

Laboratory Testcal, No. 35, 1st Floor, SK Tower, 11th Cross, Vyalikaval,
Malleswaram, Bengaluru, Karnataka

Accreditation Standard ISO/IEC 17025: 2005

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
<u>ELECTRO-TECHNICAL CALIBRATION</u>				
1.	SOURCE			
1.	DC Voltage [#]	1 mV to 100 mV 100 mV to 1000V	0.12 % to 0.004 % 0.004 % to 0.0024%	Using Calibrator Fluke 5522A By Direct method
2.	AC Voltage [#]	45 Hz to 1 kHz 1 mV to 1000 V 1 kHz to 10 kHz 1 mV to 300 V 10 kHz to 100 kHz 30 mV to 100 V 100 kHz to 450 kHz 30 mV to 3 V	0.79 % to 0.038 % 0.79 % to 0.026 % 0.04 % to 0.29 % 0.45 % to 0.30 %	Using Calibrator Fluke 5522A By Direct method
3.	DC Current [#]	10 µA to 100 µA 100 µA to 1 A 1 A to 10 A 10 A to 20 A 20 A to 1000 A	0.25 % to 0.04 % 0.04 % to 0.028 % 0.028 % to 0.064 % 0.064 % to 0.12 % 0.12 % to 0.64 %	Using Calibrator Fluke 5522A By Direct Method With 50Turns Current Coil
4.	AC Current [#]	45 Hz to 1 kHz 33 µA to 1 A 1 A to 20 A 1 kHz to 10 kHz 30 mA to 3 A	0.52 % to 0.07 % 0.07 % to 0.25 % 0.06 % to 3.08 %	Using Calibrator Fluke 5522A By Direct method

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		1 kHz to 5 kHz 3 A to 20 A	3.5 %	With 50 Turns Current Coil
		50 Hz 20 A to 1000 A	0.25 % to 0.64 %	
5.	Resistance [#]	100 m Ω to 100 Ω 100 Ω to 100 M Ω 100 M Ω to 1G Ω	1.16 % to 0.005 % 0.005 % to 0.063 % 0.063 % to 1.8 %	Using Calibrator Fluke 5522A By Direct method
6.	Capacitance [#]	1 kHz 220 pF to 100 nF 100 nF to 110 μ F	5.83 % to 0.4 % 0.4 % to 0.6 %	Using Calibrator Fluke 5522A By Direct method
7.	AC Power [#]	50 Hz @ UPF 120 V to 240 V 0.01 A to 20 A 1.2 W to 4.8 kW 50 Hz @ 0.8 PF 120 V to 240 V 0.01 A to 20 A 0.96 W to 3.8 kW 50 Hz @ 0.5 PF 120 V to 240 V 0.01 A to 20 A 0.6 W to 2.4 kW 50 Hz @ 0.2 PF 120 V to 240 V 0.01 A to 20 A 0.24 W to 960 W	0.17 % 0.3 % 0.44 % 1.11 %	Using Calibrator Fluke 5522A By Direct Method

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8.	DC Power# 1 V to 600 V 10 mA to 20 A	10 mW to 12 kW	0.03 % to 0.08 %	Using Calibrator Fluke 5522A By Direct method
9.	Power Factor# Lead / Lag	50 Hz 0.2-1-0.2 PF	0.003 PF	Using Calibrator Fluke 5522A By Direct method
10.	Inductance#	100 µH to 10 H	1.2 %	Using Decade Inductance Box By Direct method
11.	Scope Mode# Amplitude-DC Signal AC Time Marker Band Width	1 mV to 130 V 1 kHz 1 mV to 55 Vp-p 1 nS to 5 S 50 kHz 50 kHz to 1 GHz	0.06 % 0.34 % to 0.12 % 0.007 % to 0.002 % 6.5 %	Using Calibrator Fluke 5522A By Direct method
12.	Frequency#	10 Hz to 1 GHz	0.007 % to 0.0012 %	Using Calibrator Fluke 5522A By Direct Method
13.	Temperature Simulation# Thermocouple K E J T R S B N RTD (pt-100)	(-) 200 °C to 1372 °C (-) 200 °C to 1000 °C (-) 200 °C to 1200 °C (-) 200 °C to 400 °C 150 °C to 1750 °C 150 °C to 1750 °C 600 °C to 1800 °C (-) 200 °C to 1300 °C (-) 200 °C to 800 °C	0.04 °C 0.03 °C 0.07 °C 0.04 °C 0.09 °C 0.09 °C 0.12 °C 0.04 °C 0.03 °C	Using Calibrator Fluke 5522A By Direct Method

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II.	MEASURE			
1.	DC Voltage [#]	1 mV to 100 mV 100 mV to 10 V 10 V to 1000 V 1 kV to 30 kV	0.42 % to 0.009 % rdg 0.009 % to 0.003 % rdg 0.003 % to 0.005 % rdg 0.005 % to 3.63 %	Using Calibrator Fluke 8846A By Direct Method Using Fluke 80k-40 Probe By Direct Method
2.	AC Voltage [#]	1 kHz to 100 kHz 100 mV to 100V 45 Hz to 1 kHz 1 mV to 1000 V 50 Hz 1 kV to 28 kV	0.12 % to 0.20 % 5.39 % to 0.07 % 0.07 % to 3.87 %	Using Calibrator Fluke 8846A By Direct Method Using Fluke 80k-40 Probe By Direct Method
3.	DC Current [#]	10 μ A to 1 A 1 A to 10 A 10 A to 200 A 200 A to 1000 A	0.36 % to 0.08 % 0.08 % to 0.19 % 0.19 % to 0.70 % 0.70 % to 0.90 %	Using Calibrator Fluke 8846A & Current Shunt Veetech By Direct Method & VI Method
4.	AC Current [#]	40 Hz to 5 kHz 10 mA to 100 mA 100 mA to 2 A 5 kHz to 10 kHz 10 mA to 1 A 45 Hz to 1 kHz 33 μ A to 10 A	0.25 % to 0.18 % 0.18 % to 0.3 % 0.28 % to 1.57 % 0.43 % to 0.31 %	Using Calibrator Fluke 8846A By Direct Method

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5.	Resistance [#]	100mΩ to 1 Ω	3.5 % to 0.36 % rdg	Using Micro ohm meter Using Calibrator Fluke 8846A By Direct method	
		1Ω to 100 Ω	0.36 % to 0.02 % rdg		
		100Ω to 100 kΩ	0.02 % to 0.013 % rdg		
		100kΩ to 100 MΩ	0.013 % to 0.94 % rdg		
		100MΩ to 1GΩ	0.94 % to 2.31 % rdg		
6.	Capacitance [#]	1 kHz 1 nF to 100 μF	0.3 % to 1.7 % rdg	Using LCR Meter	
7.	Time Interval #	1 Sec to 24 Hrs	0.23 % to 0.12 % rdg	Using Time Totalizer By Comparison method	
8.	Frequency [#]	10 Hz to 1GHz	0.007 % to 0.0012 %	Using Frequency Counter By Direct Method	
9.	Temperature Simulation [#] Thermocouple			Using Calibrator Fluke 8846A by Simulation Method	
		K	(-) 200 °C to 1372 °C		0.21 °C
		E	(-) 200 °C to 1000 °C		0.17 °C
		J	(-) 200 °C to 1200 °C		0.18 °C
		T	(-) 200 °C to 400 °C		0.21 °C
		R	150 °C to 1750 °C		0.46 °C
		S	150 °C to 1750 °C		0.51 °C
		B	600 °C to 1800 °C		0.65 °C
		N	(-) 200 °C to 1300 °C		0.27 °C
RTD (pt-100)	(-) 200 °C to 800 °C	0.12 °C			

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<u>MECHANICAL CALIBRATION</u>				
1.	DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)			
1.	Calipers [§] (Vernier/Digital/ Dial) L.C.: 10 μ m	0 to 600 mm 0 to 1000 mm	10.0 μ m 10.31 μ m	Using Caliper Checker & Gauge Blocks '0' Grade
2.	Depth Caliper [§] (Vernier/Dial/Digital) L.C.:10 μ m	0 to 300 mm	7.32 μ m	Using Gauge Blocks '0' Grade
3.	Height Gauge [#] (Vernier/Dial/Digital) L.C.: 1 μ m	0 to 600 mm	6.60 μ m	Using Gauge Blocks '0' Grade, Squareness Master
	L.C.: 10 μ m	0 to 300 mm 0 to 1000 mm	7.52 μ m 10.15 μ m	Using Gauge Blocks '0' Grade
4.	External Micrometer [§] L.C.: 1 μ m	0 to 100 mm 0 to 300 mm	1.1 μ m 2.97 μ m	Using Gauge Blocks '0' Grade
	L.C.: 10 μ m	0 to 600 mm	9.90 μ m	
5.	Setting Rods / Interchangeable Rods [§]	25 mm to 600 mm	5.59 μ m	Using ULM
6.	Internal Micrometer [§] (Stick type) L.C.: 10 μ m	50 mm to 500 mm 500 mm to 1000 mm	6.5 μ m 9.20 μ m	Using Gauge Blocks '0' Grade

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7.	Depth Micrometer [§] L.C.: 10 μ m	0 to 300 mm	6.40 μ m	Using Gauge Blocks '0' Grade
8.	Dial Gauge [§] (Plunger/ Digital/ Dial Thickness Gauge) L.C.: 1 μ m L.C.: 10 μ m	0 to 25 mm	1.76 μ m	Using Electronic Dial Calibration Tester
		25 mm to 100 mm	5.85 μ m	Using ULM
9.	Dial Gauge [§] (Lever Type) L.C.: 1 μ m L.C.: 10 μ m	0 to 0.2 mm	1.75 μ m	Using Electronic Dial Calibration Tester
		0 to 2 mm	6.01 μ m	
10.	Bore Dial Gauge [§] (Transmission only) L.C.: 1 μ m	0 to 1 mm	3.15 μ m	Using Electronic Dial Calibration Tester
11.	Snap Gauge [§]	0.5 to 100 mm	0.9 μ m	Using Gauge Blocks '0' Grade/ ULM
		100 mm to 300 mm	4.8 μ m	
12.	Dial Snap Gauge [§] L.C.: 1 μ m	0 to 300 mm	3.45 μ m	Using Gauge Blocks '0' Grade
13.	Leg Caliper / Inside Caliper [§]	0 to 150 mm	3.45 μ m	Using Gauge Blocks '0' Grade
14.	Measuring Pin [§]	0.5 mm to 25 mm	0.39 μ m	Using ULM
15.	Ultra Sonic Thickness Gauge [§] L.C.: 10 μ m	0 to 300 mm	2.97 μ m	Using Gauge Blocks '0' Grade
16.	Dial Thickness Gauge [§] L.C.: 10 μ m	0 to 10 mm	0.59 μ m	Using Gauge Blocks '0' Grade

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17.	Feeler Gauge [§]	Upto 2 mm	1.63 μ m	Using ULM
18.	Foils/ Thickness Plate [§]	Upto 1 mm	1.62 μ m	Using ULM
19.	Coating Thickness Gauge [§]	Upto 1 mm	1.73 μ m	Using Standard Foils
20.	V-Block [§] Parallelism & Symmetricity	200 mm	6.81 μ m	Using Lever Dial Gauge & Mandrel
21.	Comparator Stand-Flatness [§]	Upto 200 mm	3.1 μ m	Using Lever Dial Gauge
22.	Dial Comparator [§] L.C.: 0.5 μ m (Supramess) L.C.: 1 μ m (Millimes)	0 to (\pm) 25 mm 0 to (\pm) 50 mm	1.69 μ m 1.76 μ m	Using Electronic Dial Calibration Tester
23.	Pistol Caliper [§] L.C.: 100 μ m	0 to 100 mm	5.60 μ m	Using Gauge Block 0 Grade
24.	Engineer's Parallel [§] (for Parallelism Parameter Only)	Upto 400 mm	5.17 μ m	Using Lever Dial Gauge
25.	Plain Plug Gauge [§]	1 mm to 100 mm 100 mm to 300 mm	0.67 μ m 2.87 μ m	Using ULM
26.	Plain Ring Gauge [§]	1 mm to 100 mm 100 mm to 300 mm	2.16 μ m 3.84 μ m	Using ULM, Master Ring Gauge
27.	Thread Plug Gauge [§]	1 mm to 100 mm 100 mm to 300 mm	0.94 μ m 2.95 μ m	Using ULM

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28.	Thread Ring Gauge [§]	\varnothing 1 mm to 100 mm 100 mm to 300 mm	2.85 μ m 4.95 μ m	Using ULM, Master Ring Gauge
29.	Taper Thread Plug Gauge [§]	1 mm to 100 mm 100 mm to 300 mm	0.94 μ m 2.95 μ m	Using ULM
30.	Taper Thread Ring Gauge [§]	1 mm to 100 mm 100 mm to 300 mm	2.85 μ m 4.95 μ m	Using ULM
31.	Radius Gauge [§]	0.4 mm to 25 mm	4.20 μ m	Using VMS
32.	Fillet Gauge/Form Gauge [§]	0 to 150 mm 0 to 90°	4.10 μ m 2.5 min	Using VMS
33.	Thread Pitch Gauge [§]	Pitch (0.4 mm to 7mm) Angle (55° & 60°)	3.89 μ m 2.47 min	Using VMS
34.	Bevel Protractor [§] L.C.: 5'	0° - 90° - 0°	2.90 min	Using VMS
35.	Combination Set [§] L.C.: 1°	0° - 90° - 0°	2.90 min	Using VMS
36.	Limit Gauge (Length, Radius / Diameter, Angle) [§]	Length 0 to 150 mm Diameter Upto 100 mm Angle 360°	4.10 μ m 3.94 μ m 2.5 min	Using VMS
37.	Wire Gauge [§]	0.19 mm to 7.61 mm	3.89 μ m	Using VMS
38.	Taper Scale [§]	Up to 15 mm	3.89 μ m	Using VMS
39.	Measuring Scale [§]	Upto 300 mm	7.55 μ m	Using VMS
40.	Test Sieves [§]	0.03mm to 90 mm	3.93 μ m	Using VMS
41.	Gauge Blocks / Length Bars [§]	100 mm to 300 mm 300 mm to 500 mm	2.87 μ m 5.15 μ m	Using Length Measuring Machine

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II.	PRESSURE INDICATING DEVICES			
1.	Analog/Digital Pressure Gauge Pressure Transmitter/ Transducers / Pressure Switch [#]	Upto 30 Bar Upto 1000 Bar	0.009 Bar 0.66 Bar	Using Digital Pressure Indicator By Comparison Method
2.	Magnahelic Gauge / Manometer / Differential Pressure Gauge /Pressure Gauge/Pressure Transmitter / Transducers / Pressure Switch [#]	(±) 98 mbar	0.078 mbar	Using Digital Low Pressure Indicator By Comparison Method
3.	Vaccum Gauge/ Vacuum Transmitter/ Transducer #	(-) 0.8 bar to 0 bar	0.009 Bar	Using Digital Vacuum Indicator By Comparison Method
III.	TORQUE GENERATING DEVICES			
1.	Torque: Torque Generating Devices [§] Type I (Class A, B, C, D, E) Type II (Class A, B, C, D, E, F, G)	0.5 Nm to 5 Nm 5 Nm to 50 Nm 50 Nm to 500 Nm 500 Nm to 3000 Nm	2.85 % 2.98 % 2.98 % 2.45 %	Using Torque Wrench Calibration System with Torque Sensors
IV.	ACCELERATION AND SPEED			
1.	Vibration Meter [§]	Acceleration 0.5 g to 10 g 25 kHz to 1 kHz	1.5 %	Using Signal Analyzer & Accelerometer

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		Velocity: 10 mm/s to 155 mm/s	6.8 %	Using Vibration Meter
		Displacement 0.2 mm to 1 mm	9.15 %	
2.	Vibration Machine / Vibration Measurement *	0.5 g to 20 g 5 Hz to 10 KHz	2.60 %	Using Signal Analyzer & Accelerometer
3.	Speed *	10 RPM to 10000 RPM	1.96 %	Using Std Tachometer
V.	ACOUSTICS			
1.	Acoustic Chamber / Sound Level Measurement *	Up to 114 dB (Up to 20 kHz)	0.54 dB	Using Microphone with DAQ Module
2.	Sound Calibrator §	1 kHz 94 dB & 114 dB	0.41 dB	Using Microphone with DAQ Module
3.	Sound Level meter §	1 kHz 94 dB & 114 dB	0.8 dB	Using Sound Level Calibrator

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<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	RTD / Thermocouple, Temperature Sensor with Indicator & Temperature Transmitter #	(-) 100 °C to 100 °C 100 °C to 400 °C 400 °C to 1200 °C	0.12 °C 0.2 °C 1.5 °C	Using SSPRT with Temperature Read out Using S Type Thermocouple with Temperature Read out
2.	Glass Thermometer \$	25 °C to 200 °C	0.17 °C	Using SSPRT with Temperature Readout
3.	Oil Bath / Low and High Temperature Bath / Dry Bath#	(-) 100 °C to 100 °C 100 °C to 400 °C 400 °C to 1200 °C	0.24 °C 0.3 °C 1.86 °C	Using SSPRT / Standard Thermocouple with Temperature readout
4.	Temperature Chambers / Oven / Furnace / Climatic Chamber / Incubator (for Non-Medical Applications) Water Bath / Autoclave / Refrigerator/ Freezer/ Sterilizer *	(-) 80 °C to 200 °C 200 °C to 400 °C 400 °C to 1200 °C	0.29 °C 0.35 °C 1.8 °C	Using RTD Sensors / thermocouples with Multi Channel Recorder

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5.	Temperature Humidity Chamber / Climatic Chamber *	15 % RH to 95 % RH @25 °C	1.1 % RH	Using Humidity Sensor with Multi Channel Recorder

* Measurement Capability is expressed as an uncertainty (±) 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.