

Laboratory

Centre for Calibration, Nagman Calibration Services LLP, No. 168/7,
Chennai-Bangalore National Highway NH4 ,Chembarambakkam,
Chennai, Tamil Nadu

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO TECHNICAL CALIBRATION</u>				
I.	SOURCE			
1.	DC Voltage [§]	1 mV to 100 mV 100 mV to 200 mV 200 mV to 20 V 20 V to 200 V 200 V to 1000 V	0.36 % to 0.005 % 0.005 % to 0.003 % 0.003 % to 0.002 % 0.002 % 0.002 %	Using Standard Multiproduct Calibrator By Direct Method
2.	AC Voltage [§]	40 Hz 20 mV 40 Hz to 1 kHz 200 mV to 700 V 56 Hz 700 V to 1000 V 20 kHz 2V to 200 V	0.20 % 0.05 % 0.04 % to 0.03 % 0.09 % to 0.06 %	Using Standard Multiproduct Calibrator By Direct Method
3.	DC Current [§]	100 μ A to 200 mA 200 mA to 2 A 2 A to 30 A 30 A to 200 A 200 A to 1000 A	1.62 % to 0.009 % 0.009 % to 0.02 % 0.02 % to 0.04 % 0.04 % to 0.82 % 0.82 % to 0.41%	Using Standard Multiproduct Calibrator By Direct Method

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4.	AC Current [§]	40 Hz to 1 kHz 200 μ A to 200 mA 200 mA to 2 A 40 Hz to 56 Hz 2 A to 20 A 56 Hz 20 A to 30 A 50 Hz 30 A to 200 A 200 A to 1300 A	0.4 % to 0.6 % 0.6 % to 0.25 % 0.25 % to 0.11 % 0.11 % 0.11 % to 0.65 % 0.65 % to 0.41 %	Using Standard Multiproduct Calibrator by Direct Method
5.	DC Resistance [§]	0.1 Ω 100 M Ω 1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 100 k Ω 100 k Ω to 10 M Ω 10 M Ω to 1G Ω 1G Ω to 10 G Ω	0.18 % 0.21 % 0.18 % to 0.06 % 0.06 % to 0.01 % 0.01 % to 0.06 % 0.06 % to 0.21 % 2.50 % 2.60 %	Using Standard Multiproduct Calibrator by Direct Method Using Standard Decade Resistance Box
6.	Frequency [§]	100 Hz to 1 MHz	0.0023 % to 0.006 %	Using Multiproduct Calibrator by Direct Method
7.	Capacitance [§] (Discrete Values)	1kHz 1 nF, 10 nF, 20nF 100 nF, 1 μ F, 10 μ F	0.36 % to 0.7 %	Using Standard Multiproduct Calibrator by Direct Method

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8.	Inductance ^s (Discrete Values)	1kHz 1 mH, 10mH, 100mH, 1 H	0.6 %	Using Standard Multiproduct Calibrator by Direct Method
9.	AC Power ^s Power Factor: Unity Single Phase	50 Hz 100 V to 500 V 2 A to 10 A 200 W to 5 Kw	0.24 % to 1.2 %	Using Standard Multiproduct Calibrator by Direct Method
10.	DC Power ^s	10 mW to 20 kW 10 V to 1000 V 1 mA to 20 A	0.1 % to 0.3 %	Using Standard Multiproduct Calibrator by Direct Method
11.	Oscilloscope Amplitude ^s	10 mV/div to 20 V/div	0.09 % to 0.35 %	Using Standard Multiproduct Calibrator by Direct Method
12.	Band Width ^s	10 MHz to 600 MHz	4.7 %	Using Standard Multiproduct Calibrator by Direct Method
13.	Time Base ^s	20 ns/div to 1 s/div	0.04 %	Using Standard Multiproduct Calibrator by Direct Method
14.	Phase Angle ^s	50 Hz 0 to 180 °	0.3°	Using Standard Multiproduct Calibrator by Direct Method
15.	DC Voltage ^s	1 mV to 10 mV 10 mV to 50 mV 50 mV to 300 mV 300 mV to 1000 V	0.5 % 0.5 % to 0.02 % 0.02 % to 0.01 % 0.01 %	Using Standard Multiproduct Calibrator by Direct Method

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16.	DC Current*	100 μ A to 30 A 30 A to 850 A	0.03 % to 0.4 % 0.4 % to 0.43 %	Using Standard Multiproduct Calibrator with 50turn Coil by Direct Method
17.	DC Resistance*	1 Ω to 30 Ω 30 Ω to 300 k Ω 300 k Ω to 100 M Ω	1.18 % to 0.1 % 0.1 % to 0.03 % 0.03 % to 0.16 %	Using Standard Multiproduct Calibrator by Direct Method
18.	Frequency*	1 Hz to 1 MHz	0.8 % to 0.01 %	Using Standard Multiproduct Calibrator by Direct Method
19.	AC Voltage*	10 Hz to 1 kHz 10 mV to 100 mV 10 Hz to 3 kHz 100 mV to 300 mV 300 mV to 30 V 40 Hz to 1 kHz 32 V to 320 V 320 V to 1000 V	1.19 % 0.39 % to 0.06 % 0.06 % 0.05 % to 0.07 % 0.07 %	Using Standard Multiproduct Calibrator by Direct Method

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20.	AC Current *	10 Hz to 1 kHz 320 μ A to 3.2 mA 110 Hz to 30 kHz 3 mA to 320 mA 110 Hz to 10 kHz 320 mA to 20 A 50 Hz 20 A to 200 A 200 A to 700 A	0.25 % 0.20 % to 0.11 % 0.11 % to 0.27 % 0.27 % to 0.1 % 0.43 %	Using Standard Multiproduct Calibrator with 50turn Coil by Direct Method
21.	Capacitance *	1 kHz 1 nF to 6 μ F	1.87 % to 0.71 %	Using Standard Multiproduct Calibrator by Direct Method
22.	Temperature Simulation (Source) #			
	J-Type	(-)210 $^{\circ}$ C to 0 $^{\circ}$ C 0 $^{\circ}$ C to 1200 $^{\circ}$ C	0.25 $^{\circ}$ C to 0.11 $^{\circ}$ C 0.11 $^{\circ}$ C to 0.4 $^{\circ}$ C	Using Standard MFC by Direct Method
	K-Type	(-)200 $^{\circ}$ C to 0 $^{\circ}$ C 0 $^{\circ}$ C to 1370 $^{\circ}$ C	0.92 $^{\circ}$ C to 0.14 $^{\circ}$ C 0.14 $^{\circ}$ C to 0.43 $^{\circ}$ C	
	T-Type	(-)100 $^{\circ}$ C to 400 $^{\circ}$ C	0.14 $^{\circ}$ C to 0.34 $^{\circ}$ C	
	R-Type	150 $^{\circ}$ C to 350 $^{\circ}$ C 350 $^{\circ}$ C to 1760 $^{\circ}$ C	0.95 $^{\circ}$ C to 0.75 $^{\circ}$ C 0.75 $^{\circ}$ C to 0.91 $^{\circ}$ C	
	S-Type	120 $^{\circ}$ C to 1760 $^{\circ}$ C	1.13 $^{\circ}$ C to 0.95 $^{\circ}$ C	
	B-Type	850 $^{\circ}$ C to 1800 $^{\circ}$ C	0.9 $^{\circ}$ C to 0.84 $^{\circ}$ C	
	E-Type	(-)100 $^{\circ}$ C to 40 $^{\circ}$ C 40 $^{\circ}$ C to 1000 $^{\circ}$ C	0.6 $^{\circ}$ C to 0.14 $^{\circ}$ C 0.14 $^{\circ}$ C to 0.37 $^{\circ}$ C	
	N-Type	(-)110 $^{\circ}$ C to 1300 $^{\circ}$ C	0.19 $^{\circ}$ C to 0.41 $^{\circ}$ C	
	RTD-PT100	(-)200 $^{\circ}$ C to 800 $^{\circ}$ C	0.18 $^{\circ}$ C to 0.31 $^{\circ}$ C	

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II.	MEASURE			
1.	DC Voltage [#]	1 mV to 100 mV 100 mV to 1 V 1 V to 1000 V 1 kV to 40 kV	0.42 % to 0.01 % 0.01 % to 0.006 % 0.006 % 4.66 % to 4.03 %	Using Standard 6½ DMM by Direct Method Using HV Probe & 4½ DMM with HV Tester by Direct / Comparison Method
2.	AC Voltage [#]	1 kHz 10 mV to 1 V 1 V to 10 V 10 V to 100 V 100 V to 750 V 50 Hz 1 kV to 28 kV	0.5 % to 0.1 % 0.1 % 0.1 % 0.11 % 7.66 % to 6.7 %	Using Standard 6 ½ DMM by Direct Method Using HV Probe & 4½ DMM with HV Tester by Direct/Comparison Method
3.	DC Current [#]	100 µA to 10 mA 10 mA to 100 mA 100 mA to 10 A 10 A to 30 A	0.23 % to 0.08 % 0.08 % to 0.064 % 0.064 % to 0.16 % 0.16 % to 0.6 %	Using Standard 6½ DMM Using Current Shunt
4.	AC Current [#]	1kHz 100 µA to 100 mA 100 mA to 1 A 1 A to 10 A	0.17 % 0.17 % to 0.18 % 0.18 % to 0.23 %	Using Standard 6½ DMM

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Sl.	Quantity Measured / Instrument	Range/Frequency	Calibration Measurement Capability (\pm)	Remarks
		50Hz 10 A to 30 A	0.23 % to 0.75 %	Using Current Shunt
5.	DC Resistance [#]	1 Ω to 10 k Ω 10 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω	0.47 % to 0.013 % 0.013 % 0.013 % to 0.048 % 0.048 % to 0.94 %	Using Standard 6½ DMM by Direct Method
6.	Frequency [#]	10 Hz to 300 kHz 300 kHz to 1 MHz 1 MHz to 300 MHz	0.17 % to 0.01 % 0.01 % to 0.09 % 0.02 %	Using Standard 6½ DMM by Direct Method Using Standard Universal Frequency Counter
7.	Time [#]	1 Sec to 90 Min 90 Min to 3 Hr	0.14 Sec to 3.4 Sec 3.4 Sec to 6.4 Sec	Using Digital Timer by Direct Method
8.	Temperature Simulation [#]			Using Standard MFC by Direct Method
	J-Type	(-)210 °C to 0 °C 0 °C to 1200 °C	0.31 °C to 0.13 °C 0.13 °C to 0.4 °C	
	K-Type	(-)200 °C to 0 °C 0 °C to 1370 °C	0.65 °C to 0.14 °C 0.14 °C to 0.43 °C	
	T-Type	(-)200 °C to 400 °C	0.32 °C to 0.34 °C	
	R-Type	150 °C to 1760 °C	0.75 °C to 0.91 °C	
	S-Type	150 °C to 1760 °C	0.78 °C to 0.95 °C	
	B-Type	900 °C to 1800 °C	0.77 °C to 0.84 °C	
	E-Type	(-)200 °C to 1000 °C	0.22 °C to 0.37 °C	
	N-Type	(-)190 °C to 0 °C 0 °C to 1300 °C	0.22 °C to 0.28 °C	
	RTD-PT100	(-)200 °C to 800 °C	0.11 °C to 0.21 °C	

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<u>FLUID FLOW CALIBRATION</u>				
1.	Quantity of Mass ^o	10 kg to 100 kg	0.04%	Using Weighing System 150kg
		100 kg to 500 kg	0.08%	Using Weighing System 600kg
		550 kg to 5500 kg	0.08%	Using Weighing System 6000kg
		5500 kg to 11500 kg	0.08%	Using Weighing System 12000kg Gravimetric method
2.	Liquid Mass Flow Rate ^s	0.3 TPH to 6 TPH	0.12%	Using Weighing System 150kg
		6 TPH to 36 TPH	0.12%	Using Weighing System 600kg
		36 TPH to 360 TPH	0.12%	Using Weighing System 6000kg
		360 TPH to 720 TPH	0.12%	Using Weighing System 12000kg by Gravimetric method

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Sl.	Quantity Measured / Instrument	Range/Frequency	Calibration Measurement Capability (\pm)	Remarks
3.	Quantity by Volume ^s	0.01 m ³ to 0.1 m ³	0.10%	Using Weighing System 150kg
		0.1 m ³ to 0.55 m ³	0.10%	Using Weighing System 600kg
		0.55 m ³ to 5 m ³	0.10%	Using Weighing System 6000kg
		5 m ³ to 11.5 m ³	0.10%	Using Weighing System 12000kg
4.	Liquid Volume Flow Rate ^s	0.3 m ³ /h to 6 m ³ /h	0.12%	Using Weighing System 150kg
		6 m ³ /h to 36 m ³ /h	0.12%	Using Weighing System 600kg
		36 m ³ /h to 360 m ³ /h	0.12%	Using Weighing System 6000kg
		360 m ³ /h to 720 m ³ /h	0.2%	Using Weighing System 12000kg by Gravimetric method
5.	Liquid Volume Flow Rate ^s	720 m ³ /h to 1500 m ³ /h	0.40%	Using Reference Flow Meter
6.	Flow Rate By Volume ^s (Air)	0.016 m ³ /h to 0.040 m ³ /h	2.0%	Using Bell Prover at Temperature (20 \pm 1) ^o C & at Pressure Atm+5mbar With Reference Standard
		1 m ³ /h to 6 m ³ /h	1.0%	

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7.	Anemometer ^s	3 m/s to 10 m/s	9.0%	Using Wind Top Tunnel & Vane Anemometer
8.	Volume Flow Rate* (Medium of Calibration Liquid– Water)	1.2 m ³ /h to 360 m ³ /h 360 m ³ /h to 1440 m ³ /h	0.80% 1.1%	Using clamp on Ultrasonic flow meters by comparison method

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<u>MECHANICAL CALIBRATION</u>				
I.	DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)			
1.	Dimensional Caliper ^s (Dial/Digital/Vernier) L.C : 0.01mm	0 to 600 mm	14.4 μ m	Using Caliper Checker
2.	Dimensional Height Gauge ^s (Dial/Digital/Vernier) L.C : 0.01 mm	0 to 600 mm	9.5 μ m	Using Caliper Checker
3.	Micrometer ^s (External) L.C : 0.001mm	0 to 100 mm	2.6 μ m	Using Set of Slip Gauges
4.	Snap Gauge ^s	Up to 100 mm	2.3 μ m	Using Set of Slip Gauges
5.	Micrometer Setting Standard ^s	Up to 100 mm	10.7 μ m	Using Set of Slip Gauge And Electronic Comparator
6.	Plain Plug Gauge ^s	Up to 100 mm	10.6 μ m	Using Set of Slip Gauge And Electronic Comparator

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
7.	Dial Gauge ^s (Plunger Type) L.C : 0.001mm	0 to 25 mm	1.9 μ m	Using Dial Calibration Tester
8.	Dial Gauge ^s (Lever Type) L.C.: 0.001mm	0 to 25 mm	1.1 μ m	Using Dial Calibration Tester
9.	Bore Dial Gauge ^s	Up to 1.2 mm	1.0 μ m	Using Dial Calibration Tester
10.	Measuring Pins / Thread Measuring Wire ^s (Grade 2 & Coarser)	0 to 20 mm	1.2 μ m	Using Set of Slip Gauge And Electronic Comparator
11.	Surface Plate ^s	3000 mm x 3000 mm	$1.9 \sqrt{\frac{L+W}{100}}$ μ m	Using Sprit Level
12.	Internal Micrometer ^s L.C : 0.001 mm	Up to 300 mm	7.4 μ m	Using Set of Slip Gauges & Slip Gauge Accessory Set
13.	Micrometer Head ^s L.C : 0.0002 mm	Up to 25 mm	1.6 μ m	Using Electronic Probe & Set of Slip Gauge
14.	Depth Micrometer ^s L.C : 0.001 mm	Up to 150 mm	7.0 μ m	Using Set of Slip Gauge
15.	Foils ^s	Up to 690 μ m	4.2 μ m	Using Electronic Probe

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16.	Gauge Block Accessory Set Measuring Jaw Nominal Size Parallelism Flatness ^{\$}	-	0.8 μ m	Using Gauge Block Set , Electronic Probe & Optical Flat
17.	Dial Calibration Tester ^{\$} L.C : 0.0002 mm	Up to 25 mm	1.2 μ m	Using Electronic Probe
18.	Electronic Probe ^{\$}	Up to 25 mm	1.2 μ m	Using Gauge Block Set
19.	Depth Gauge ^{\$} L.C : 0.01 mm	Up to 150 mm	14.7 μ m	Using Set of Slip Gauge & Surface Plate
20.	Dial Thickness Gauge ^{\$} L.C : 0.01 mm	Up to 10 mm	4.6 μ m	Using Set of Slip Gauge
21.	Coating Thickness Gauge ^{\$} L.C : 0.0001 mm	10 μ m to 690 μ m	3 μ m	Using Master Foils
22.	Steel Scale / Measuring Tape ^{\$}	Up to 2000 mm	20 \sqrt{L} μ m L in mm	Using Measuring Scale & Tape Calibrator Unit

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II.	WEIGHTS			
1.	Mass ^s (Weights of Accuracy Class E2 and Coarser)	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g	0.002 mg 0.002 mg 0.002 mg 0.002 mg 0.002 mg 0.009 mg 0.009 mg 0.009 mg 0.009 mg 0.01 mg 0.01 mg 0.01 mg 0.01 mg 0.01 mg	Using Standard Weights E1 Class & Digital Electronic Micro Balances with readability 0.001mg
	Weights of Accuracy Class E2 and Coarser ^s	50 g	0.02 mg	Using Standard Weights E1 Class & Digital Electronic Semi Micro Balances with readability 0.01mg
	Weights of Accuracy Class F1 and Coarser ^s	100 g 200 g	0.09 mg 0.11 mg	Using Standard Weights E1 Class & Digital Electronic Semi Micro Balances with readability 0.01g
	Weights of Accuracy Class F2 and Coarser ^s	500 g 1000 g 2000 g	8.2 mg 8.2 mg 8.3 mg	Using Standard Weights E2Class & Digital Electronic Balances with readability 0.01g

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	Weights of Accuracy Class F2 and Coarser ^s	5000 g 10 kg	11 mg 19.4 mg	Using Standard Weights F1Class & Digital Electronic Balances with readability 0.01 g
	Weights of Accuracy Class F2 and Coarser ^s	20 kg 50 kg	1.64 g 1.69 g	Using Standard Weights F1Class & Digital Electronic Balances with readability 2g
III.	DENSITY AND VISCOSITY			
1.	Density Hydrometer ^s	0.6 g/ml to 1.6 g/ml	0.0021 g/ml	Using Hydrometer of resolution 0.0005 g/ml and Appropriate Liquids
IV.	VOLUME			
1.	Micropipette ^s	1 μ l to 10 μ l >10 μ l to 100 μ l >100 μ l to 1000 μ l	0.008 μ l 0.064 μ l 0.36 μ l	Using Micro Balance and Distilled Water of Known Density by Gravimetric Method based on ISO 8655-6
		>1 ml to 10 ml	9.2 μ l	Using Semi Micro Balance And Distilled Water of Known Density by Gravimetric Method based on ISO 8655-6

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2.	Pipettes / Burettes ^s	1 ml to 10 ml >10 ml to 50 ml >50 ml to 100 ml	5.9 μ l 9 μ l 63 μ l	Using Micro Balance / Semi Micro Balance And Distilled Water of Known Density by Gravimetric method based On ISO 4787
3.	Beaker, Measuring Jar/Cylinder/Flask ^s	1 ml to 10 ml >10 ml to 50 ml >50 ml to 100 ml >100 ml to 5 l	5.9 μ l 9 μ l 63 μ l 2.7 ml	Using Semi micro balance / Analytical balance and distilled water of known density by gravimetric method based on ISO 4787
V.	WEIGHING SCALE AND BALANCE			
1.	Balance [*] Weighing Balance Readability = 0.001 mg Readability = 0.01mg Readability = 0.1mg	Up to 20 g >20 g to 80 g >80 g to 200 g	0.012 mg 0.07 mg 0.16 mg	Using Standard Weights of Class E1 based on OIML R 76
	Readability = 10 mg	>200 g to 2000 g	9.0 mg	Using Standard Weights of Class E1 & E2
	Readability = 2 g	>2 kg to 100 kg	10.14 g	Using Standard Weights of Class F1 & F2
	Readability = 20 g	>100 kg to 300 kg	18.7 g	Using Standard Weights of Class F2

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	Readability = 200 g	>300 kg to 2000 kg	173.6 g	Using Standard Weights of Class F2 & M1
VI.	PRESSURE INDICATING DEVICES			
1.	Pressure (Absolute) - (Pressure gauges, Pressure calibrator, Recorder, Logger, Modules, Manometer, Pr. Transmitter, Pr. Switch, Barometer [#])	50 mbar to 1100 mbar abs	0.4 mbar	Using Digital Manometer (Absolute) By Direct / Comparison Method
2.	Vacuum Gauges, Vacuum Calibrator, Manometer, Vacuum Transmitter ^{\$}	(-) 0.95 bar to (-) 0.1 bar	0.07 % rdg	Using Vacuum Dead Weight Tester By Direct/ Comparison Method
3.	Pressure -Pneumatic/ Pressure Gauges, Pressure Calibrator, Recorder, Logger, Modules, Manometer, Pr. Recorder, Pr. Transmitter, Pr. Switch ^{\$}	0 mbar to 70 mbar	0.025% rdg	Using Pneumatic Pressure Indicator By Direct / Comparison Method
		70 mbar to 160 mbar	0.02% rdg	Using Pneumatic Dead Weight Tester By Direct/ Comparison Method
4.	Pressure (Pneumatic) / Pressure Gauges, Pressure calibrator, Recorder, Logger, Modules, Manometer, Pr. Transmitter, Pr. Switch ^{\$}	0.16 bar to 1 bar	0.06 % rdg	Using Pneumatic Dead Weight Tester By Direct/ Comparison Method

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5.	Pressure (Pneumatic) / Dead Weight Tester, Pressure Calibrator, Recorder, Logger, Modules, Manometer, Pr. Transmitter, Pr. Switch [§]	1 bar to 35 bar	0.01 % rdg	Using Cross float system (Pneumatic)
6.	Pressure (Hydraulic) / Dead Weight Tester, Pressure calibrator, Recorder, Logger, Modules, Manometer, Pr. Transmitter, Pr. Switch [§]	6.55 bar to 70 bar	0.011 % rdg	Using Cross Float System (Hydraulic)
7.	Pressure (Hydraulic) / Dead Weight Tester, Pressure calibrator, Recorder, Logger, Modules, Manometer, Pr. Transmitter, Pr. Switch [§]	70 bar to 1600 bar	0.007 % rdg	Using Cross Float System (Hydraulic)
8.	Vacuum / Vacuum Gauge, Vacuum Transmitter, Recorder, Logger, Manometer, Vacuum Calibrators [*]	(-)0.9 bar to 0 bar	0.0007 bar	Using Pressure Calibrator By Direct / Comparison Method

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9.	Pressure (Pneumatic)/ Pressure Gauge, Pressure Transmitter, Manometer, Logger, Modules, Recorder, Pressure Calibrator, Pressure Switch*	0 bar to 40 bar	0.02% rdg	Using Pressure Calibrator By Direct / Comparison Method
10.	Pressure (Hydraulic) / Pressure Gauge, Pressure Transmitter, Manometer, Logger, Modules, Recorder, Pressure Calibrator, Pressure Switch*	0 bar to 700 bar	0.025% rdg	Using Pressure Calibrator By Direct / Comparison Method
VII.	TORQUE GENERATING DEVICES			
1.	Torque Wrench ^s (Type I-Class B & C) (Type II-Class A & B)	6 Nm to 60 Nm 60 Nm to 1380 Nm	2.85 % rdg. 1.45 % rdg.	Using Bench Type Torque Wrench Calibration System With Built In Torque Sensor & Indicator based on ISO 6789
VIII.	DUROMETER			
1.	Rubber Hardness Tester ^s	0 to 100 Shore A 0 to 100 Shore D	0.39 Shore A 0.39 Shore A	Using Shore Hardness Tester Calibrator as per ASTM D 2240-15

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IX.	ACOUSTICS			
1.	Sound Level Meter [#] (Weighting A & C)	1 kHz 94 dB & 114 dB	0.5 dB	Using Sound Level Calibrator
X.	ACCELERATION AND SPEED			
1.	Digital Tachometer [§] (Non-Contact Type)	600 rpm to <3000 rpm 3000 rpm to <40000 rpm	2.7 % rdg. 0.54 % rdg.	Using Digital Tachometer and RPM Source
2.	RPM Measurement Centrifuge [#]	600 rpm to 10000 rpm	2.87 % rdg.	Using Digital Tachometer
3.	Vibration Meter [§] Acceleration (Peak)	20 Hz & 160 Hz, 1280 Hz 10 m/s ² 40 Hz to 640 Hz 15 m/s ² to 28 m/s ² 40 Hz 30 m/s ² to 60 m/s ² 80 Hz 25 m/s ² to 73 m/s ² 160 Hz 30 m/s ² to 40 m/s ² 320 Hz 25 m/s ² to 35 m/s ² 1280 Hz 15 m/s ² to 20 m/s ²	2.8 % 2.4 % 2.2 % 2.2 % 2.2 % 2.2 % 2.2 % 2.4 %	Using Vibration Exciter by Comparison Method

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	Displacement (pk-pk)	10 Hz 350 μ m to 1300 μ m	2.2 %	
	Velocity (Rms)	10 Hz 6 mm/s to 24 mm/s	3.7 %	
		20 Hz 20 mm/s to 55 mm/s	2.3 %	
		40 Hz 40 mm/s to 170 mm/s	2.2 %	
		80 Hz 50 mm/s to 105 mm/s	2.2 %	
		160 Hz 10 mm/s to 40 mm/s	2.8 %	
		320 Hz 9 mm/s to 12 mm/s	2.9 %	

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<u>OPTICAL CALIBRATION</u>				
1.	Illuminance Meter \$	475 to 25000 lx	2.9 %	Using Luminous Intensity Standard Lamp By Direct Method

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<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	Temperature Resistance Temperature Detector's, Thermocouples, Temperature Gauges, Temperature Switches, Temperature Transmitters, Recorders With Sensor, Temperature Indicator /Controller With Sensor ^{\$}	(-)80°C to 650 °C 650°C to 1200 °C 1200°C to 1500 °C	0.08°C 1.7°C 2.2°C	Using Standard SPRT, Liquid bath (Methanol), Dry block Temperature Calibrator and 6½ DMM Using Standard Thermocouple, Dry Block Temperature Calibrator, 6½ DMM Using Standard Thermocouple, Dry Block Temperature Calibrator, 6½ DMM
2.	Glass-In-Thermometers ^{\$}	(-)80°C to 250 °C	0.3°C	Using Standard SPRT, Liquid bath (Methanol), and 6½ DMM
3.	Temperature-Baths, Ovens, Furnace ^{\$}	(-)80°C to 650 °C 650°C to 1200 °C	0.1°C 1.7°C	Using Standard SPRT, Liquid bath (Methanol), Dry block Temperature Calibrator and 6½ DMM Using Standard Thermocouple, Dry Block Temperature Calibrator 6½ DMM

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		1200°C to 1500 °C	2.2°C	Using Standard Thermocouple, Dry Block Temperature Calibrator, 6½ DMM
4.	Temperature-Black Body Source [§]	50°C to 550°C	1.7°C	Using Standard Pyrometer By Direct Method
		700°C to 1300°C	2.8°C	Using Standard Pyrometer By Direct Method
5.	Temperature [§] (Pyrometer)	50°C to 550°C	1.7°C	Using Standard Thermocouple & MFC & Standard Pyrometer By Comparison Method
		700°C to 1300°C	2.2°C	
6.	Thermo Hygrometer [§]	10°C to 50°C @50% RH	0.7°C	Using Standard Temperature & Humidity Meter And Humidity Generator By Comparison Method
		15% RH to 95% RH @25°C	1.5% RH	Using Standard Temperature & Humidity Meter And Humidity Generator By Comparison Method
7.	Temperature (Temperature Baths)*	(-)80°C to (-)15 °C	0.2°C	Using Standard RTD (Pt 100), Multifunction Calibrator and RTD Calibrator

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8.	Temperature (Resistance Temperature Detector's, Thermocouples, Temperature Gauges, Temperature Switches, Temperature Transmitters, Recorders With Sensor, Temperature Indicator / Controller With Sensor) *	(-)15°C to 650°C	0.3°C	Using Standard RTD (Pt 100), Dry Block Temperature Calibrator, Multifunction Calibrator and RTD Calibrator
		650°C to 1000°C	2.3°C	Using Standard Thermocouple, Dry Block Temperature Calibrator, Multifunction Calibrator and TC Calibrators
		1000°C to 1200°C	3.1°C	Using Standard Thermocouple, Dry Block Temperature Calibrator, Multifunction Calibrator and TC Calibrators
9.	Temperature (Black Body Source) *	50°C to 550°C	1.7°C	Using Standard Pyrometer
		700°C to 1300°C	2.8°C	
10.	Temperature* (Baths, Ovens, Furnace)	(-) 80°C to 650°C	0.3°C	Using Standard RTD (Pt 100), Dry Block Temperature Calibrator, Multifunction Calibrator and RTD Calibrator
		650°C to 1200°C	2.3°C	Using Standard Thermocouple, Dry Block Temperature Calibrator, Multifunction Calibrator and TC Calibrators

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		1200°C to 1500°C	3.6°C	Using Standard Thermocouple, Dry Block Temperature Calibrator, Multifunction Calibrator and TC Calibrators
11.	Temperature (Pyrometer) *	50°C to 550°C 700°C to 1300°C	1.7°C 2.2°C	Using Standard Thermocouple & MFC & Standard Pyrometer
12.	Temperature (Thermal Mapping – Ovens, Furnace, Thermal Chamber, Climatic Chamber) *	(-)80°C to 600°C 600°C to 1200°C	0.8°C 4.2°C	Using Standard RTD & Data Logger Using Standard Thermocouple & Data Logger
II.	SPECIFIC HEAT & HUMIDITY			
1.	Temperature / Humidity Indicators of Chamber, Environmental Chamber, Thermal Chamber, Climatic Chamber – Single Point*	15 %RH to 95 %RH @25 °C	1.8 % RH	Using Standard Temperature & Humidity Meter

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2.	Environmental Chamber, Humidity Chamber, Climatic Chamber – Mapping*	10 °C to 50 °C @50 % RH 15%RH to 95%RH @25°C	1.7°C 3.95%RH	Using Standard Temperature Transmitter/ Sensor with Data Logger by Multi Point Mapping 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.

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