Laboratory	**Star Calibration, 1st Floor, Ambala-Chandigarh Highway, Mohan Nagar, Tehsil Road, Derabassi, Punjab**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Certificate Number	**CC-2648** ***(in lieu of C-1059, C-1060 & C-1061)***	**Page**	**1 of 14**
Validity	**12.04.2018 to 11.04.2020**	**Last Amended on**	**13.04.2018**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		ELECTRO-TECHNICAL CALIBRATION		
I.	**MEASURE**			
1.	DC Voltage[$]	1 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 1000 V	0.4 % to 0.04 % 0.04 % to 0.08 % 0.008 % to 0.09 % 0.09 % to 0.009 % 0.009 % to 0.007 %	Using Fluke 6½ DMM 8846 A
2.	AC Voltage[$]	**50 Hz** 10 mV to 100 mV 100 mV to 1 V 1 V to 1000 V	 0.5 % to 0.12 % 0.12 % to 0.14 % 0.14 % to 0.1 %	Ussing Fluke 6½ DMM 8846 A
3.	DC Current[$]	10 µA to 1 mA 1 mA to 10 mA 10 mA to 400 mA 400 mA to 1 A 1 A to 10 A	0.35 % to 0.06 % 0.06 % to 0.08 % 0.08 % to 0.06 % 0.06 % to 0.08 % 0.08 % to 0.18 %	Using Fluke 6½ DMM 8846 A
4.	AC Current[$]	**50 Hz** 30 µA to 1mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 400 mA 1 A to 10 A	 1.0 % to 0.16 % 0.16 % to 0.05 % 0.05 % to 0.19 % 0.24 % to 0.17 % 0.17 % to 0.24 %	Using Fluke 6½ DMM 8846 A
5.	Frequency[$]	10 Hz to 1 kHz	0.06 % to 0.01 %	Using Fluke 6½ DMM 8846 A
6.	Resistance[$]	1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 100 kΩ	0.36 % to 0.05 % 0.05 % to 0.06 % 0.02 % to 0.06 % 0.013 %	Using Fluke 6½ DMM 8846 A

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Program Director

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		100 kΩ to 1 MΩ 10 MΩ to 100 MΩ 100 MΩ to 1 GΩ	0.013 % to 0.05 % 0.05 % to 0.93 % 0.93 % to 2.3 %	
7.	Temperature (Simulation) $			
	RTD (Pt -100) E - Type B - Type J - Type K - Type T - Type R - Type S - Type	(-) 200 ºC to 850 ºC (-) 200 ºC to 900 ºC 600 ºC to 1750 ºC (-) 200°C to 750 °C 200°C to 1300 °C 200 °C to 400 °C 200 °C to 1700 °C 200 °C to 1700 °C	0.7 ºC 0.7 ºC 2.5 ºC 0.7 ºC 0.7 ºC 0.7 ºC 1.6 ºC 1.6 ºC	Using Universal Calibrator Unical 3001 M
8.	DC Voltage♣	10 mV to 50 mV	1.0 % to 0.16 %	Using Universal Calibrator Unical 3001M
		50 mV to 30 V 30 V to 1000 V	0.16 % 0.16 % to 0.2 %	Using 5 ½ Digit DMM
9.	AC Voltage♣	**50 Hz** 30 mV to 300 V 300 V to 1000 V	 1.7 % to 0.4 % 0.34 % to 0.6 %	Using 5 ½ Digit DMM
10.	AC High Voltage♣	1 kV to 15 kV	6.0 %	Using HV Probe with DMM
11.	DC Current♣	30 µA to 300 mA 300 mA to 10 A	0.4 % to 0.3 % 0.3 % to 0.65 %	Using 5 ½ Digit DMM
12.	AC Current ♣	**50 Hz** 30 µA to 10 A	 2.0 % to 1.0 %	Using 5 ½ Digit DMM
13.	Resistance♣	30 Ω to 3 MΩ 3 MΩ to 19 MΩ	1.1 % to 0.2 % 0.2 % to 0.25 %	Using 5 ½ Digit DMM

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
14.	Timer/Stop/Watch/ Hour Meter (Mech./Digital) ♣	5 sec to 50 sec 50 sec to 24 hrs	1.0 % to 0.08 %	Using Time Interval Calibrator
II.	**SOURCE**			
1.	DC Voltage#	1 mV to 3 mV 3 mV to 10 mV 10 mV to 300 mV 300 mV to100 V 100 V to 1000 V	0.35 % to 0.13 % 0.13 % to 0.04 % 0.04 % to 0.02 % 0.02 % to 0.01 % 0.01 % to 0.007 % 0.007 % to 0.006 %	Using Multi-Product Calibrator Fluke-5502A
2.	AC Voltage #	**45 Hz to 10 kHz** 1 mV to 3 mV 3 mV to 10 mV 10 V to 30 mV 30 mV to 300 mV 300 mV to 3 V 3 V to 1000 V	 2.5 % to 1.1 % 1.1 % to 0.35 % 0.35 % to 0.19 % 0.19 % to 0.05 % 0.05 % to 0.04 % 0.04 % to 0.07 %	Using Multi-Product Calibrator Fluke-5502A
3.	DC Current#	1 µA to10 µA 10 µA to 300 µA 300 µA to 100 mA 300 mA to 10A 10 A to 20 A	2.3 % to 0.25 % 0.25 % to 0.03 % 0.03 % to 0.02 % 0.02 % to 0.03 % 0.03 % to 0.08 %	Using Multi-Product Calibrator Fluke-5502A & Current Coil
4.	AC Current#	30 µA to 100 µA 100 µA to 300 µA 300 µA to 1 mA 1 mA to 3 mA 3 mA to 10 mA 10 mA to 1 A 1 A to 10 A 10 A to 20 A	0.59 % to 0.5 % 0.3 % to 0.21 % 0.21% to 0.28 % 0.28 % to 0.14 % 0.14 % to 0.08 % 0.08 % to 0.12 % 0.12 % to 0.14 % 0.14 % to 0.35 %	Using Multi-Product Calibrator Fluke-5502A & Current Coil

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
5.	Frequency[#]	10 Hz to 1 MHz	0.06 % to 0.01 %	Using Multi-Product Calibrator Fluke-5502A
6.	Resistance[#]	1 Ω to 3 Ω 3 Ω to 10 Ω 10 Ω to 30 Ω 30 Ω to 300 Ω 300 Ω to 30 kΩ 30 kΩ to 10 MΩ 10 MΩ to 30 MΩ 30 MΩ to 300 MΩ 300 mΩ to 1 GΩ	0.7 % to 0.25 % 0.25 % to 0.08 % 0.08 % to 0.04 % 0.04 % to 0.02 % 0.02 % to 0.03 % 0.03 % to 0.07 % 0.07 % to 0.13 % 0.13 % to 0.6 % 0.6 % to 1.8 %	Using Multi-Product Calibrator Fluke-5502A
7.	Capacitance[#]	1 nF to 3 nF 3 nF to 10 nF 10 nF to 300 nF 300 nF to1 µF 1 µF to 3 µF 3 µF to 30 µF 30 µF to 100 µF	1.7 % to1.8 % 1.7 % to 1.0 % 1.0 % to 0.7 % 0.7 % to 0.4 % 0.4 % to 0.46 % 0.3 % to 0.35 % 0.35 % to 0.29 % 0.29 % to 0.5 %	Using Multi-Product Calibrator Fluke-5502A
8.	AC Power (UPF Single Phase)[#]	6.35 W to 6.4 kW @ 50 Hz (63.5 V to 320 V/0.1 A to 20 A)	0.5 % to 0.3 %	Using Multi-Product Calibrator Fluke-5502A
9.	Timer/Stop/Watch/ Hour Meter (Analog/Digital) [#]	5 sec to 50 sec 50 sec to 24 hrs	1.0 % to 0.08 %	Using Time Interval Calibrator
10.	Power Factor[#]	**50 Hz** 0.2 to 1 PF	2.0 % to 0.1 %	Using Multi-Product Calibrator Fluke-5502A

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
11.	Temperature Simulation[$]			Using Multi-Product Calibrator Fluke-5502A
	RTD (Pt -100)	(-) 200 ºC to 800 ºC	0.3 ºC	
	E - Type	(-) 200 ºC to 1000 ºC	0.6 ºC	
	B - Type	600 ºC to 1800 ºC	1.0 ºC	
	J - Type	(-) 200°C to 1200 °C	0.3 ºC	
	K - Type	(-) 200°C to 1350 °C	0.5 ºC	
	T - Type	(-) 200 °C to 400 °C	0.8 ºC to 0.20 °C	
	R - Type	0 °C to 1700 °C	1.0 ºC	
	S - Type	0 °C to 1700 °C	1.1 ºC	

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	MECHANICAL CALIBRATION			
I.	**DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)**			
1.	Measuring Pin Set[$]	Up to 20 mm	6.8 µm	Using Slip Gauge Blocks & Dial Indicator By Comparison Method as per IS: 11103
2.	Feeler Gauge/ Standard Foil[$]	Up to 1 mm	2.8 µm	Using Digimatic Micrometer By Comparison Method as per IS: 3179
3.	V-Block[$] (Parallelism, Symmetricity, Flatness)	Up to 150 mm	10.1 µm	Using Test Mendral & Dial Gauge By Comparison Method as per IS: 2949
4.	Caliper[$] (Vernier/Dial/Digital) L.C.: 0.01 mm	0 to 1000 mm	16.2 µm	Using Slip gauge blocks & Caliper Checker By Comparison Method as per IS: 3651
5.	External Micrometer[$] (Mechanical/Digital) L.C.: 0.001 mm	0 to 25 mm Up to 150 mm	1.5 µm 2.7 µm	Using Slip Gauge Blocks By Comparison Method as per IS:2967
6.	Height Gauge[$] (Vernier/Dial/Digital) L.C.: 0.01 mm	0 to 1000 mm	17.7 µm	Using Slip gauge blocks & Caliper Checker By Comparison Method as per IS: 2921

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
7.	Internal micrometer[$] L.C.: 0.01 mm	5 mm to 35 mm	6.0 µm	Using Slip gauge Blocks By Comparison Method as per IS: 2966
8.	Depth Micrometer[$] (Mechanical/Digital) L.C.: 0.001 mm	0 to 150 mm	2.0 µm	Using Slip gauge Blocks By Comparison Method as per IS:JIB B 7544
9.	Depth Caliper[$] (Vernier/Dial/Digital) L.C.: 0.01 mm	0 to 150 mm	13.7 µm	Using Slip gauge Blocks By Comparison Method as per IS:3651
10.	Plunger Type Dial Indicator(Dial/Digital)[$] L.C.: 0.001 mm	0 to 25 mm	2.5 µm	Using Dial Calibration Tester By Comparison Method as per IS:2092
11.	Lever Dial Gauge[$] L.C.: 0.001 mm L.C.: 0.01 mm L.C.: 0.1 m	 Up to 0.14 mm Up to 0.2 mm Up to 0.14 mm	 2.5 µm 3.0 µm 6.0 µm	Using Dial Calibration Tester By Comparison Method as per IS:11498
12.	Dial Bore Gauge[$]	Up to 1 mm Travel	2.5 µm	Using Dial Calibration Tester By Comparison Method as per JIS B 7515
13.	Dial Thickness Gauge/ OD Caliper[$] L.C.: 0.001 mm L.C.: 0.01 mm L.C.: 0.1 mm	 Up to 5 mm Up to 50 mm Up to 100 mm	 6.0 µm 7.0 µm 60 µm	Using Slip Gauge Blocks By Comparison Method
14.	Bevel/Angle Protractor/ Combination Set (Angle) [$] L.C.: 1 min	0 to 90°	2.9’	Using Angle gauge set By Comparison Method as per IS: 4239

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
15.	Dial snap Gauge[$] L.C.: 0.001 mm	3 mm to 100 mm	1.2 µm	Using Slip Gauge Blocks By Comparison Method as Per IS:3455
16.	Coating Thickness Gauge[$] L.C.: 0.01 mm	0 to 1 mm	2.1 µm	Using Standard Foils By Comparison Method
17.	Ultrasonic Thickness Gauge[$]	0 to 100 mm	6.0 µm	Using Slip Gauge Blocks By Comparison Method
18.	Plain Plug Gauge[$]	Up to 100 mm	7.6 µm	Using Slip Gauge Blocks with Dial Comparator Stand By Comparison Method As Per IS:3455
19.	Snap Gauge[$]	3 mm to 150 mm	2.7 µm	Using Slip Gauge Blocks By Comparison Method As Per IS:3455
20.	Bench Centre[#] (Parallelism, Co-Axiality)	Up to 300 mm	6.0 µm	By Comparison Method As Per IS:5980
II.	**ACOUSTICS**			
1.	Sound Level Meter[$]	94 dB & 114 dB	3.4 dB	Using Sound Level Calibrator By Comparison Method
III.	**ACCELERATION & SPEED**			
1.	Tachometer/ Centrifuge/ RPM Measurement (Non-Contact) [$]	100 rpm to 2000 rpm 2000 rpm to 10000 rpm 10000 rpm to 40000 rpm	2.1 rpm 7.2 rpm 18.5 rpm	Using Tachometer Calibrator/ Tachometer By Comparison Method As Per IS:12508

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
IV.	**WEIGHTS**			
1.	Mass/Weights[$] For Calibration of F2 class weights 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 50 g 100 g 200 g	0.02 mg 0.02 mg 0.02 mg 0.02 mg 0.02 mg 0.03 mg 0.03 mg 0.03 mg 0.033 mg 0.033 mg 0.033 mg 0.033 mg 0.033 mg 0.033 mg 0.04 mg 0.2 mg 0.2 mg	Using E2 class standard weights up to 5 kg with Digital weighing Balance up to 60g/220g g of d = 0.01 mg and d=0.1 mg Procedure. Calibration of Weights is based on substitution Method & ABBA Weighing Cycle as per OIML R 111
	For Calibration of M2 class weights and coarser	500 g 1 kg 2 kg 5 kg 10 kg	0.08 g 0.08 g 0.08 g 0.08 g 0.18 g	Using Digital Weighing Balance up to 12 kg with d = 100 mg
		20 kg 50 kg	0.7 g 0.8 g	Using F1 Class weights and up to 52 kg with d = 1.0 g
V.	**WEIGHING SCALE AND BALANCE**			
1.	Calibration of Electronic Weighing Balance of Class I and Coarser[#]	1 mg to 60 g d ≥ 0.01 mg	0.02 mg	Using E2 class standard weights up to 5 kg and F1 class above that up to 50 kg as per OIML R-76-1 :2006
		>60 g to 220 g d ≥ 0.1 mg	0.11 mg	

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	Weighing Balance of Class II and Coarser	>220 g to 12 kg d ≥ 100 mg	0.2 g	Using E2 class standard weights up to 5 kg and F1 class above that up to 50 kg as per OIML R-76-1 :2006
	Calibration of Class III and IV Weighing Balances and Coarser	>12 kg to 52 kg d ≥1 g	3.0 g	Using F1 class standard weights as per OIML R-76-1 :2006
		>52 kg to 100 kg d ≥5 g	7.0 g	
		>100 kg to 250 kg d ≥20 g	25.0 g	Using M1 Class Standard Weights as per OIML R-76-1 :2006
VI.	**VOLUME**			
1.	Piston Pipette[$] (Micro pipettes)	>10 µl to 100 µl	0.23 µl	Using Digital Balance up to 60 g /200g readability 0.01/0.1 mg and distilled water of known density. Micropipette as per IS 8655-6 & ISO/TR 20461
		>100 µl to 1000 µl	0.24 µl	
2.	Glass Ware[$] Glass Pipettes (Graduated / Non Graduated)	0.1 ml to 10 ml >10 ml to 50 ml	0.083 ml 0.12 ml	Using Digital Balances up to 60 g /220g readability 0.01/0.1 mg and up to 12 kg with distilled water of known density. Glass ware as per ISO 4787 & ISO/TR 20461
	Glass Burette[$]	0.1 ml to 10 ml >10 ml to 50 ml	0.083 ml 0.12 ml	

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	Measuring Cylinder/ Volumetric Flask/Conical Flask/Beaker[$]	1 ml to 10 ml >10 ml to 200 ml >200 ml to 1000 ml >1000 ml to 2000 ml	0.09 ml 0.1 ml 0.217 ml 0.4 ml	
VII.	**PRESSURE INDICATING DEVICES**			
1.	Hydraulic Pressure Dial /Digital Pressure Gauges and Calibrators, Pressure Transmitter[#]	0 to 30 bar >30 bar to 700 bar	0.12 bar 0.21 bar	Using Calibrated Digital Pressure Gauge Comparison method as per (DKD-R-6-1)
2.	Pneumatic Low Pressure - Dial /Digital Low Pressure Gauges and Manometers, Magnehelic Gauge[#]	0 to 1960 Pa	2.54 Pa	Using Calibrated Digital Manometer by Comparison method as per (DKD-R-6-1)
3.	Dial/Digital Vacuum Gauges /indicators and calibrators[#]	(-) 0.90 bar to 0 bar	0.01 bar	Using Calibrated Digital Vacuum Gauge Comparison method as per (DKD-R-6-1)

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	THERMAL CALIBRATION			
I.	**TEMPERATURE**			
1.	RTD, Thermocouple With or Without Indicator /Data Logger/ Recorder , Temperature Gauge, Digital Thermometer , Temperature Transmitter #	(-) 40 °C to 50 °C	0.22 °C	Using Fluke 6½ DMM with RTD, Low Temperature Bath By Comparison Calibration
		50 °C to 250 °C	0.23 °C	Using Fluke 6½ DMM With RTD, Oil Bath By Comparison
2.	RTD, Thermocouple With or Without Indicator /Data Logger / Recorder , Temperature Gauge, Digital Thermometer , Temperature Transmitter #	300 °C to 1000 °C	2.3 °C	Using "S" Type Thermocouple, Universal Calibrator & Dry Block Furnace By Comparison Calibration
3.	Thermocouple With or Without Indicator / Data Logger/ Recorder, Temperature Gauge, Digital Thermometer , Temperature Transmitter #	1000 °C to 1200 °C	2.93 °C	Using S-Type Thermocouple With Universal Calibrator, Dry Block Furnace By Comparison Calibration
4.	Glass Thermometer #	50 °C to 250 °C	1.2 °C	Using Fluke 6½ DMM With RTD, Oil Bath By Comparison Calibration

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
5.	Temperature Indicator with sensor of Liquid Bath, Dry Block, Furnace, Freezer, Oven Incubator, Chamber, Muffle Furnace[#]	(-) 80 °C to 350 °C	1.77 °C	Using Fluke 6½ DMM With RTD Single Position Calibration (At Measuring Location in DUC) By Comparison Calibration
		350 °C to 1000 °C	2.3 °C	Using S-Type Thermocouple , Universal Calibrator Single Position Calibration (At Measuring Location in DUC) By Comparison Calibration
6.	Calibration of Furnace Freezer/ Deep Freezer, Oven Incubator, Environmental Chamber, Cold & Hot Room [♠]	(-) 30 °C to 350 °C	4.9 °C	Using Multi Position Calibration Using T Type Thermocouple (Minimum Nine) With Data Logger By Comparison Calibration
II.	**SPECIFIC HEAT & HUMIDITY**			
1.	Digital/Analog Hygrometer, RH Transmitter, Humidity Sensor with Indicator/ Data Logger/Recorder[$]	20 % RH to 90 % RH @25 °C	2.8 % RH	Using RH Indicator, Humidity Chamber By Comparison Calibration

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2.	Environmental Chamber, Humidity Oven, Humidity Chamber ♣	20 % RH to 85 % RH @25 °C	9.8 % RH	Using Warless Data Logger (Minimum Nine) Multi Position Calibration

*** Measurement Capability is expressed as an uncertainty (±) 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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