

Laboratory **Kalashri Technical Pvt. Ltd., Kala Nivas, 64, Khese Park, Lohegaon, Pune, Maharashtra**

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

Certificate Number **CC-2194**

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Validity **18.01.2018 to 17.01.2020**

Last Amended on **26.04.2018**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO-TECHNICAL CALIBRATION</u>				
I.	SOURCE			
1.	DC Voltage [#]	1mV to 320 mV 320 mV to 1000V	0.56 to 0.009% 0.009 to 0.009%	Using MFC Fluke calibrator 9100E By Direct Method
2.	DC Current [#]	320 μ A to 320 mA 320 mA to 10 A 10 A to 20 A 20 A to 1000 A	0.03 to 0.03% 0.03 to 0.09% 0.09-0.118% 0.67 to 0.36%	Using MFC Fluke calibrator with current coil By Direct Method
3.	AC Voltage [#]	50 Hz to 1kHz 10mV to 320 mV 320mV to 750V 750 V to 1000V	1.10 to 0.02% 0.055 to 0.068% 0.03 to 0.03%	Using MFC Fluke calibrator 9100E By Direct Method
4.	AC Current [#]	50 Hz to 1kHz 100 μ A to 100mA 100mA to 10 A 10A to 20A	0.49 to 0.2% 0.20 to 0.31% 0.31 to 0.30%	Using MFC Fluke calibrator 9100E By Direct Method
5.	AC High Current [#]	20 A to 1000A	0.43 to 0.71%	Using MFC Fluke calibrator with current coil By Direct Method
6.	DC Resistance [#]	1 Ω to 1k Ω 1k Ω to 400 M Ω	1.19 to 0.05 % 0.05 to 0.31 %	Using MFC Fluke calibrator 9100E By Direct Method
7.	DC Resistance [#]	400 M Ω to 1.2 G Ω	0.31 to 6.43%	Using Decade high Resistance box By Direct Method

Abhinav Thakur
Convenor

Avijit Das
Program Director

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8.	DC Capacitance [#]	1nF to 1Mf	4.36 to 1.68%	Using MFC Fluke calibrator 9100E By Direct Method
9.	Inductance [#]	1kHz 100 μ H to 10 H	1.87 to 1.35%	Inductance Decade By Direct Method
10.	Frequency [#]	10 Hz to 1MHz	0.012 to 0.58%	Using MFC Fluke calibrator 9100E By Direct Method
		1MHz to 100MHz	0.17 to 1.17%	Using Arbitrary Function Generator By Direct Method
11.	Oscilloscope [#] Amplitude	Amplitude @ 1kHz 20mV to 20 V	0.58 to 0.58%	Using Arbitrary Function Generator By Direct Method
	Period	10nSec to 0.1 Sec	0.58 to 5.8%	
	Band width	Up to 100 MHz	0.082%	
12.	Temperature [#] Simulation Temperature Indicators & Controllers/ Recorders RTD – PT -100	(-)200 °C to 800°C	0.57°C to 0.25°C	Using MFC Fluke calibrator 9100E By Direct Method
	K Type	(-) 200 °C to 1300 °C	0.46°C	
	J Type	(-) 200 °C to 1300 °C	0.42°C	
	R Type	400°C to 1750 °C	0.86°C	
	S Type	300°C to 1600 °C	0.83°C	

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II.	MEASURE			
1.	DC Voltage #	1mV to 320 mV 320mV to 3.2 V 3.2V to 32 V 32 V to 320 V 320V to 1000 V	0.47% to 0.003 % 0.003% to 0.005% 0.005% to 0.01% 0.008% 0.008% to 0.009%	Using 6½ DMM Fluke8846A By Direct Method
2.	DC High Voltage #	1kV to 40kV	2.4%	Using High Voltage Probe 80k40 with 289 DMM By Direct Method
3.	DC Current #	100µA to 100mA 100mA to 10 A	0.09% to 0.07% 0.07% to 0.2 %	Using 6½ DMM Fluke8846A By Direct Method
4.	DC High Current (Shunt)	10 A to 500 A	2.3%	Using shunt & By using 6½ DMM By Direct Method
5.	AC Voltage #	50 Hz 1mV to 320mV 320mV to 1V 1 V to 100 V 100 V to 1000 V	4.7 % to 0.141% 0.141% to 0.11% 0.11%to 0.11%	Using 6½ DMM By Direct Method
6.	AC High Voltage #	1kV to 25kV	6.2%	Using High Voltage Probe 80k40 with 289 DMM By Direct Method
7.	AC Current #	50Hz 1mA to 1A 1A to 10 A	6.36% to 0.10% 0.10% to 0.22%	Using 6½ DMM Fluke8846A By Direct Method
8.	DC Resistance #	1Ω to 100 Ω 100 Ω to 100KΩ	0.374% to 0.002% 0.002% to 0.94%	Using 6½ DMM 4-Wire By Direct Method

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9.	Resistors / DRBS #	100M Ω to 1.2 G Ω	0.94% to 2 .86%	Using 6½ DMM 2 – Wire By Direct Method
10.	Frequency #	3Hz to 10 Hz 10Hz to 1kHz 20 Hz to 100MHz 100 MHz to 520MHz	0.122 % to 0.077% 0.077% to 0.014% 0.46% to 0.018% 0.018% to 0.001%	Using 6½ DMM By Direct Method Using Classic Counter By Direct Method
11.	Time Interval #	2 Sec to 1Hr 1 Hr to 24 Hr	0.036% to 0.002%	Using Classic Counter By Comparison Method
12.	Energy 1 \emptyset & 3 \emptyset , UPF 0.8/0.6 UPF Energy meter	50Hz 18.4 Kwh	4.87%	Using Energy meter Jig By Direct Method

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<u>MECHANICAL CALIBRATION</u>				
I. PRESSURE INDICATING DEVICES				
1.	Pneumatic Pressure Gauge #	0 to 40m bar	0.14 mbar	Using Low Pressure With Indicator & Pump by Comparison Method
2.	Hydraulic Pressure Gauge #	0 to 40 Bar	0.08 bar	Using Digital Pressure Indicator & Pump by Comparison Method
3.	Hydraulic Pressure Gauge #	0 to 400 Bar	0.06 bar	Using Digital Pressure Calibrator & Pump by Comparison Method
4.	Pneumatic Vacuum Gauge #	(-) 0.8 bar to 0	0.05 bar	Using Digital Vacuum Indicator with Pump by Comparison Method
II. ACCELERATION AND SPEED				
1.	Digital Tachometer Contact mode ^{\$}	130 rpm to 1000 rpm 1000 rpm to 9700 rpm	8 rpm 14 rpm	Using Calibrated Tachometer by comparison Method
2.	Digital Tachometer Non Contact mode ^{\$}	100 rpm to 1000 rpm 1000 rpm to 10000 rpm	6.4 rpm 46 rpm	Using Calibrated Tachometer by comparison Method
3.	Digital Tachometer Non Contact Type [*]	10 rpm to 1000 rpm 1000 rpm to 20000 rpm	4 rpm 14 rpm	Using Calibrated Tachometer by comparison Method

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III.	WEIGHING SCALE AND BALANCE			
1.	Weighing Balance *Readability of 0.1 mg	1 mg to 200 g	0.8mg	Using E2 class weight 1 mg to 200 g. Weighing balance accuracy class I and coarser
	Readability of 0.5 g	Upto 30 kg	0.7 g	
IV.	WEIGHTS			
1.	WEIGHTS^s 1mg to 200 g	1mg 2mg 5mg 10mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g	0.39 mg 0.39 mg 0.39 mg 0.39 mg 0.39 mg 0.39 mg 0.39 mg 0.39 mg 0.39 mg 0.3 mg 0.3 mg 0.3 mg 0.3 mg 0.3 mg 0.3 mg 0.3 mg 0.3 mg	Using E2 class weight (1 mg to 200g) and weighing balance of 0.1 mg readability. Calibration of weights of class M2 and coarser Calibration of weights of class M2 and coarser Calibration of weights of class F2 and coarser

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	500 g to 2 kg	500 g 1 kg 2 kg	0.5 g 0.5 g 0.5 g	Using F 2 Class Weight And Weighing Balance of 0.5 g Readability. Calibration of weights of class M3 and coarser
	5 kg to 10 kg	5 kg 10 kg	0.50 g 0.50g	Using F1 Class Weight And Weighing Balance Of 0.5 Readability. Calibration of weights of class M3 and coarser
	20 kg	20 kg	0.50 g	Using 5kg,10kg F1 class and 5 kg F2 class and Weighing Balance of 0.5 Readability. Calibration of weights of class M3 and coarser

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<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	Temperature Sensors - RTD Thermocouple With/without Indicator / Temperature Controllers ^s	(-) 196.5 ^o C	0.58 ^o C	Using Pt -100 sensor, Documenting Process Calibrator Fluke 702, LN2 Dewar By Comparison Method (Single Point)
		(-) 80 ^o C to Ambient (25 \pm 2 ^o C)	0.50 ^o C	Using Sec. PRT-Pt- 100 sensor, 6 1/2 DMM Fluke 8846 A, Low Temperature Bath By Comparison Method
		Ambient (25 \pm 2 ^o C) to 650 ^o C	0.45 ^o C	Using Sec. PRT-Pt- 100 sensor, Fluke 9144A Dry Block Calibrator with built - in Digital Temperature indicator By Comparison Method
		650 ^o C to 1200 ^o C	2.08 ^o C	Using Standard S- Type Thermocouple, Fluke 702 Documenting process calibrator Muffle Furnace By Comparison Method
2.	Glass Thermometer ^s	(-)50 to + 50 ^o C	0.44 ^o C	Using Sec. PRT-Pt- 100 sensor, 6 1/2 DMM Fluke 8846 A, Low Temperature Bath By Comparison Method

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		50 ⁰ C to 250 ⁰ C	0.50 ⁰ C	Using Sec.PRT-Pt- 100 sensor, 6 ½ DMM Fluke 8846 A, Low Temperature Bath By Comparison Method
3.	Temperature Sensors - RTD Thermocouple With/without indicator / Temperature Controllers*	(-)196.5 ⁰ C	0.58 ⁰ C	Using Pt -100 sensor, Documenting Process Calibrator Fluke 702, LN2 Dewar By Comparison Method
		(-) 80 ⁰ C to Ambient (26 \pm 2 ⁰ C)	0.74 ⁰ C	Using Pt -100 sensor, Documenting Process Calibrator Fluke 702
4.	Temperature Sensors - RTD Thermocouple With/without indicator / Temperature Controllers*	Ambient (26 \pm 2 ⁰ C) to 200 ⁰ C	0.64 ⁰ C	Using Pt -100 sensor, Documenting Process Calibrator Fluke 702 By Comparison Method
		200 ⁰ C to 500 ⁰ C	1.94 ⁰ C	Using Standard K - Type Thermocouple, Fluke 702 Documenting process calibrator Muffle Furnace
		500 ⁰ C to 1200 ⁰ C	2.05 ⁰ C	Using Standard K - Type Thermocouple. Fluke 702 Documenting process calibrator Muffle Furnace

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5.	Oven / Furnace/ Environmental chambers/ Water bath / Refrigerators/ Freezers/ Temperature Enclosures – Rooms Multipoint Temperature Measurement *	-85 ^o C to Ambient (26 \pm 2 ^o C	0.74 ^o C	Using Pt 100 sensor (1) documenting process calibrator, Traceable pt-100 sensor(8) with 8 channel data logger(Minimum 9 points)
		Ambient (26 \pm 2 ^o C)to 200 ^o C	0.64 ^o C	
6.	Indicator of Oven / Furnace/ Environmental chambers/Autoclave Water bath / Refrigerators/ Freezers/ incubator Temperature Enclosures – Rooms Multipoint Temperature Measurement*	200 ^o C to 500 ^o C	1.94 ^o C	Using Standard K - Type Thermocouple. Fluke 702 Documenting process calibrator By comparison Method (Single point Calibration)
		500 ^o C to 1200 ^o C 2.05 ^o C	2.05 ^o C	Using Standard K - Type Thermocouple. Fluke 702 Documenting process calibrator Muffle Furnace

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II.	SPECIFIC HEAT AND HUMIDITY			
1.	Hygrometer #	20 % RH to 95 % RH at 25 °C	1.3 % RH at 25 °C	Using Humidity & Temperature probe with Digital Humidity Temperature Indicator fitted to a Humidity Chamber

* 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.

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