

**Laboratory** M V Consultants, Gate No. 110, Flat No. 102, 103, 'Siddhi Vijay'  
NanekarWadi, Pune-Nashik Road, A/P-Chakan, Taluka-Khed,  
Dist.- Pune, Maharashtra

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

**Certificate Number** CC-2423 (in lieu of C-0774 & C-1279)

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**Validity** 26.10.2017 to 25.10.2019

**Last Amended on** 18.01.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
<b><u>ELECTRO-TECHNICAL CALIBRATION</u></b>				
<b>1.</b>	<b>SOURCE</b>			
<b>1.</b>	DC Voltage <sup>#</sup>	1mV to 1000V	2.5% to 0.14%	Using Zeal Multifunction Calibrator By Direct Method
<b>2.</b>	DC Current <sup>#</sup>	1mA to 200 mA 200mA to 10A  10A to 900A	0.54% to 0.19% 0.19% to 0.25%  2%	Using Zeal Multifunction Calibrator By Direct Method  Using By Current Coil
<b>3.</b>	AC Voltage <sup>#</sup>	@50 Hz 5mV to 10V 10V to 1000V	1.23% to 0.23% 0.23% to 0.3%	Using Zeal Multifunction Calibrator By Direct Method
<b>4.</b>	AC Current <sup>#</sup>	@50 Hz 1mA to 200 mA 200mA to 10A  10A to 900A	0.74% to 0.25% 0.25% to 0.33%  2.7%	Using Zeal Multifunction Calibrator By Direct Method  Using By Current Coil
<b>5.</b>	DC Resistance <sup>#</sup>	1 $\Omega$ to 100 $\Omega$ 100 $\Omega$ to 1k $\Omega$ 1k $\Omega$ to 1M $\Omega$ 1M $\Omega$ to 10M $\Omega$ 10M $\Omega$ to 100M $\Omega$	1.29% to 0.5% 0.5 % to 0.9% 0.9% to 0.8% 0.8% to 1.0% 1.02% to 1.2%	Using Zeal Decade Resistance By Direct Method

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6.	Temperature Simulation <sup>#</sup> (Temperature Indicator Controller, Recorder)			
	RTD/Pt-100 K-Type (T/C) J-Type (T/C) R-Type (T/C) S-Type (T/C)	(-) 200 °C to 850°C (-) 200 °C to 1350°C 0 °C to 750°C 100 °C to 1700°C 100 °C to 1700°C	1.02°C to 0.94°C 1.21°C to 1.44°C 0.97°C to 1.15°C 2.5°C to 2.3°C 2.5°C to 2.3°C	Using Yokogawa Handy By Direct Method
II.	<b>MEASURE</b>			
1.	DC Voltage <sup>#</sup>	1mV to 10mV 10mV to 100 mV 100mV to 1000V	0.52% to 0.2% 0.2% to 0.02% 0.02%	Using 6½ DMM By Direct Method
2.	DC Current <sup>#</sup>	0.1mA to 10mA 10mA to 10A	0.58 to 0.1% 0.1% to 0.2 %	Using 6½ DMM By Direct Method
3.	AC Voltage <sup>#</sup>	@50 Hz 5mV to 100 mV 100mV to 10 V 10 V to 950 V	1.5% to 0.2% 0.2% 0.2 % to 0.25 %	Using 6½ DMM By Direct Method
4.	AC Current <sup>#</sup>	@50 Hz 0.1mA to 100mA 100mA to 3A 3A to 10A	0.84% to 0.3% 0.3% to 0.7% 0.7% to 0.8%	Using 6½ DMM By Direct Method
5.	DC Resistance <sup>#</sup>	1Ω to 100kΩ 100k Ω to 10MΩ 10MΩ to 100MΩ	0.4% to 0.02% 0.02 % to 0.16% 0.16% to 1%	Using 6½ DMM By Direct Method
6.	AC High Voltage <sup>#</sup>	@50 Hz 1 kV to 20 kV	4%	Using HV Probe ZMHVP With Digital Multimeter By Direct Method

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7.	DC High Voltage <sup>#</sup>	1 kV to 20 kV	2.5%	Using HV Probe ZMHVP With Digital Multimeter By Direct Method
8.	Time <sup>#</sup>	6 sec to 3600 Sec	0.84 s to 4.9 s	Using Time Interval Meter By Direct Method

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<b><u>MECHANICAL CALIBRATION</u></b>				
<b>I. DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)</b>				
1.	Calipers <sup>s</sup> L.C.: 0.02mm	0 to 300 mm 0 to 600 mm 0 to 1000 mm 0 to 1500 mm	20 $\mu$ m 18 $\mu$ m 20 $\mu$ m 25 $\mu$ m	Using Caliper Checker & Length Bar By Comparison Method
	L.C.: 0.01 mm	0 to 300 mm 0 to 600 mm 0 to 1000 mm	12 $\mu$ m 16 $\mu$ m 16 $\mu$ m	Using Caliper Checker & Length Bar By Comparison Method
	L.C.: 0.05 mm	0 to 1000 mm	42 $\mu$ m	Using Caliper Checker Length Bar By Comparison Method
2.	Height Gauge <sup>#</sup> L.C.: 0.02 mm	0 to 300 mm 0 to 600 mm 0 to 1000 mm	19 $\mu$ m 19 $\mu$ m 20 $\mu$ m	Using Caliper Checker & Length Bar By Comparison Method
	L.C.: 0.01mm	0 to 300 mm 0 to 600 mm 0 to 1000 mm	14 $\mu$ m 14 $\mu$ m 15 $\mu$ m	Using Caliper Checker & Length Bar By Comparison Method
3.	External Micrometer <sup>s</sup> L.C.: 0.001 mm	0 to 150mm	3 $\mu$ m	Using Slip Gauge Set By Comparison Method
	L.C.: 0.01 mm	0 to 150 mm 150 mm to 300 mm 300 mm to 500 mm	6 $\mu$ m 9 $\mu$ m 11.5 $\mu$ m	Using Slip Gauge Set & Length Bar By Comparison Method

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4.	Internal Micrometer <sup>§</sup> L.C.: 0.001 mm L.C.: 0.01 mm	0 to 300 mm 0 to 300 mm	9 $\mu$ m 9.2 $\mu$ m	Using Length Measuring Machine –LMM & Length Bar by Comparison Method
5.	Depth Gauge <sup>§</sup> L.C.: 0.01 mm L.C.: 0.02 mm	0 to 300 mm 0 to 300 mm	16 $\mu$ m 21 $\mu$ m	Using Slip Gauge & Length Bar On Surface Plate By Comparison Method
6.	Plunger Dial Gauge <sup>§</sup> L.C.: 0.01mm L.C.: 0.001mm	0 to 50 mm 0 to 50 mm	3.2 $\mu$ m 1.5 $\mu$ m	Using LMM by Comparison Method
7.	Lever Dial Gauge <sup>§</sup> L.C.:0.01 mm L.C.:0.001 mm L.C.:0.002 mm	0 to 1.4 mm 0 to 0.14 mm 0 to 0.14 mm	3.5 $\mu$ m 1.5 $\mu$ m 1.6 $\mu$ m	Using LMM by Comparison Method
8.	Bore Gauge <sup>§</sup> (Transmission Error Only)	0 to 400 mm	2.0 $\mu$ m	Using LMM with Electronic Probe by Comparison Method
9.	Plain Plug Gauge, OD Master <sup>§</sup>	0 to 100 mm 100 mm to 250 mm	2.6 $\mu$ m 4.7 $\mu$ m	Using LMM/Electronic Probe & Comparator Stand by Comparison Method
10.	Thread Measuring Wires <sup>§</sup>	0.17 mm to 6.35 mm	2.5 $\mu$ m	Using LMM/Electronic Probe by Comparison Method
11.	Snap Gauge <sup>§</sup>	0 to 100 mm 100 mm to 250 mm	2.4 $\mu$ m 4.5 $\mu$ m	Using LMM & Slip Gauge by Comparison Method

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12.	Thread Plug Gauge <sup>s</sup>	0 to 100 mm	3.4 $\mu$ m	Using Measurement of Effective Diameter on LMM Thread Wires
13.	Thread Ring Gauge <sup>s</sup>	0 to 100 mm	2.4 $\mu$ m	Using Measurement of Effective Diameter on LMM by Comparison Method
14.	Plain Taper Plug <sup>s</sup>	0 to 100 mm	3.6 $\mu$ m	Using LMM by Measurement Pins / Comparison Method
15.	Feeler Gauge / Coating Thickness Foils <sup>s</sup>	Upto 1.0 mm	2.0 $\mu$ m	Using Slip Gauge & Comparator by Comparison Method
16.	Pistol Caliper <sup>s</sup> L.C.: 0.1 mm	Upto 300 mm	69.34 $\mu$ m	Using Slip Gauge Set & Length Bar By Comparison Method
17.	Dial Thickness Gauge <sup>s</sup> L.C.: 0.01 mm L.C.: 0.001 mm	Upto 300 mm Upto 300 mm	10.0 $\mu$ m 2.0 $\mu$ m	Using Slip Gauge Set by Comparison method
18.	Measuring Pins <sup>s</sup>	0.5 mm to 20 mm	2.8 $\mu$ m	Using Electronic Comparator With Comparator with stand / LMM by Comparison Method
19.	Surface Plate <sup>#</sup>	2000 mm x 3000 mm	$4.9 \sqrt{\frac{L+W}{150}}$ $\mu$ m L & W in mm	Using Level Bottle

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20.	Depth Micrometer <sup>§</sup> L.C.: 0.001mm	Upto 300 mm	7.3 $\mu$ m	Using Slip Gauge Set & Length bar by Comparison Method
21.	Plain Ring Gauge <sup>§</sup>	0 to 150 mm 150 mm to 220 mm	2.8 $\mu$ m 3.7 $\mu$ m	Using LMM by Direct/ Comparison Method
22.	Electronic Probe With Comparator Stand <sup>§</sup> L.C.: 0.0001 $\mu$ m	0 to 25 mm	1.3 $\mu$ m	Using Slip Gauge Set by Comparison Method
23.	V-Block-Symmetry & Parallelism <sup>§</sup> Angular L.C.:1min of Arc  Magnification	0 to 150 mm  0 to 360°  10X to 100X	9 $\mu$ m 5 min  0.2 %	Using Master Cylinder & Lever Dial Gauge By Comparison Method
24.	Electronic Height Gauge (Single Axis Vertical Measuring Equipment) <sup>#</sup> L.C.: 0.0001 $\mu$ m	0 to 1000 mm	14.4 $\mu$ m	Using Length Bar & Caliper Checker by Comparison Method
25.	Radius Gauge <sup>§</sup>	Upto 25 mm	25 $\mu$ m	Using Profile Projector by Comparison Method
26.	Dial Snap Gauge <sup>§</sup>	Upto 300 mm	5.2 $\mu$ m	Using Gauge Block & Master Probe by Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
27.	Measuring Scale & Tape <sup>§</sup>	Upto 1000 mm	$90 \sqrt{\frac{L}{1000}} \mu\text{m}$ L in mm	Using Profile Projector by Comparison Method
28.	Bevel Protector / Angle Protector <sup>§</sup> L.C. 5 min	0° to 360°	8.2 min	Using Profile Projector by Comparison Method
29.	Thread Pitch Gauge <sup>§</sup> Pitch Angle	0.5 mm to 6 mm	15 $\mu\text{m}$ 8 min	Using Profile Projector by Comparison Method
30.	Thread Pitch Micrometer <sup>§</sup> L.C.: 0.001 mm Linear Angle	0 to 100 mm	3 $\mu\text{m}$ 8 min	Using Slip Gauge & Profile Projector by Comparison Method
31.	Bench Center <sup>#</sup> Axillity & Parallelism	0 to 500 mm	8.5 $\mu\text{m}$	Using Profile Projector & Slip Gauge by Comparison Method
II.	<b>DIMENSION (PRECISION INSTRUMENTS)</b>			
1.	Length Bar / Micrometer/ Height Setting Standard <sup>§</sup>	Upto 400 mm	5.0 $\mu\text{m}$	Using LMM by Comparison Method
2.	Profile Projector <sup>#</sup> Linear -X & Y Axis L.C.: 0.001mm	0 to 200 mm	10 $\mu\text{m}$	Using Slip Gauge by Comparison Method

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<b>III.</b>	<b>PRESSURE INDICATING DEVICES</b>			
1.	Pressure Gauge <sup>#</sup> (Pneumatic)	0 to 35 bar	0.28 bar	Using Digital Pressure Gauge Calibrator by Air Pump Comparator by DKD-R6-1
2.	Hydraulic <sup>#</sup>	0 to 700 bar	6.1 bar	Using Digital Pressure Gauge Calibrator by Oil Based Comparator Pump by DKD-R6-1
<b>IV.</b>	<b>TORQUE GENERATING DEVICES</b>			
1.	Torque Wrench <sup>o</sup> (Type I Class B & C Type II Class A & B )	1 Nm to 10 Nm 10 Nm to 200 Nm 200 Nm to 1000 Nm	2.35 % 1.80 % 1.32 %	Using Torque Transducers Indicator based on ISO 6789
<b>V.</b>	<b>WEIGHING SCALE &amp; BALANCE</b>			
1.	Weighing Balance <sup>#</sup> Readability $\geq$ 1m	0 to 200g	2mg	Using E2 Class Standard weights as per OIML R76-1
	Readability $\geq$ 1g	0 to 8 kg 8 to 100 kg	1.8g 6.0g	Using E2 & F1 Class Standard weights as per OIML R76-1

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<b><u>THERMAL CALIBRATION</u></b>				
<b>I.</b>	<b>TEMPERATURE</b>			
<b>1.</b>	RTD & Thermocouple with and without Indicator for Bath , Ovens, Furnace, Dial Temperature Gauge #	(-) 30 °C to 50 °C 50 °C to 250 °C 250 °C to 1200°C	0.5 °C 1.71°C 3.97 °C	Using RTD Sensor, 6½ DMM & Temperature Liquid Bath/ Silicon Oil Bath By Comparison Method  Using S Type Sensor 6 ½ DMM & Dry Block Bath By Comparison Method
<b>2.</b>	Glass Thermometer #	0 °C to 250 °C	1.72 °C	Using RTD Sensor 6 ½ DMM & Temperature Liquid Bath/ Silicon Oil Bath By Comparison Method

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

§ Only in Permanent Laboratory

# 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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