ml 10 to 100 ml 100 to 250 ml 250 to 1000 ml 1000 to 5000 ml	3.4 μ l 8.2 μ l 196 μ l 1.03 ml 3.4 ml	Using Precision Balance and Distilled Water of Known Density Gravimetric Method
IX.	WEIGHTS			
1.	Weights of Accuracy Class F2 and Coarser	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 5 kg 10 kg	0.02 mg 0.02 mg 0.02 mg 0.02 mg 0.03 mg 0.03 mg 0.05 mg 0.06 mg 0.08 mg 0.1 mg 0.12 mg 0.16 mg 0.2 mg 0.25 mg 0.3 mg 0.5 mg 1.0 mg 2.5 mg 5.0 mg 10 mg 25 mg 1.6 g	Using Standard Weights of Accuracy Class F1 Substitution Method of Weighing and ABBA Weighing Cycle Based on OIML R111-1 Precision Balance of Readability 0.01 mg Precision Balance of Readability 1 mg Precision Balance of Readability 10 mg Balance of Readability 1 g

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	Class M3 Class M3 Class M3	20 kg 50 kg	2.1 g 7.0 g	
X.	WEIGHING SCALE AND BALANCE			
1.	Weighing Balances #			
	Readability \leq 0.1 mg and Coarser	Up to 200g	0.5 mg	Standard Weights of Accuracy Class F1 Based on OIML R-76
	Readability = 1 mg and Coarser	Up to 1 kg	2.2 mg	
	Readability = 10 mg and Coarser	Up to 10 kg	15 mg	
	Readability = 100 mg and Coarser	Up to 50 kg	300 mg	Standard Weight of Accuracy Class F1 and F2
	Readability = 1 g and Coarser	Up to 100 kg	2.3 g	
	Readability = 10 g and Coarser	Up to 200 kg	10 g	Standard Weight of Accuracy Class F1 , F2 and M1
	Readability = 10 g and Coarser	Up to 300 kg	22.7 g	

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<u>THERMAL CALIBRATION</u>				
1.	TEMPERATURE			
1.	RTD's , Thermocouples With or Without Indicator/ Data Logger/ Recorder, Temperature Transmitter, Digital Thermometer #	(-) 25 °C to 140 °C 150 °C to 400 °C	0.15°C 1.5°C	Using SPRT with Temperature Indicator & Drywell Furnace
2.	Thermocouples With or without Controller/ Indicator/ Data logger / Recorder, Temperature Transmitter, Digital Thermometer #	400°C to 1200 °C	2.1°C	Using S' type Thermocouple & Drywell Furnace
3.	Temperature Indicator with sensor of Liquid bath, Oven, Dry Block Furnace, Freezers, Auto Clave, BOD Incubator, Environmental Chamber, hot Plate, Soldering Station, Furnaces, Centrifuge, Refrigerator, Washing machine, Washcator, Dryer *	(-)70°C to 400 °C	0.3°C	Using RTD Sensor with Hydra Series III, Single Position Calibration at Measuring Location in DUC

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4.	Temperature Indicator with sensor of Oven, Dry Block Furnace/Muffle Furnace *	400°C to 1200 °C	2.1°C	Using S-Type Thermocouple Hydra Series III Single Position Calibration at Measuring Location in DUC
5.	Oven, Vacuum Oven, Aging, Oven, BOD Incubator, Incubator, Centrifuge, Chamber, Environment Chamber, Furnaces*	(-)70°C to 50°C 50°C to 250°C	1.44°C 1.8°C	Using data Logger with RTD Sensors Multi Position Calibration
6.	Dry Block Furnace, Muffle Furnace, Industrial furnace and Ovens *	200°C to 600°C 600°C to 1000°C	5.5°C 8.0°C	Using Data Logger with K type Thermocouples, Multi Position Calibration
II.	SPECIFIC HEAT & HUMIDITY			
1.	Humidity Indicator of Humidity Calibrator/Generator Humidity Chamber *	15°C to 50°C @50% 25%RH to 95% RH @ 25°C	2.6°C 2.9%RH	Using Digital RH Indicator with Sensor Single Position Calibration at Measuring Location in DUC
2.	Dial / Digital & Analog Thermo-Hygrometer / RH Sensors / With Indicator / Recorder / Data Logger §	10°C to 55°C @50% RH 30% to 90% RH @ 25°C	2.6°C 2.9% RH	Using Humidity Chamber & Digital RH & Temperature Indicator with Sensor Probe

* 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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