

Laboratory **Calitech, 103, Patil Chamber, New Telephone Exchange Road, Char Rasta, GIDC, Vapi, Gujarat**

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

Certificate Number **CC-2729** Page **1 of 13**

Validity **22.06.2018 to 21.06.2020** Last Amended on **-**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO-TECHNICAL CALIBRATION</u>				
1.	MEASURE			
1.	Programmable Timer #	1 s to 59.59 min 59.59 min to 180.0 min	0.08 s to 2.43 s 2.43 s to 7.02 s	Using Programmable Timer by Comparison Method
2.	Stop Watch#	1 min 59.59 min 180.0 min	0.35 s 1.06 s 3.02 s	Using Stop Watch by Comparison Method
3.	DC Voltage#	1 mV to 1 V 1 V to 100 V 100 V to 1000 V	0.09 % to 0.006 % 0.006 % 0.006 % to 0.001 %	Using Agilent 6½ DMM 34401A by Direct Method
4.	AC High Voltage #	1 kV to 5 kV	6.1 %	Using HV Probe with 6½ DMM Agilent 34401A by Direct Method
5.	AC Voltage #	50 Hz 25 mV to 1V 1 V to 100 V 100 V to 750 V	0.05 % to 0.02 % 0.02 % to 0.01 % 0.01 %	Using Agilent 6½ DMM 34401A by Direct Method
6.	DC Current #	2 mA to 100 mA 100 mA to 1A 1 A to 3 A	0.07 % to 0.005 % 0.05 % to 0.02 % 0.02 % to 0.07 %	Using Agilent 6½ DMM 34401A by Direct method
7.	AC Current #	50 Hz 200 mA to 1 A 1 A to 3 A	0.06 % to 0.08 % 0.08 %	Using Agilent 6½ DMM by Direct method

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8.	DC Resistance #	1 Ω to 100 Ω 100 Ω to 100 k Ω 100 k Ω to 100 M Ω	0.16 % to 0.58 % 0.58 % to 0.003 % 0.003 % to 0.65 %	Using Agilent 6 $\frac{1}{2}$ DMM by Direct method
9.	Frequency Source/ Generator #	3 Hz to 100 Hz 100 Hz to 300 kHz	2.0 % to 0.059 % 0.059 % to 0.02 %	Using Agilent 6 $\frac{1}{2}$ DMM by Direct method
10.	Temperature Indicator/Controller / Scanner/Recorder/Scanner/ Data Logger/Oven/Muffle Furnace/Stability Chamber/Incubator#			
	Pt-100(RTD)	(-) 199 $^{\circ}$ C to 850 $^{\circ}$ C	0.46 $^{\circ}$ C	Using Masibus Unical 3001M by Direct method
	J Type Thermocouple	0 to 760 $^{\circ}$ C	0.16 $^{\circ}$ C	
	K Type Thermocouple	0 to 1370 $^{\circ}$ C	0.72 $^{\circ}$ C	
	R Type Thermocouple	200 $^{\circ}$ C to 1768 $^{\circ}$ C	0.79 $^{\circ}$ C	
	T Type Thermocouple	(-) 160 $^{\circ}$ C to 400 $^{\circ}$ C	0.23 $^{\circ}$ C	
II.	SOURCE			
1.	Temperature Indicator / Controller / Scanner/Recorder/Scanner/ Data Logger/Oven/Muffle Furnace/Stability Chamber/Incubator#			
	Pt-100(RTD)	(-) 199 $^{\circ}$ C to 850 $^{\circ}$ C	0.81 $^{\circ}$ C	Using Masibus Unical 3001M Direct method
	J Type Thermocouple	0 to 760 $^{\circ}$ C	0.16 $^{\circ}$ C	
	K Type Thermocouple	0 to 1370 $^{\circ}$ C	0.61 $^{\circ}$ C	
	R Type Thermocouple	200 $^{\circ}$ C to 1750 $^{\circ}$ C	0.67 $^{\circ}$ C	
	T Type Thermocouple	(-) 160 $^{\circ}$ C to 400 $^{\circ}$ C	0.17 $^{\circ}$ C	
2.	DC Voltage#	0.5 mV to 2 V 2 V to 200 V 200 V to 1000 V	2.99 % to 0.12 % 0.12 % 0.12 % to 0.13 %	Using 5 $\frac{1}{2}$ Multifunction Calibrator by Direct method
3.	AC Voltage#	50 Hz 5 mV to 2 V 2 V to 100 V 100 V to 1000 V	1.03 % to 0.32 % 0.32 % to 0.32 % 0.32 % to 0.24 %	Using 5 $\frac{1}{2}$ Multifunction calibrator Zeal 5 $\frac{1}{2}$ by Direct method
4.	DC Current #	0.01 mA to 2 mA 2 mA to 20 mA 100 mA to 1 A	0.03 % to 0.08 % 0.08 % to 0.15 % 0.04 % to 0.25 %	Using 5 $\frac{1}{2}$ Multifunction Calibrator by Direct Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
		1 A to 10 A 10 A to 1000 A	0.25 % to 0.24 % 1.42 % to 1.01 %	Using Current Coil by Direct Method
5.	AC Current #	50 Hz 1 mA to 200 mA 200 mA to 1 A 1 A to 10 A 10 A to 1000 A	0.84 % to 0.24 % 0.24 % to 0.40 % 0.04 % to 0.33 % 2.15 % to 1.12 %	Using 5 ½ Multifunction Calibrator by Direct Method Using Current Coil by Direct Method
6.	Resistance #	1 Ω to 100 Ω 100 Ω to 100 K Ω 100 K Ω to 100 M Ω 100 M Ω to 1000 M Ω	1.40 % to 1.15 % 1.15 % to 1.15 % 1.15 % to 1.29 % 1.29 % to 0.38 %	Using Decade Resistance Box by Direct Method
7.	Frequency Meter/ Indicator #	1 Hz to 500 Hz 500 Hz to 300 kHz	0.07 % to 0.01 % 0.01 % to 0.02 %	Using Frequency Generator by Direct Method

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<u>MECHANICAL CALIBRATION</u>				
1.	DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)			
1.	Caliper [§] (Vernier/Dial/Digital) L.C.: 10 μ m	0 to 600 mm	14.0 μ m	Using Caliper Checker & External Micrometer By Comparison Method
2.	Height Gauge [§] (Vernier /Dial/Digital) L.C.: 10 μ m	0 to 600 mm	13.0 μ m	Using Caliper Checker & Surface Plate By Comparison Method
3.	External Micrometer [§] (Analog/ Dial/ Digital) L.C.: 1 μ m	0 to 150 mm	2.1 μ m	Using Gauge Block Set; Mic Check Set By Comparison Method
4.	Micrometer Setting Rod [§]	25 mm to 125 mm	3.8 μ m	Using Gauge Block Set; Electronic Probe & Comparator Stand By Comparison Method
5.	Plunger Dial Gauge [§] L.C.: 1 μ m	0 to 25 mm	2.2 μ m	Using Dial Calibration Tester & Electronic Probe By Comparison Method
6.	Lever Dial Gauge [§] L.C.: 10 μ m	0 to 1.0 mm	1.9 μ m	Using Dial Calibration Tester & Electronic Probe By Comparison Method
7.	Bore Gauge Transmission Error [§] L.C.: 1 μ m	Upto 1.0 mm	4.6 μ m	Using Dial Calibration Tester & Electronic Probe By Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
8.	Dial Thickness Gauge [§] L.C.: 10 μ m	0 to 10 mm	2.9 μ m	Using Gauge Block Set By Comparison Method
9.	Plain Plug Gauge [§]	Up to 200 mm	2.6 μ m	Using Gauge Block Set, Electronic Probe & Comparator Stand By Comparison Method
10.	Snap Gauge [§]	Up to 200 mm	3.8 μ m	Using Gauge Block Set By Comparison Method
11.	Cylindrical Measuring Pin [§]	Up to 20 mm	1.3 μ m	Using Gauge Block Set & Electronic Probe By Comparison Method
12.	Feeler Gauge [§]	Up to 1 mm	1.2 μ m	Using Electronic Probe & Comparator Stand By Comparison Method
13.	Bevel Protractor [§] L.C.: 5"	0° - 90° - 0°	3.5" arc	Using Angle Gauge By Comparison Method
14.	Degree Protractor/Combination Set [§] L.C.: 1°	0° - 90° - 0°	35" arc	Using Angle Gauge By Comparison Method
II.	ACOUSTIC			
1.	Sound Level Meter [§]	94 dB & 114 dB	1.8 dB	Using Sound Level Calibrator By Comparison Method

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III.	ACCELERATION AND SPEED			
1.	Tachometer [§]	10 RPM	1.2 RPM	Using Digital Tachometer By Comparison Method
		100 RPM to 1000 RPM	11.7 RPM	
		1000 RPM to 10000 RPM	58.0 RPM	
		10000 RPM to 50000 RPM	60.0 RPM	
IV.	PRESSURE INDICATING DEVICES			
1.	Pneumatic Pressure Dial Pressure Gauges Digital Pressure Gauge/Magnehelic Gauge/Manometer [#]	0 to 2000 Pa	1.2 Pa	Using Digital Pressure Calibrator With Pneumatic Pump by Comparison Method (DKD-R-6-1:2014)
		0 to 100 mbar	0.09 mbar	
2.	Pneumatic Pressure Analogue Pressure Gauges/ Digital Pressure Gauges/ Pressure Transmitter [#]	0 to 20 bar	0.12 bar	Using Digital Pressure Gauge With Pneumatic Pump By Comparison Method (DKD-R-6-1: 2014)
3.	Hydraulic Pressure Hydraulic Analogue Pressure Gauges/ Digital Pressure Gauges/ Pressure Transmitter [#]	20 bar to 70 bar	0.033 bar	Using Digital Pressure Gauge With Hydraulic Pump By Comparison Method (DKD-R-6-1:2014)
		70 bar to 700 bar	0.35 bar	
4.	Vacuum Dial, Digital Vacuum Gauges/ Vacuum Transmitter [#]	(-) 0.9 bar to 0 bar	0.00072 bar	Using Digital Vacuum Gauge, Vacuum Pump By Comparison Method (DKD-R-6-1: 2014)

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	(F2 Class and coarser)	10 kg 20 kg	100 mg 100 mg	Using F1 Class Standard Weights and Weighing Balance 0.1 g as per OIML R 111-1:2004
VI.	WEIGHING SCALE AND BALANCE			
1.	Non - Automatic Weighing Balance/ Scale*	0 to 50 g	0.04 mg	Using E2 Accuracy Class Standard Weights as per OIML-R -76 -1: 2006 & Weighing Balance Class I (d: 0.01 mg)
		0 to 200 g	0.3 mg	Using E2 Accuracy Class Standard Weights as per OIML R -76 – 1 : 2006 & Weighing Balance Class I (d: 0.1 mg)
		0 to 1 kg	3 mg	Using F1 Accuracy Class Standard Weights as per OIML R -76 – 1 : 2006 & Weighing Balance Class II (d: 1 mg)
		0 to 5 kg	20 mg	Using F1 Accuracy Class Standard Weights as per OIML R -76 – 1 : 2006 & Weighing Balance Class II (d: 10 mg)

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		0 to 20 kg	100 mg	Using F1 Accuracy Class Standard Weights as per OIML R -76 – 1 : 2006 & Weighing Balance Class III (d: 100 mg)
		0 to 200 kg	12 g	Using F1 Accuracy Class Standard Weights as per OIML R -76 – 1 : 2006 & Weighing Balance Class III (d: 10 g)
VII.	VOLUME			
1.	Piston Pipette ^s	10 μ l to 1000 μ l	0.19 μ l	Using Weighing Balance with d: 0.01 mg/ 0.1 mg Cap. 82 g/ 220 g and distilled water of known density as per ISO 8655-6 : 2002
2.	Glass Pipette ^s	>1 ml to 10 ml	5.00 μ l	Using Weighing Balance with d: 0.01 mg Cap. 82g and distilled water of known density as per IS/ISO 4787 : 2010
		>10 ml to 25 ml	5.0 μ l	Using Weighing Balance with d: 0.1 mg Cap. 220g and distilled water of known density as per IS/ISO 4787 : 2010

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
3.	Burette ^s	>1 ml to 25 ml	3.0 μ l	Using Weighing Balance with d: 0.1 mg Cap. 220g and distilled water of known density as per IS/ISO 4787 : 2010
4.	Measuring Cylinder ^s	>10 ml to 200 ml	59 μ l	Using Weighing Balance with d: 1 mg Cap. 1 kg and distilled water of known density as per IS/ISO 4787 : 2010
		> 200 ml to 2000 ml	38 μ l	Using Weighing Balance with d: 10 mg Cap. 6 kg and distilled water of known density as per IS/ISO 4787 : 2010

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	RTD/Thermocouple With/Without Indicator/Controller/ Scanner/Recorder/ Data Logger/ Temp. Transmitter With/Without Indicator/Digital Thermometer#	(-) 95 °C to 140 °C 140 °C to 250 °C 250 °C to 650 °C 650 °C to 1200 °C	0.3 °C 0.4 °C 1.7 °C 2.3 °C	Using Standard PRT (pt-100), 6 ½ DMM & Dry Block Bath (-95 to 140°C) by ITS-90-Scale/ Standard PRT (Pt-100) Indicator with sensor, Dry Block Bath (-95 to 140°C) by Comparison Method Using Standard Pt-100, Dry Block Bath (Amb to 650°C) and 6 ½ DMM / Standard PRT (Pt-100) Indicator with Sensor, Dry Block Bath (Amb to 650°C) by Comparison Method Using Standard R Type Thermocouple, Dry Block Bath (Amb to 650°C) and (250 °C to 1200°C) and 6 ½ DMM / Standard PRT (Pt-100) Indicator with Sensor, Dry Block Bath (Amb to 650°C) and (250 °C to 1200 °C) by Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
2.	Liquid in Glass Thermometer, Dial Gauge, Liquid in Glass of Thermometer of Wet & Dry Bulb Hygrometer [#]	(-) 30 °C to 40 °C 40 °C to 100 °C 100 °C to 250 °C	0.32 °C 0.24 °C 0.7 °C	Using Standard Pt-100, Temperature Bath / Liquid Bath and 6½ DMM / Standard PRT (Pt-100) Indicator with Sensor by Comparison Method
3.	Temperature Data Logger [#]	(-) 25 °C to 50 °C	0.6 °C	Using RTD Sensor with 6.5 DMM, Standard PRT (Pt-100) Indicator with Sensor, Temperature Chamber By Comparison method
4.	Thermal Source (Single Point Calibration) *	(-) 196 °C	0.44°C	Using Standard PRT (Pt-100) Indicator with sensor by Comparison Method
5.	Calibration of Deep Freezers/ Refrigerators / Incubators / Temperature Bath / Temperature Calibrator / Chambers /Oven / Furnace / Warehouse/ Area/ Autoclave (Multipoint-09) *	(-) 80 °C to 0 °C 0°C to 100 °C >100°C to 200°C	1.0 °C 1.5 °C 1.7 °C	Using RTDs (Minimum 9) with Multi Channel Recorder by Comparison Method Multi Position Calibration

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II.	SPECIFIC HEAT & HUMIDITY			
1.	Humidity Calibration of Humidity Chamber/ Environmental Chamber, Wireless Data Logger, Stability Chamber, Warehouse Area (Multipoint-09) *	30 % RH to 95 % RH @ 25 °C	3.3 % RH	Using Wireless Type Humidity Data Loggers (Minimum 9) by Comparison Method Multi Position Calibration
2.	Relative Humidity Sensor With & Without Indicator, Thermo-Hygrometer/ Transmitter/RH Data Logger/Humidity, Transmitters, Controller/Wireless Temp./Rh Data Logger#	15°C to 50°C @50 %RH 30% RH to 95% RH @25 °C	0.7°C 1.8 % RH	Using Temperature & Humidity Meter with Sensor, Temperature & Humidity Generator / Chamber by Comparison 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.