

Laboratory Nano Technology Services, Plot No. 21, NIT Industrial Area,
Faridabad, Haryana

Accreditation Standard ISO/IEC 17025: 2005

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Validity 30.10.2017 to 29.10.2019 **Last Amended on** -

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO-TECHNICAL CALIBRATION</u>				
1.	SOURCE			
1.	DC Voltage [§]	1 mV to 330mV 330mV to 1000V	1.4% to 0.02% 0.02% to 0.016%	Using 5080 Calibrator By Direct Method
2.	AC Voltage [§]	50Hz to 1kHz 10 mV to 33mV 33mV to 1000V	1.1% to 0.6% 0.6% to 0.19%	Using Fluke 5080 Calibrator By Direct Method
3.	DC Current [§]	30 μ A to 330 μ A 330 μ A to 10A 10A to 20A 20A-1000A	0.50% to 0.31% 0.31% to 0.49% 0.49% to 0.54% 0.54% to 0.67%	Using Fluke 5080 Calibrator By Direct Method
4.	AC Current [§]	50Hz to 1kHz 30 μ A to 3.3mA 3.3mA to 1A 1A to 10A 10A to 20A 20A to 1000A	1.92% to 0.31% 0.31% to 0.49% 0.49% to 0.54% 0.54% to 0.67% 0.77%	Using Fluke 5080 Calibrator By Direct Method
5.	Low DC Resistance [§] (Discreet Values) for $\mu\Omega$ meters	100 $\mu\Omega$ 1 m Ω 10 m Ω 100 m Ω 1 Ω	0.53% 0.24% 0.24% 0.70% 1.20%	Using Std. Resistance Box By Direct Method
6.	Frequency [§]	50 Hz to 1 kHz	0.06% to 0.006%	Using Fluke 5080 Calibrator By Direct Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
7.	Power Factor ^s	± 0.3 to UPF	0.005 PF	Using Fluke 5080 Calibrator By Direct Method
8.	DC Resistance ^s (Discreet Values) 2 Wires & 4 Wires	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1000 Ω 1.9 k Ω 10 k Ω 19 k Ω 100 k Ω 190 k Ω 1 M Ω 1.9 M Ω 10 M Ω 19 M Ω 100 M Ω 190 M Ω	1.16% 0.58% 0.17% 0.12% 0.58% 0.05% 0.03% 0.03% 0.03% 0.17% 0.045% 0.05% 0.12% 0.055% 0.28% 0.23% 1.45% 1.5%	Using Fluke 5080 Calibrator By Direct Method
9.	High DC Resistance ^s (Discreet Values) For High Resistance)	2 M Ω 20 M Ω 200 M Ω 1 G Ω 10 G Ω 100 G Ω 200 G Ω 500 G Ω	3.50% 3.50% 3.75% 2.50% 2.50% 2.50% 2.50% 2.50%	Using Std. Resistance By Direct Method

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10.	Power AC ^s (Single Phase)	63.5 V to 300V 500mA to 20A PF 0.5 PF 0.8 PF 1.0 (UPF)	0.5% to 1.2%	Using Fluke 5080 Calibrator By Direct Method
11.	Temp. Source, Temp. Indicator, Controller, PID, Transmitter Thermocouple [#] R/S type J type K type T type RTD (PT100)	200 to 1700 °C 0 to 800 °C (-)100 to 1300 °C (-)150 to 400 °C (-) 200 to 600 °C	1.05° C 0.65° C 0.88° C 0.5° C 0.5° C	Using Digital Process Calibrator By Direct Method
II.	MEASURE			
1.	DC Voltage ^s	1mV to 100mV 100mV to 1 000V	0.42% to 0.011% 0.011% to 0.013%	Using 6.5 Dig. Multimeter 8845A By Direct Method
2.	AC Voltage ^s	50 Hz 100mV to 100V 100V to 750V	0.23% to 0.35% 0.35% to 0.2%	Using 6.5 Dig. Multimeter 8845A By Direct Method
3.	DC Current ^s	30 μ A to 400 mA 400 mA to 10 A	0.16% to 0.08% 0.08% to 0.18%	Using 6.5 Dig. Multimeter 8845A By Direct Method
4.	AC Current ^s	50 Hz 0.5 mA to 400 mA 400 mA to 10 A	1.6% to 0.25% 0.25%	Using 6.5 Dig. Multimeter 8845A By Direct Method

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5.	DC Resistance [§]	1 Ω to 10 K Ω 10 Ω to 10 M Ω 10 M Ω to 100M Ω	1.6% to 0.25% 0.25% 0.05% to 0.94%	Using 6.5 Dig. Multimeter 8845A By Direct Method
6.	Frequency [§]	50 Hz to 300 kHz	0.6% to 0.06%	Using 6.5 Dig. Multimeter 8845A By Direct Method
7.	Inductance [§]	1kHz 100 μ H to 1.0 H	1.35% to 0.05%	Using LCR Meter By Direct Method
8.	Capacitance [§]	1kHz 100nf to 1 μ F	0.75%	Using LCR Meter By Direct Method
9.	Phase Energy [§] (1 \emptyset & 3 \emptyset)	230/415V 1A to 5A 0.5 to UPF	0.26%	Using Standard Energy Meter By Comparison Method
10.	Temp Simulation for calibration of Process calibrators [#] Thermocouple B Type R/S Type J Type K Type T Type RTD (PT100)	500 to 1700 $^{\circ}$ C 200 to 1700 $^{\circ}$ C 0 to 800 $^{\circ}$ C (-)100 to 1300 $^{\circ}$ C (-) 150 to 400 $^{\circ}$ C (-) 200 to 600 $^{\circ}$ C	1.05 $^{\circ}$ C 1.05 $^{\circ}$ C 0.24 $^{\circ}$ C 0.8 $^{\circ}$ C to 0.3 $^{\circ}$ C 0.5 $^{\circ}$ C 0.26 $^{\circ}$ C	Using Digital Process Calibrator/ Masibus Calibrator By Simulation Method
11.	TIME [#]	10 s to 60 min	0.21 s to 1 s	Using Time Calibrator By Comparison Method

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12.	AC High Voltage *	50 Hz 1 kV to 10 Kv 50 Hz 10 kV to 100 kV	6% 4.2%	Using HV Probe with DMM By Direct/ Comparison Method
13.	DC High Voltage *	1 kV to 30 kV	6%	Using HV Divider with DMM By Direct Method

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<u>MECHANICAL CALIBRATION</u>				
I. DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)				
1.	Caliper [§] (Vernier/Dial/ Digital) L.C.0.01mm	Upto 300 mm Upto 600 mm	13 μ m 17 μ m	Using Caliper Checker
2.	External Micrometer/ Point Micrometer/ Ball Micrometer [§] L.C. 0.001 mm	0 to 25 mm 25 mm to 150 mm 150 mm to 300 mm	1.2 μ m 2.3 μ m 6.5 μ m	Using Slip Gauge Set
3.	Height Gauge [§] L.C. 0.01 mm	0 to 300 mm 0 to 600 mm	13 μ m 17 μ m	Using Caliper Checker
4.	Plunger Type Dial Gauge [§] L.C. 0.001 mm L.C. 0.01 mm	0.25 mm 25 mm to 100 mm	1.2 μ m 3.2 μ m	Using ULM
5.	Lever Type Dial Gauge [§] L.C. 0.001 mm	0 to 1 mm	1.5 μ m	Using ULM
6.	Dial Bore Gauge [§] (Travel Only)	2 mm	1.5 μ m	Using ULM

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7.	Dial Thickness Gauge [§] L.C. 0.010 mm	0 to 25 mm	6 μ m	Using Slip Gauge Set
8.	Snap Gauge [§]	Upto 300 mm	4.64 μ m	Using Slip Gauge Set
9.	Feeler Gauge [§]	Upto 2 mm	2 μ m	Using Digital Micrometer
10.	Plain Plug Gauge/ Paddle Gauge [§]	Upto 300 mm	3.4 μ m	Using ULM + Slip Gauge set
11.	Micrometer Setting Rod [§]	0 to 150 mm 150 mm to 300 mm	1.0 μ m 3.5 μ m	Using ULM + Slip Gauge set
12.	Depth Vernier Caliper [§] L.C. 0.02 mm	0 to 300 mm	14.3 μ m	Using Slip Gauge set & Caliper Checker
13.	Pin Gauge Set [§]	Upto 20 mm	2.4 μ m	Using ULM
14.	Thread Measuring Wire Set/Three Wire Set [§]	Upto 20 mm	1 μ m	Using ULM
15.	Standard Foils [§]	Upto 2 mm	2 μ m	Using Digital Micrometer
16.	Bevel Angle Protractor [§]	0-360°	4 Min	Using Angle Gauge Set
17.	Surface Plate [#]	3m X 3m	$1.5\sqrt{\{(L+W)/125\}}$ Where L & W is in mm	Using Electronic Level

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18.	V Block [§]	Upto 150mm Flatness Symmetricity Squareness	3.3 μ m 5.9 μ m 6.6 μ m	Using Slip Gauge Set, Master Cylinder, Mandrel & Plunger Type Dial
19.	Thread Plug Gauge/ Wear Checking Plug [§]	Upto 300mm	4.1 μ m	Using ULM
20.	Sieves [§]	30 μ m to 4mm 5mm to 100mm	8 μ m 17 μ m	Using Profile Projector Using Dig. Vernier Caliper
21.	Angle Plate/Box Angle Plate [§] (Right Angle Squareness)	Upto 300mm	4.7 μ m	Using Master Cylinder & Slip Gauge Set
22.	Coating Thickness Gauge [§]	Upto 1 mm	4.8 μ m	Using Standard Foils
23.	Inside Micrometer [§] (Stick Type) L.C. 0.01 mm	Micrometer Head (50-63mm) Extension Rod Upto 600mm	11 μ m 12.4 μ m	Using Slip Gauge Set & Caliper Checker
24.	Inside Micrometer [§] L.C. 0.001 mm	5mm to 30 mm	4.6 μ m	Using Slip Gauge Set & Caliper Checker
25.	Micrometer Head [§] L.C. 1 μ m & Coarser	0 to 50 mm	2 μ m	Using ULM

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25.	Spline Plug Gauge	Upto 75 mm	3 μ m	Using Digital Micrometer
26.	Flange Micrometer/ Blade Micrometer [§] L.C. 0.001 mm	0 to 25 mm	2.29 μ m	Using Slip Gauge Set
27.	Plain Taper Gauge [§] (Half Angle Only)	Upto 50mm and taper Upto 45°	15 Sec	Using Sine Bar, Plunger Type Dial Indicator & Slip Gauge Set
28.	Angle Gauge [§]	Upto 90°	15 Sec	Using Sine Bar, Plunger Type Dial Indicator & Slip Gauge Set
29.	Dial Calibration Tester [§] L.C. 1 μ m	0 to 25 mm	1.79 μ m	Using Slip Gauge Set & Plunger Type Dial
30.	Spirit Level [§] Sensitivity 20 μ m/m	Base Length Upto 150mm	8 μ m/m	Using Electronic Level L.C. 0.001mm/m
31.	Electronic Level [§] Sensitivity 0.01mm/m	Base Length Upto 150mm	8 μ m/m	IS 5706 – 1993 Using Electronic Level L.C. 0.001mm/m
32.	Sine Bar [§] Upto 200mm	Angle Centre Distance Flatness Parallelism	20 Sec 6.1 μ m 5.7 μ m 5.6 μ m	IS 5359 – 1987 Using Slip Gauge set and Angle gauge
33.	Radius Gauge [§]	0.5 mm to 25 mm	6 μ m	Using Profile Projector

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34.	Pitch Gauge [§]	Upto 60° Upto 25mm	3 min 6 μ m	Using Profile Projector
35.	Electronic Probe [§] L.C. 0.1 μ m	0 to 25 mm	1 μ m	Using ULM
36.	Engg. Square [§]	Upto 300mm Squareness	5.6 μ m	Using Master Cylinder and Slip Gauge Set
37.	Slip Gauge Accessories [§]	Upto 25mm	1.3 μ m	Using Slip gauge set and Plunger Type dial
38.	Comparator with Stand [§] L.C 0.5 μ m Work Table Flatness	Upto 25 μ m 200 x 200mm	0.9 μ m 3.8 μ m	Using Slip Gauge set
39.	Straight Edge [#]	1000 mm	1 $\sqrt{L/125}$ Where L is in mm	Using Electronic Level L.C. 0.001mm/m
40.	Thread Ring Gauge [§]	M5-M100	3.5 μ m	Using ULM & Master Ring Gauge, T-Stylus probe
41.	Plain Ring Gauge [§]	5 mm to 200 mm	2.7 μ m	Using ULM & Master Ring Gauge, T-Stylus probe
42.	Comparator Stand [#] (Work Table Flatness Only)	Upto 200mm X 200mm	3.1 μ m	Using Lever Type Dial Gauge

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43.	Bench Centre (Parallelism of centre axis w.r.t guide ways)	Up to 2m	6.4 μ m	Using Tape Shank Cylindrical Mandrel Plain Cylindrical Mandrel
	Co-Axiality of Centre [#]	Upto 1m	8.1 μ m	
44.	Surface Plate [#]	3m x 3m	$1.5\sqrt{\{(L+W)/125\}}$ Where L & W is in mm	Using Electronic Level
II.	ACOUSTICS			
1.	Sound Level Meter [§]	94dB	1.7 dB	Using Sound level calibrator By Comparison Method
III.	DIMENSION (PRECISION INSTRUMENTS)			
1.	Profile Projector [#] L.C. 0.001 mm L.C. 35 sec	Linear Upto 200mm Angular Upto 360° Magnification Up to 50X	3.4 μ m 2 min 0.05%	Using Linear Upto 200mm, Angular Upto 360° & Magnification Up to 50X
2.	ULM [#]	0 to 100mm	0.7 μ m	Using Slip Gauge set
IV.	ACCELERATION AND SPEED			
1.	Centrifuge [#]	40 to 10000 rpm	0.20%	Using Digital Tachometer
2.	Tachometer [§]	40 to 8000 rpm 8000 to 16000 rpm	1.03% 0.20%	Using Digital Tachometer

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V.	PRESSURE INDICATING DEVICES			
1.	Pressure Gauge Pressure Transducer With Indicator / Transmitter [#]	0 to 700 bar	1.4 bar	Using Digital Pressure Gauge By Comparison DKD R-6-1
2.	Pressure Gauge Pressure Transducer With Indicator / Transmitter [#]	\leq 35 bar	0.14 bar	Using Digital Pressure By Comparison DKD R-6-1 Gauge
3.	Vacuum Gauge [#]	(-)0.9 to 0 bar	0.0116 bar	Using Druck Calibrator By Comparison DKD R-6-1
4.	Pressure Gauge Pressure Transducer With Indicator / Transmitter [#]	0 to 3 bar	0.026 bar	Using Druck Calibrator By Comparison DKD R-6-1
5.	Magnahelic Gauge [#]	0 to 1000 mm WC	15.3 mm WC	Using Digital Pressure Gauge by Comparison DKD R-6-1

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VI.	WEIGHING SCALE AND BALANCE			
1.	Weighing Balance*			
	Readability = 0.01 mg or coarser	0 to 200 g	0.5 mg	Using OIML R-76 and Standard weight of class F1
	Readability = 0.1 g or coarser	0 to 1kg	0.2 g	Using OIML R-76 and Standard weight of class F1 & M1
	Readability = 0.1 g or coarser	0 to 10kg	1 g	Using OIML R-76 and Standard weight of class M1
	Readability = 1 g or coarser	0 to 50kg	1.5 g	Using OIML R-76 and Standard weight of class M1
	Readability = 10 g or coarser	0 to 100kg	9.6 g	Using OIML R-76 and Standard weight of class M1
VII.	VOLUME			
1.	Micropipette [§]	10 μ l to 100 μ l >100 μ l to 1000 μ l	0.2 μ l 1.2 μ l	Using Digital Balance of Readability 0.01mg/0.1mg ISO8655 (Part -6)

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<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	Liquid-in-Glass Thermometer, RTD/Thermocouple with & without Indicator, Digital Thermometer, Temperature Indicator with sensor, Dial Thermometer [#]	(-)38°C to 50°C 50°C to 250°C	0.29°C 0.3°C	Using PRT with indicator and 6.5 Digital Multimeter using low Temp. bath & oil bath By Comparison Calibration
2.	RTD/Thermocouple with & without Indicator, Digital Thermometer, Temperature Indicator with sensor, Dial Thermometer [#]	300°C to 1000°C 1000°C to 1200°C	2.2°C 2.3°C	Using R – type thermocouple with indicator and 6.5 Digital Multimeter using dry block calibrator By Comparison Calibration
3.	Non Contact type Thermometer, IR Thermometer [#]	50°C to 350°C	3.5°C	Using Infrared Thermometer and Black body source By Comparison Calibration

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4.	Temperature Indicator with Sensor of Chilling chamber/ Bath/Dry Block/Oven/ Furnace. *	(-)80°C to 250°C 250°C to 1100°C	0.62°C 2.3°C	Using Single position calibration (At measuring location in DUC)
5.	Temperature Indicator with inbuilt or external sensor §	5°C to 60°C	0.85°C	Using RTD with indicator, temperature controlled chamber by Comparison Calibration
II.	SPECIFIC HEAT & HUMIDITY			
1.	RH Indicator with inbuilt or external sensor, Thermo hygrometer§	20%RH to 95 %RH @ ~ 25°C	1.84% RH @ ~25°C	Using RH sensor probe with indicator Single position calibration (At measuring location in DUC)
2.	RH Indicator with Sensor of Climatic / Humidity / Environmental Chamber#	20 %RH to 95 %RH @ ~25°C	1.84% RH @ ~25°C	Using RH sensor probe with indicator Single position calibration (At measuring location in DUC)

* 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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