

Laboratory Bhagwati Calibration Laboratory, 16, Hindon Market, Karhera, Mohan Nagar, Ghaziabad, Uttar Pradesh
Accreditation Standard ISO/IEC 17025: 2005
Certificate Number CC-2464 **Page** 1 of 12
Validity 06.12.2017 to 05.12.2019 **Last Amended on** 14.03.2019

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ($\pm$)	Remarks
<u>ELECTRO-TECHNICAL CALIBRATION</u>				
I.	SOURCE			
1.	DC Resistance ^{\$} (2 Wire Method)	1 Ω to 100 k Ω 100 k Ω to 1 M Ω 2 M Ω 20 M Ω 200M Ω 2 G Ω 20 G Ω	1.0% to 0.58% 0.58% to 1.2% 3.5% 3.52% 4.62% 4.95% 5.16%	Using Decade Resistance Box & Mega Ohm Box (Fixed Values) By Direct Method
2.	Capacitance ^{\$}	1 kHz 10 pF to 1 μ F 100 Hz 10 μ F to 1000 μ F	1.61% 1.61%	Using Std. Capacitance Box (Fixed Values) By Direct Method
3.	Inductance ^{\$}	1 kHz 100 μ H to 10 H	1.28%	Using Std. Inductance Box (Fixed Values) By Direct Method
4.	DC High Current [*]	100 A to 1000 A	1.5%	Using Multifunction Calibrator with Current Coil (X100) By Direct Method
5.	AC High Current [*]	50 Hz 100 A to 1000 A	1.5%	Using Multifunction Calibrator with Current Coil (X100) By Direct Method

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6.	Temperature Simulation* (Controller/Indicator) Recorder/Data Logger/ PID /Scanner			
	RTD (Pt-100)	(-) 200 °C to 850 °C	0.9°C	Using Universal Calibrator (Gipitronix, Model: Unical 38534 By Direct Method
	J-Type Thermocouple	(-) 200 °C to 1050 °C	1.2°C	
	K-Type Thermocouple	0°C to 1350 °C	1.4°C	
	N-Type Thermocouple	0°C to 1295 °C	1.3°C	
	T-Type Thermocouple	(-) 200 °C to 390 °C	1.0°C	
	E-Type Thermocouple	(-) 195 °C to 1000 °C	1.4°C	
	R-Type Thermocouple	0 °C to 1750 °C	4.5°C	
	S-Type Thermocouple	0 °C to 1750 °C	2.6°C	
	B-Type Thermocouple	400 °C to 1800 °C	4.5°C	
	Thermocouple			
II.	MEASURE			
1.	DC Voltage ^{\$}	1 mV to 100 mV 100 mV to 10 V 10V to 1000 V	0.65% to 0.041% 0.043% 0.043%	Using Digital Multimeter 6½ (Fluke - 8846A) / Multifunction Calibrator by Direct / Comparison Method
2.	AC Voltage ^{\$}	50 Hz 1 mV to 100 mV 100 mV to 10 V 10 V to 1000 V	4.7% to 0.13% 0.13% 0.11%	Using Digital Multimeter 6½ (Fluke - 8846A) / Multifunction Calibrator by Direct / Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ($\pm$)	Remarks
3.	DC Current ^s	100 μ A to 1 mA 1 mA to 1 A 1 A to to 10 A	0.12% 0.12% 0.2%	Using Digital Multimeter 6½ (Fluke - 8846A) Multifunction Calibrator by Direct / Comparison Method
4.	AC Current ^s	50 Hz 100 μ A to 1 mA 1 mA to 1 A 1 A to 10 A	0.32% to 0.26% 0.26% 0.26% to 0.26%	Using Digital Multimeter 6½ (Fluke - 8846A) / Multifunction Calibrator by Direct / Comparison Method
5.	Stop watch/Timer / Hour Meter ^s (Digital/ Mechanical)	5 s to 50 s 50 s to 200 s 500 s to 3600 s	0.65 s 0.6 s to 0.95 s 0.95 s to 4.90 s	Using Digital Timer Calibrator By Comparison Method
6.	DC High Voltage*	1 kV to 10 kV	6.2%	Using HV Probe (Fluke 80K-40) with DMM By Direct Method
7.	AC High Voltage*	50 Hz 1 kV to 10 kV	6.2%	Using HV Probe (Fluke 80K-40) with DMM By Direct Method
8.	Temperature Simulation ^s (Controller/Indicator) Recorder/Data Logger/ PID /Scanner			
	RTD (Pt-100)	(-) 200 °C to 800 °C	1.2 °C	Using Universal Calibrator (Gipitronix, Model: Unical 38534 By Direct Method
	J-Type Thermocouple	(-) 200 °C to 1050 °C	1.2 °C	
	K-Type Thermocouple	0 °C to 1300 °C	1.2 °C	
	N-Type Thermocouple	0 °C to 1250 °C	1.3 °C	
	T-Type Thermocouple	(-) 200 °C to 390 °C	0.9 °C	
	E-Type Thermocouple	(-) 200 °C to 990 °C	1.2 °C	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ($\pm$)	Remarks
	R-Type Thermocouple	0 °C to 1750 °C	4.6 °C	
	S-Type Thermocouple	0 °C to 1750 °C	4.6 °C	
	B-Type Thermocouple	600 °C to 1800 °C	2.6 °C	

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<u>MECHANICAL CALIBRATION</u>				
I.	DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)			
1.	Vernier Caliper ^{\$} L.C.: 0.01 mm	Upto 300 mm Upto 600 mm	7.8 μ m 10.0 μ m	Using Caliper Checker, Slip Gauge Set & Long Gauge Block Set By Comparison Method
	L.C.: 0.01 mm ^Φ	Upto 1000 mm	14.3 μ m	Using Caliper Checker, Slip Gauge & Long Gauge Blocks By Comparison Method
2.	External Micrometer ^{\$} L.C.: 0.001 mm	Upto 100 mm 100 mm to 300 mm	1.7 μ m 3.7 μ m	Using Slip Gauge Set, Slip Gauge Acc & Long Gauge Block By Comparison Method
	L.C.: 0.01 mm	Upto 300 mm 300 mm to 600 mm	8.4 μ m 10.0 μ m	
3.	Internal Micrometer ^{\$} L.C.: 0.001 mm	5 mm to 30 mm 50 mm to 600 mm	7.1 μ m 9.9 μ m	Using Gauge Blocks (0-Grade) Caliper Checker & Long Gauge Block By Comparison Method
	L.C.: 0.01 mm	50 mm to 1000 mm	11.2 μ m	
4.	Dial Indicator ^{\$} (Plunger Type) L.C.: 0.001 mm	0 to 50 mm	1.62 μ m	Using Dial Calibration Tester, Slip Gauge Set & Comparator Stand By Comparison Method

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5.	Dial Indicator ^{\$} (Lever Type) L.C.: 0.001 mm L.C.: 0.002 mm L.C.: 0.01 mm	0 to 0.14 mm 0 to 0.2 mm 0 mm to 1.0 mm	0.8 μ m 1.3 μ m 5.9 μ m	Using Dial Calibration Tester By Comparison Method
6.	Height Gauge ^{\$} L.C.: 0.001 mm L.C.: 0.01/0.02 mm	0 to 450 mm 0 to 600 mm	6.0 μ m 17.70 μ m	Using Slip Gauge Set, Long Gauge Block Lever Type Dial Gauge Calliper Checker, Surface Plate By Comparison Method
7.	Dial Thickness Gauge ^{\$} L.C.: 0.001 mm	0 to 25 mm	1.7 μ m	Using Slip Gauge Set By Comparison Method
8.	Bore Gauges ^{\$} (Transmission only) L.C.: 0.001 mm	Upto 2 mm	3.3 μ m	Using Dial Calibration Tester/ Plunger Dial By Comparison Method
9.	Snap Gauge ^{\$}	5 mm to 100 mm	3.0 μ m	Using Slip Gauge Set By Comparison Method
10.	Plain Plug Gauge ^{\$}	5 mm to 50 mm	3.5 μ m	Using Slip Gauges, Electronic Probe Comparator Stand By Comparison Method
11.	Feeler Gauge ^{\$}	0.03 mm to 1 mm	1.8 μ m	Using Digital Micrometer By Comparison Method
12.	Standard Thickness Foil ^{\$}	0.01 mm to 1 mm	1.7 μ m	Using Digital Micrometer By Comparison Method

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13.	Depth Gauge ^{\$} L.C.: 0.02 mm	Up to 300 mm	16.4 μ m	Using Slip Gauge Set, Long Gauge Block Calliper Checker, Surface Plate By Comparison Method
14.	Depth Micrometer ^{\$} L.C.: 0.001 mm	0 to 300 mm	6.81 μ m	Using Slip Gauge Set, Long Gauge Block Surface Plate, Calliper Checker By Comparison Method
15.	Dial / Digital Inside Caliper ^{\$} L.C.: 0.01 mm	6 mm to 40 mm	7.0 μ m	Using Slip Gauge Set, Long Gauge Block , Calliper Checker By Comparison Method
16.	Dial Calibration Tester ^{\$} L.C.: 0.0002/ 0.001 mm	0 to 10 mm	1.3 μ m	Using Electronics Probe By Comparison Method
17.	Micrometer Head ^{\$} L.C.: 0.001 mm	0 to 50 mm	3.5 μ m	Using Electronics Probe By Comparison Method
18.	V- Block ^{\$} Parallelism Symmetry Flatness	150 mm x 150 mm x 150 mm	5.5 μ m 5.5 μ m 5.5 μ m	Using Surface Plate, Mandrel & Lever Dial Gauge By Comparison Method
19.	Coating Thickness Gauge ^{\$}	0 to 1200 μ m	2.5 μ m	Using Std Thickness Foil By Comparison Method
20.	Test Sieves ^{\$} (Aperture Size)	4 mm to 25.0 mm 25.0 mm to 125 mm	16.0 μ m 24.4 μ m	Using Vernier Callipers By Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ($\pm$)	Remarks
21.	Surface Roughness Tester ^{\$}	Ra 3.04 μ m	4.0 μ m	Using Roughness Master By Comparison Method
22.	Roughness Master ^{\$}	Ra 3.04 μ m	10.2 μ m	Using Surface Roughness Tester By Comparison Method
23.	Electronics Probe ^{\$} L.C.: 0.0001 mm	0 to 10 mm	1.7 μ m	Using Slip Gauges Comparator Stand By Comparison Method
24.	Surface Plate, Granite Comparator Stand*	1500 mm x 1500 mm	$0.9 \sqrt{\frac{L+W}{120}} \mu$ m	Using Electronic Level Meter By Comparison Method
25.	Radius Gauge ^{\$}	Up to 25 mm	4.7 μ m	Using Profile Projector By Comparison Method
26.	Angle Gauge ^{\$} (Industrial)	Up to 90°	1',5"	Using Profile Projector By Comparison Method
27.	Thread Pitch Gauge ^{\$}	Up to 6 mm	5.0 μ m 1',5"	Using Profile Projector By Comparison Method
28.	Measuring Pin Set ^{\$}	Up to 20 mm	1.7 μ m	Using Electronics Probe, Slip Gauge Set & Comparator Stand By Comparison Method
29.	Profile Projector * (Linear Scale) L.C.: 0.001 / 0.005 mm Angular Scale L.C-1° Magnification	Up to 150 mm 0 to 360° 10X to 50X	4.5 μ m 31.5" 4.12 %	Using Glass Scale, Circular Glass & Digital Vernier Calliper By Comparison Method

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II.	DIMENSION (PRECISION INSTRUMENTS)			
1.	Length Bar ^s	>100 mm to 500 mm	5.4 μ m	Using Slip Gauge Set, Long Gauge Block, Height Gauge. Lever Dial Gauge Surface Plate By Comparison Method
III.	PRESSURE INDICATING DEVICES			
1.	Digital/ Analog Pressure Gauge, Pressure Indicator With Transducer #	0 to 700 bar 0 to 20 bar 0 to 2 bar	0.85 bar 0.041 bar 0.007 bar	Using Digital Pressure Gauge By Comparison Method
2.	Digital/ Analog Vacuum Gauge [#]	0 to (-) 0.8 bar	0.0048 bar	Using Digital Vacuum Gauge & Comparator Pump By Comparison Method
3.	Low Pressure Gauge Magnehelic Gauge / Differential Gauge #	0 to 13729.31 Pa (0 to 1400 mmH ₂ O)	12.75 Pa 1.3 mmH ₂ O	Using Digital Pressure Gauge (Differential) By Comparison Method
IV.	MASS			
1.	Weights ^s (M1 Class and coarser)	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg	0.011 mg 0.045 mg 0.057 mg 0.057mg 0.057mg 0.057mg 0.057mg 0.057mg 0.057mg	Using F1 Class Weights And Balance of readability 0.01mg / 0.1 mg

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ($\pm$)	Remarks
		1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g	0.072 mg 0.072 mg 0.072 mg 0.103 mg 0.133 mg 0.22 mg 0.99 mg 0.99 mg	
	(M3 Class and Coarser)	5Kg 10Kg 20Kg	1.1 g 1.1 g 2.11 g	Using F1 Class Weights And Balance of readability 1g
V.	VOLUME			
1.	Micro-pipette ^{\$}	10 μ l to 100 μ l >100 μ l to 1000 μ l (at 27 °C)	0.40 μ l 5.1 μ l	Using Balance of 200 g Capacity And 0.01mg / 0.1 mg readability
2.	Glassware Pipettes, Burettes, Measuring Cylinder, Volumetric Flask ^{\$}	1 ml to 100 ml (at 27 °C) 200 ml (at 27 °C)	0.07 ml to 0.4 ml 0.98 ml	Using Balance of 200 g Capacity And 0.01mg / 0.1 mg readability Using Balance of 600 g Capacity And 10 mg Readability and Distilled Water
VI.	WEIGHING SCALE AND BALANCE			
1.	Electronic Weighing Balances With Readability [#]			F1 Class Weights 1 mg to 200 g
	d=10 mg	Up to 200 g	0.85 mg	
	d=10 mg	Up to 600 g	13 mg	
	d=1 g	Up to 30 kg	3 g	F1 Class Weights 500 g to 20 Kg

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<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	RTD, Thermocouple With or Without Temperature Indicator / Controller, Digital Thermometer, Temp. Gauge & Temp. Transmitter [#]	(-) 30 °C to 50 °C 50 °C to 200 °C	0.26 °C 0.35 °C	Using PRT With Digital Multimeter, Liquid Bath, Dry Bath & 6½ Digital Multimeter By Comparison Method
2.	Liquid in Glass Thermometer [#]	(-) 30 °C to 140 °C	0.64 °C	Using PRT With Digital Multimeter & Liquid Bath, By Comparison Method
3.	RTD, Thermocouple With or Without Temperature Indicator / Controller, Digital Thermometer, Temp. Gauge & Temp. Transmitter [#]	200 °C to 650 °C	0.68 °C	Using PRT With Digital Multimeter, Dry Bath & 6½ Digital Multimeter By Comparison Method
4.	Temp. Indicator With Sensor of Liquid Bath, Dry Block Bath ^{\$}	(-)30 °C to 200 °C	0.35 °C	Using PRT With Digital Multimeter (Single Position Calibration)
5.	Temp. Indicator With Sensor of Dry Block Bath ^{\$}	200 °C to 650 °C	0.65 °C	Using PRT With Digital Multimeter (Single Position Calibration)
6.	Temp. Indicator With Sensor of Dry Block Furnace, Freezer,	-30 °C to 200 °C	0.87 °C	Using PRT With Digital Multimeter (Single Position Calibration)

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ($\pm$)	Remarks
	Oven, Incubator (for Non-Medical Applications), Chamber, Cold / Hot Rooms #			
7.	Temp. Indicator With Sensor of Dry Block Furnace, Industrial Furnace#	200 °C to 1000 °C	3.0 °C	Using R Type Thermocouple With Temp. Indicator (Single Position Calibration)
II.	SPECIFIC HEAT & HUMIDITY			
1.	Humidity Indicator With Sensor of Chamber, Environmental Chamber #	30% RH to 85% RH at 25°C	2.1% RH	Using Dig. Humidity Indicator With Sensor (Single Position Calibration)

* 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.

Φ Laboratory can also calibrate instruments/devices of coarser resolution / least count within the accredited range using same reference standard/ master equipment under the scope of accreditation.