

Laboratory Institute for Design of Electrical Measuring Instruments, Swatantryaveer
Tatya Tope Marg, Chunabhatti, Sion, Mumbai, Maharashtra

Accreditation Standard ISO/IEC 17025:2005

Discipline Mechanical Calibration **Issue Date** 31.08.2014

Certificate Number C-0086 **Valid Until** 30.08.2016

Last Amended on 02.09.2014 **Page** 1 of 10

Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
I. DIMENSION			
1 Calipers \$ L.C. 10 μ m	Up to 600 mm	10.4 μ m	Using Caliper Checker by comparison method
L.C. 10 μ m	Up to 1000 mm	13.2 μ m	Using Long Slip Gauge by comparison method
2 Height Gauges \$ L.C. 10 μ m	Up to 600 mm	12.8 μ m	Using Caliper checker & Surface plate by comparison method
3 External Micrometer\$ L.C. 1 μ m	Up to 25mm	1.2 μ m	Using Tungsten Carbide Slip Gauges Grade '0' & '1', Long Slip Gauge by comparison method
L.C. 1 μ m	Up to 300 mm	3 μ m	
4 Inside Micrometer\$ L.C. 10 μ m	Up to 200 mm	11 μ m	Using Universal Measuring System by comparison method
5 Bevel Protector\$ L.C. 1min.	0° - 180° - 0°	1 minute	Using Steel Angle Gauge Set by comparison method
6 Dial Gauges\$ (Plunger / Lever Type) L.C. 1 μ m	Up to 25 mm	3.9 μ m	Using Electronic Dial Calibrator Tester by comparison method
Avijit Das Program Manager			Neeraj Verma Convenor

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7 Bore Dial Gauge ^{\$} (Transmission Movement)	Up to 2mm	3.9 μ m	Using Electronic Dial Calibrator Tester by comparison method
8 Feeler Gauges Set ^{\$}	Up to 2 mm	1.9 μ m	Using External Micrometer by comparison method
9 Steel Scale ^{\$}	Up to 2000 m	$116X\sqrt{\frac{L}{200}}$ μ m Where L in mm	Using Universal Measuring Machine by comparison method
10 Measuring Tape ^{\$}	Up to 50 m	$117X\sqrt{\frac{L}{200}}$ μ m Where L in mm	Using Universal Measuring Machine & weights by comparison method
11 Depth Gauge ^{\$} L.C. 10 μ m	Up to 300mm	8 μ m	Using Slip Gauge Grade '0' & Long Slip Gauge by comparison method
12 Depth Micrometer ^{\$} L.C. 1 μ m ^{ϕ}	Up to 300mm	3.6 μ m	Using Slip Gauge Grade '0' & Long Slip Gauge by comparison method
13 Caliper Checker ^{\$}	Up to 1000mm	11.2 μ m	Using Slip Gauge Grade '0' & Long Slip Gauge, Lever dial gauge by comparison method

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Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
14 Micrometer Head ^{\$} L.C. 1 μ m	Up to 50mm	2.7 μ m	Using Tungsten Carbide Slip Gauge Grade '0' by comparison method
15 Length Gauge / Setting Rod ^{\$}	Up to 350mm	5.3 μ m	Using Electronic Probe with DRO & Comparator Stand by comparison method
16 Dial Thickness Gauge ^{\$} L.C. 10 μ m	Up to 10mm	7.1 μ m	Using Tungsten Carbide Slip Gauge Grade '0' by comparison method
17 Cylindrical Measuring Pins ^{\$}	Up to 50mm	3.4 μ m	Using Electronic Probe with DRO & Comparator Stand by comparison method
18 Plain Plug Gauge ^{\$}	Up to 100mm	3.3 μ m	Using Tungsten Carbide Slip Gauge Grade '0' & Electronic comparator by comparison method
19 Snap Gauge / Dial Snap Gauge ^{\$}	Up to 300mm	4.7 μ m	Using Tungsten Carbide Slip gauge Grade '0', Long slip gauge & Lever dial gauge by comparison method
20 Electronic Height Gauge#	Up to 600mm	7.4 μ m	Using Slip Gauge Grade '0' & Long Slip Gauge by comparison method

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Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
21 Universal Measuring Machine#	X Axis (200mm) Y Axis (100mm)	2.4 μ m	Using Tungsten Carbide Slip Gauge Grade '0' & Long Slip Gauge by comparison method
22 Profile Projector#	X-Y travel 100mm magnification (10X to 100X) Angle (0 to 360°)	3.7 μ m 0.16% 3.7 minute	Using Tungsten Carbide Slip Gauge Grade '0' & Steel Angle Gauge by comparison method
II. SPEED			
1. Speed ^s Contact Mode	3 RPM to 30 RPM 30 RPM to 10000 RPM	2.62% to 0.24 % 0.24 % to 0.013 %	Using RPM source with frequency counter 1120- 1 & Frequency meter MC- 2 by Comparison Method (Frequency based)
2. Speed [#] Non Contact Mode	3 to 30 RPM 30 RPM to 500000 RPM	0.2 % to 0.012% 0.012 % to 0.002 %	Using frequency measurement by Comparison method
III. MASS			
1. Weights ^s (Conventional Mass)	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg	0.003 mg 0.003 mg 0.003 mg 0.003 mg 0.003 mg 0.004 mg 0.005 mg 0.006 mg 0.008 mg	Using Weights of Accuracy Class E1 and Precision Balance by Substitution method, ABBA weighing Cycle based on OIML R-111 2004

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Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
	1 g	0.010 mg	
	2 g	0.012 mg	
	5 g	0.016 mg	
	10 g	0.020 mg	
	20 g	0.025 mg	
	50g	0.03 mg	
	100g	0.05 mg	
	200g	0.10mg	
	500g	1.2 mg	Using Weights of Accuracy Class E2 & F1 and Precision Balance by Substitution method, ABBA weighing Cycle based on OIML R-111 2004
	1kg	1.3 mg	
	2kg	1.4 mg	
	5kg	2.5 mg	
	10kg	13 mg	
	20kg	14 mg	
2. Weighing Machine # d = Readability	(0 to 200)g d = 0.01 mg d = 0. 1 mg	0.06 mg 0.20 mg	Using Weights of Accuracy Class E1 based on OIML R-76 (2006)
	(0 to 2)kg d = 1 mg	5 mg	Using Weights of Accuracy Class (E2 & F1) based on OIML R-76 (2006)
	(0 to 10)kg d = 10 mg d = 100 mg d = 1 g	60 mg 150 mg 1.5 g	Using Weights of Accuracy Class (E2 & F1) based on OIML R-76 (2006)

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	(0 to 100)kg d = 1 g d = 10 g	2 g 15 g	Using Weights of Accuracy Class E2 & F1) based on OIML R-76 (2006)
	(0 to 200) kg d = 1g d =10 g	5 g 30 g	Using Weights of Accuracy Class F1 & M1) based on OIML R-76 (2006)
	(20 kg to 5000 kg) d = 0.1 kg	0.2 kg	Using Weights of Accuracy Class F1 based on OIML R-76 (2006)
IV. VOLUME^s			
1. Micropipette	5 μ l	0.02 μ l	Using Standard Weights of Class E2 Precision Balance & Distilled water of known density
	10 μ l	0.07 μ l	
	20 μ l	0.08 μ l	
	50 μ l	0.09 μ l	
	100 μ l	0.09 μ l	
	200 μ l	0.09 μ l	
	500 μ l	0.10 μ l	
	1000 μ l	0.2 μ l	
	2000 μ l	0.21 μ l	
	5000 μ l	0.21 μ l	
2. Pipette/ Burette	1 ml	0.02 μ l	Using Standard Weights of Class(E2 & F1) Precision Balance & Distilled water of known density
	5 ml	0.05 μ l	
	10 ml	0.10 μ l	
	20 ml	0.11 μ l	
	50 ml	0.15 μ l	
	100 ml	0.30 μ l	

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3. Measuring Cylinder/ Volumetric / Flask/ Graduated Jar/ Can etc.	5 ml 10 ml 20 ml 50 ml 100 ml 200 ml 500 ml 1000 ml 2000 ml	0.05 μ l 0.10 μ l 0.11 μ l 0.40 μ l 0.40 μ l 0.50 μ l 0.11 ml 0.11 ml 0.11 ml	By Gravimetric Method based on ISO 4787
V. PRESSURE & VACUUM			
1. Pressure Pneumatic^s			
a. Digital Pressure Indicator, Manometer, Magnahelic Gauge, Low Pressure Gauges	0 to 10 inH ₂ O 0 to 30 inH ₂ O	0.002 inWC 0.006 inWC	Using RUSKA Digital Pressure Controller Indicator by Comparison Method UUC to Standard as per DKD-R-6-1
b. Pressure Indicator, Instrument & Gauges	0.015 bar to 1 bar	0.015% rdg	Using DWT Budenberg Air by Direct Method UUC to Standard as per DKD- R-6-1
c. Pressure Indicator, Calibrator & Gauges	0.1 bar to 35 bar	0.005% rdg	Using DWT system by Direct Method UUC to Standard as per DKD-R-6-1

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d. Pressure Indicator , Calibrator & Gauges	35 bar to 200 bar	0.005% rdg	Using DWT system by Direct Method UUC to Standard as per DKD-R-6-1
2. Pressure Hydraulic ^s			
a. Pressure Indicator, instrument & Gauges	7 bar to 70 bar	0.01% rdg	Using Pressure Hydraulic DWT System by Direct Method UUC to Standard as per DKD-R-6-1
b. Pressure Indicator , Instrument & Gauges	80 bar to 1455 bar	0.015% rdg	Using Pressure Hydraulic System by Direct Method UUC to Standard as per DKD-R-6-1
c. Pressure Indicator , Calibrator & Gauges	200 bar to 2500 bar	0.04% rdg	Using Pressure DWT by Direct Method UUC to Standard as per DKD-R-6-1
3 Negative Over Pressure ^s			
a. Pressure Indicator, instrument & Gauges	-0.01 bar to -1.0 bar	0.015% rdg	Using DWT Budenberg by Direct Method UUC to Standard as per DKD-R-6-1

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4. Absolute Pressure	0 to 1 bar	0.04% rdg	Using Digital Pressure Indicator Model: 785-50A-500A By Comparison Method UUC to Standard as per DKD-R-6-1
	0 to 2 bar	0.02% rdg	
5. Pressure Pneumatic ^s Dead Weight Testers	0.1 bar to 35 bar	0.005% rdg	Using DWT Cross float system by Cross Float Comparison Method UUC to Standard as per Euramet-cg-3
6. Pressure Hydraulic ^s Weight Testers	7 bar to 70 bar	0.01% rdg	Using Pressure Hydraulic DWT Cross Float System by Cross Float Comparison Method UUC to Standard as per Euramet-cg-3
	80 bar to 1455 bar	0.01% rdg	
7. Pressure Pneumatic [*] Pressure Indicator, instrument & Gauges	0 to 2 bar	0.001 bar	Using Druck Digital Pressure Calibrator by Comparison Method UUC to Standard as per DKD-R-6-1
	0 to 20 bar	0.005 bar	

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8 Pressure Hydraulic*	0 to 100 bar	0.03 bar	Using Budenberg Hydraulic Pressure Comparator & Druck Digital Pressure Calibrator by Comparison Method UUC to Standard as per DKD-R-6-1
	0 to 700 bar	0.15 bar	
	0 to 1200 bar	0.65 bar	
9 Negative Over Pressure *	-0.1 bar to -0.9 bar	0.008 bar	Using Druck Digital Pressure Calibrator by Comparison Method UUC to Standard as per DKD-R-6-1
VI. ACCOUSTICS			
1. SOUND#	74 dB to 114 dB (31.5 Hz to 4 kHz)	0.3 dB	Using Sound Level calibrator by Direct Method

* 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.

φLaboratory 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.

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