Laboratory	**Indiana Test, Calibration and Certification Services (A Division of Indiana Ferro Alloys), D-151, Industrial Area Phase-VII, Mohali, Punjab**
Accreditation Standard	**ISO/IEC 17025: 2005**
Certificate Number	**CC-2594** **Page 1 of 26**
Validity	**05.03.2018 to 04.03.2020** **Last Amended on -**

Sl.	**Quantity Measured / Instrument**	**Range/Frequency**	***Calibration Measurement Capability (±)**	**Remarks**
		ELECTRO-TECHNICAL CALIBRATION		
I.	**SOURCE**			
1.	DC Voltage#	1 mV to 200 V 200 V to 1000 V	0.43 % to 0.006 % 0.006 % to 0.007 %	Using Multi Product Calibrator by Direct Method
2.	DC Current#	10 µA to 200 mA 200 mA to 2 A 2 A to 30 A	0.36 % to 0.013 % 0.013 % to 0.02 % 0.02 % to 0.05 %	Using Multi Product Calibrator by Direct Method
		12 A to 1000 A	1.1 % to 0.88 %	Using Current Coil
3.	DC Low Resistance#	0.001 Ω 0.01 Ω 0.1 Ω	0.75 % 0.36 % 0.04 %	Using Standard Resistance (Discrete Values) by Direct Method
	DC Resistance# (2/4 Wire)	1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 M Ω 100 MΩ 1 GΩ	0.6 % 0.07 % 0.012 % 0.010 % 0.010 % 0.010 % 0.02 % 0.05 % 0.6 % 1.2 %	Using Multi Product Calibrator (Discrete Values) by Direct Method
4.	AC Voltage#	**50 Hz** 10 mV to 200 V 200 V to 1000 V	 0.29 % to 0.06 % 0.06 % to 0.07 %	Using Multi Product Calibrator by Direct Method

Sangeeta Kunwar
Convenor

Avijit Das
Program Director

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		1 kHz to 10 kHz 10 mV to 200 mV 200 mV to 200 V 200 V to 1000 V	 0.51 % to 0.12 % 0.12 % to 0.13 % 0.13 % to 0.22 %	Using Multi Product Calibrator by Direct Method
5.	AC Current#	**50 Hz** 50 µA to 30A	0.7 % to 0.1%	Using Multi Product Calibrator by Direct Method
		12 A to 1200 A	1.0 % to 0.78 %	Using Current Coil
		1 kHz 50 µA to 30A	1.5 %to 0.37 %	Using Multi Product Calibrator by Direct Method
6.	High Resistance# (IR)	**250 V to 1 kV** 1 MΩ to 5 MΩ 5 MΩ to 2 GΩ	 0.66 % to 0.33 % 0.33 % to 3.7 %	Using Multi Product Calibrator by Direct Method
		1 MΩ 10 MΩ 50 MΩ 100 MΩ 500 MΩ 1 GΩ 10 GΩ 100 GΩ 500 GΩ 1 T	0.6 % 0.6 % 0.7 % 0.8 % 0.9 % 1.0 % 1.3 % 2.5 % 3.6 % 4.0 %	Using High Resistance Box (Discrete Values) By Direct Method
7.	Capacitance#	**1 kHz** 1 nF to 10µF	0.51% to 1.37 %	Using Multi Product Calibrator by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
8.	Inductance#	**1 kHz** 1 mH to 100 mH 100 mH to 1 H 1 H to 10 H	 1.75 % to 2.4 % 2.4 % to 1.03 % 1.03 % to 1.28 %	Using Multi Product Calibrator by Direct Method
9.	Frequency#	100 Hz to 10 MHz	0.61 % to 0.0046 %	Using Multi Product Calibrator by Direct Method
10.	DC Power# 1 Φ	40 W to 18 kW (40 V to 600 V) (1 A to 30 A)	0.31 %	Using Multi Product Calibrator by Direct Method
11.	AC Power# 1 Φ	**50 Hz** 10 W to 1.2 kW 1.2 kW to 12 kW (UPF to 0.5 PF Lead/Lag) (40 to 300V) (0.25 to 30A)	 0.05 % to 0.1 % 0.1 % to 0.05 %	Using Multi Product Calibrator by Direct Method
12.	Phase Angle / Power Factor#	**50 Hz** 0.1 to 1 (Lead / Lag)	0.0043 PF	Using Multi Product Calibrator by Direct Method
13.	Temperature Simulation#			
	RTD Thermocouple B-Type R-Type S-Type N-Type T-Type K-Type E-Type J-Type	(-)200 ˚C to 800 ˚C 600 ˚C to 1800 ˚C (-)50 ˚C to 1760 ˚C (-)50 ˚C to 1760 ˚C (-)200 ˚C to 1300 ˚C (-)200 ˚C to 400 ˚C (-)140 ˚C to 1370 ˚C 0 ˚C to 1000 ˚C (-)180 ˚C to 1200 ˚C	0.06 ˚C 0.85 ˚C 0.95 ˚C 0.95 ˚C 0.5 ˚C 0.7 ˚C 0.32 ˚C 0.18 ˚C 0.27 ˚C	Using Multi Product Calibrator by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
II.	**MEASURE**			
1.	DC Voltage[$]	1 mV to 1000 V	0.024 % to 0.001 %	Using 8½ Digit Precision Multimeter by Direct/ Comparison Method
2.	DC Current[$]	10 µA to 100 µA 100 µA to 30 A	0.026 % to 0.005 % 0.005 % to 0.1 %	Using 8½ Digit Precision Multimeter by Direct/ Comparison Method
3.	AC Voltage[$]	**50 Hz** 10 mV to 1000 V	0.15 % to 0.04 %	Using 8½ Digit Precision Multimeter by Direct/ Comparison Method
		1 kHz 10 mV to 100 mV 100 mV to 1000 V	0.16 % to 0.04 % 0.04 %	Using 8½ Digit Precision Multimeter by Direct/ Comparison Method
		10 kHz 10 mV to 100 mV 100 mV to 1000 V	0.16 % to 0.05 % 0.05 % to 0.06 %	Using 8½ Digit Precision Multimeter by Direct/ Comparison Method
4.	AC Current[$]	**50 Hz** 50 µA to 10 A 10 A to 30 A	0.19 % to 0.09 % 0.09 % to 0.15 %	Using 8½ Digit Precision Multimeter by Direct/ Comparison Method
		1 kHz 50 µA to 100 mA 100 mA to 30 A	0.22 % to 0.08 % 0.08 % to 0.21 %	Using 8½ Digit Precision Multimeter by Direct/ Comparison Method
5.	DC Low Resistance (4 Wire) [$]	0.001 Ω to 0.01 Ω 0.01 Ω to 0.1 Ω	0.7 % to 0.23 % 0.23 % to 0.023 %	Using Micro Ohm Meter by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	DC Resistance (4 Wire/ 2 Wire Mode) $	1 Ω to 10 Ω 10 Ω to 10 GΩ 10 GΩ to 1 TΩ	0.003 % to 0.002 % 0.002 % to 0.54% 0.54 % to 3.3 %	Using 8½ Digit Precision Multimeter by Direct Method
6.	Capacitance$	**1 KHz** 1 nF to 10 µF	0.87 % to 1.5 %	Using Standard LCR Meter by Direct Method
7.	Inductance$	**1 KHz** 1 mH to 100 mH 100 mH to 10 H	1.8 % to 2.47 % 2.47 % to 1.83 %	Using Standard LCR Meter by Direct Method
8.	Frequency$	5 Hz to 10 KHz 10 kHz to 10 MHz	0.03 % to 0.003 % 0.003 % to 0.0003 %	Using Frequency Counter by Direct Method
		5 Hz to 10 MHz	0.003 %	Using Frequency Counter by Comparison Method
9.	AC High Voltage$	**50 Hz** 1 kV to 5 kV	5.9 %	Using High Voltage Probe with Digital Multimeter, Kilo Volt Amplifier by Direct/ Comparison Method
		1 kV to 28 kV	5.9 %	Using High Voltage Probe with Digital Multimeter by Direct Method
10.	DC High Voltage$	1 kV to 10 kV	3.1 %	Using High Voltage Probe with Digital Multimeter, Kilo Volt Amplifier by Direct/ Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		1 kV to 30 kV	3.1 %	Using High Voltage Probe with Digital Multimeter by Direct Method
11.	Phase Angle$	**50 Hz** 0 to 180° Lead/Lag	0.71˚	Using 8½ Digit Precision Multimeter by Direct Method
12.	DC Power$	10 W to 12 kW	0.33 %	Using 8½ Digit Precision Multimeter by Direct Method
13.	Timer/Hour Meter$	1 s to 3600 s	0.04 s to 3.5 s	Using Digital Time Meter by Direct Method
14.	Temperature Simulation$			
	RTD-Type Thermocouple B-Type R-Type S-Type N-Type T-Type K-Type E-Type J-Type	(-)200 ˚C to 850 ˚C 600 ˚C to 1800 ˚C (-)40 ˚C to 1760 ˚C 0 ˚C to 1700 ˚C (-)200 ˚C to 1300 ˚C (-)200 ˚C to 400 ˚C (-)140 ˚C to 1340 ˚C 0 ˚C to 800 ˚C (-)200 ˚C to 1200 ˚C	0.06 ˚C 0.65 ˚C to 0.21 ˚C 0.36 ˚C to 0.19 ˚C 0.27 ˚C to 0.22 ˚C 0.14 ˚C 0.15 ˚C 0.12 ˚C 0.32 ˚C 0.11˚C	Using 8½ Digit Precision Multimeter by Direct Method
15.	DC Voltage♣	1 mV to 1000 V	0.47 % to 0.007 %	Using 6½ Digit Digital Multimeter by Direct Method
16.	DC Current♣	100 µA to 10 A	0.11 % to 0.21 %	Using 6½ Digit Digital Multimeter by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
17.	AC Voltage♣	**50 Hz** 10 mV to 750 V	0.6 % to 0.12 %	Using 6½ Digit Digital Multimeter by Direct Method
18.	AC Current♣	**50 Hz** 1 mA to 10 A	0.68 % to 0.29 %	Using 6½ Digit Digital Multimeter by Direct Method
19.	DC Low Resistance (4 Wire) ♣	0.1 Ω to 1 Ω	0.7 % to 0.23 %	Using Micro Ohm Meter by Direct Method
	DC Resistance (4 Wire/ 2Wire Mode) ♣	10 Ω to 100 MΩ	0.06 % to 1.3 %	Using 6½ Digit Digital Multimeter by Direct Method
20.	Capacitance♣	**1 kHz** 1 nF to 10 µF	0.87 % to 1.5 %	Using Standard LCR Meter by Direct Method
21.	Inductance♣	**1 kHz** 1 mH to 100 mH 100 mH to 10 H	1.8 % to 2.47 % 2.47 % to 1.83 %	Using Standard LCR Meter by Direct Method
22.	Frequency♣	5 Hz to 10 KHz 10 KHz to 10 MHz	0.03 % to 0.003 % 0.003 % to 0.0003 %	Using Frequency Counter by Direct Method
23.	AC High Voltage♣	**50 Hz** 1 kV to 28 kV	4.6 % to 4.3 %	Using High Voltage Probe with 4½Digital Multimeter by Direct Method
24.	DC High Voltage♣	1kV to 30 kV	3.1 % to 2.8 %	Using High Voltage Probe with 4½Digital Multimeter by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
25.	Phase Angle/Power Factor (1Φ, 3Φ)♣	0.1 to 1.0 (Lead/Lag)	0.14 PF	Using Energy Logger by Direct Method
26.	Energy(Active) 1Φ/3Φ ♣	**50 Hz** 100 V to 240 V 10 A to 1200 A PF 0.5 to 1 (Lead/Lag)	1.5 %	Using Energy Logger by Comparison Method
	Power (Active) 1Φ♣	**50 Hz** 100 to 240 V 10 A to 1200 A PF 0.5 to 1 (Lead/Lag)	2.4 % to 1.8 %	Using Energy Logger by Comparison Method
	Power (Active)3Φ♣	**50 Hz** 100 to 240 V 10 A to 1200 A PF 0.5 to 1 (Lead/Lag)	1.5 %	Using Energy Logger by Comparison Method
27.	Timer/Hour Meter♣	1 s to 3600 s	0.04 s to 3.5 s	Using Digital Time Meter by Comparison Method
28.	Temperature Simulation♣			
	RTD-Type Thermocouple R-Type S-Type T-Type K-Type J-Type	(-)200 ˚C to 800 ˚C 0 ˚C to 1740 ˚C 0 ˚C to 1740 ˚C (-)160 ˚C to 400 ˚C 0 ˚C to 1370 ˚C 0 ˚C to 1200 ˚C	0.59 ˚C to 0.63 ˚C 1.7 ˚C 1.7 ˚C 0.92 ˚C 0.68 ˚C 0.69 ˚C	Using Universal Calibrator by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	MECHANICAL CALIBRATION			
I.	**DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)**			
1.	Caliper$ (Vernier/ Dial/ Digimatic) L.C.: 0.01 mmφ	0 to 300 mm 300 mm to 600 mm 600 mm to 1000 mm 0 to 1000 mm	10.0 µm 11.0 µm 14.0 µm 31.0 µm	Using Slip Gauge 'O' Grade, Caliper Checker By Comparison Method
2.	Height Gauge$ (Vernier/ Dial/Digital) L.C.: 0.01 mmφ	0 to 300 mm 300 mm to 600 mm 600 mm to 1000 mm	10.0 µm 10.0 µm 12.0 µm	Using Slip Gauge 'O' Grade, Caliper Checker By Comparison Method
3.	Depth Gauge$ (Vernier/Digital) L.C.: 0.01 mmφ	0 to 300 mm 300 mm to 600 mm	8.0 µm 8.0 µm	Using Slip Gauge And Long Slip 'O' Grade, Caliper Checker By Comparison Method
4.	Outside Micrometers$ (Disc/Ball/ Point/ Blade Type/Caliper Type/Screw Thread) L.C.: 0.001 mmφ	0 to 25 mm 25 mm to 100 mm 100 mm to 150 mm 150 mm to 300 mm 300 mm to 600 mm 600 mm to 1000 mm	1.0 µm 1.2 µm 1.4 µm 1.9 µm 3.5 µm 7.0 µm	Using Slip Gauge And Long Slip 'O' Grade By Comparison Method
5.	V-Anvil Micrometer$ L.C.: 0.001 mmφ	0 to 100 mm	1.0 µm	Using Slip Gauge And Long Slip 'O' Grade By Comparison Method
6.	Internal Micrometer/ Stick Micrometer$ L.C.: 0.001 mmφ	5 mm to 300 mm 300 mm to 1000 mm	2.4 µm 8.0 µm	Using Slip Gauge And Gauge 'O' Grade, Slip Gauge Accessories & Ulm By Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
7.	Digimatic/ Vernier Micrometer Head$ L.C.: 0.0001 mmφ	0 to 100 mm 0 to 50 mm	0.6 µm 6.0 µm	Using Electronic Probe & Ulm By Comparison Method
8.	Depth Micrometer$ L.C.: 0.001 mmφ	0 to 300 mm 300 mm to 1000 mm	3.0 µm 10.0 µm	Using Slip Gauge And Long Slip 'O' Grade, Caliper Checker By Comparison Method
9.	Digimatic Indicator Plunger Type$ L.C.: 0.001 mmφ	0 to 100 mm	1.1 µm	Using Electronic Probe & Ulm By Comparison Method
10.	Dial Indicator Plunger Type$ L.C.: 0.001 mmφ	0 to 25 mm 0 to 50 mm 0 to 100 mm	0.8 µm 6.0 µm 58.0 µm	Using Electronic Probe & Ulm By Comparison Method
11.	Dial Indicator Lever Type$ L.C.: 0.001mmφ	0 to 1 mm 0 to 2 mm	0.8 µm 6.0 µm	Using Electronic Probe & Ulm By Comparison Method
12.	Dial Bore Gauge$ L.C.: 0.001 mm	Travel 1 mm	3.2 µm	Using Electronic Probe By Comparison Method
13.	Slip Gauge Block 'K' '0' '1' '2' Grade/Length Bars/Micrometer Setting Rods$	0.5 mm to 25 mm 25 mm to 50 mm 50 mm to 75 mm 75 mm to 100mm 100 mm to 200 mm 200 mm to 300 mm 300 mm to 400 mm	0.11 µm 0.12 µm 0.14 µm 0.15 µm 1.7 µm 2.4 µm 2.8 µm	Using Gauge Block Calibrator/Slip Gauge 'K' Grade/Long Slip Gauge/ Ulm By Comparison Method
14.	Micrometer Setting Rods$	Up to 1000 mm	6.0 µm	Using Slip Gauge And Long Slip 'O' Grade & Electronic Probe By Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
15.	Measuring Scale$ L.C.: 0.5 mmφ	0 to 1000 mm 1000 mm to 2000 mm	200 µm/m 200 µm/m	Using Measuring Tape & Scale Calibration System By Comparison Method
16.	Measuring Tape/ Pie Tape$ L.C.: 1.0 mmφ	0 to 50 m 0 to 100 m	200 µm/m 200 µm/m	Using Measuring Tape & Scale Calibration System By Comparison Method
17.	Plain Ring/Air Ring Gauges$	5 mm to 100 mm 100 mm to 200 mm 200 mm to 300 mm	2.0 µm 2.6 µm 3.0 µm	Using ULM By Comparison Method
18.	Thread Ring Gauge/ W.C.R.$	3 mm to 100 mm 100 mm to 200 mm 200 mm to 300 mm	2.0 µm 2.0 µm 3.0 µm	Using ULM By Comparison Method
19.	Plain Taper Plug Gauge$	Up to 100 mm Tapper Up to 60º	3.5 µm 32 sec	Using Ulm By Comparison Method
20.	Plain Plug Gauge/Air Plug Gauge/Width Gauge/Plain Pin Gauge$	3 mm to 100 mm 100 mm to 200 mm 200 mm to 300 mm 300 mm to 400 mm	2.5 µm 3.0 µm 4.0 µm 4.5 µm	Using Ulm By Comparison Method
21.	Thread Plug Gauge/ W.C.P/ Taper Thread Plug Gauge$	3 mm to 50 mm 50 mm to 150 mm	3.2 µm 4.2 µm	Using Ulm, Three Wire Unit & Digimatic Micrometer By Comparison Method
22.	Snap Gauge/Dial Snap Gauge/Gap Gauge/Plain Work Piece$	1 mm to 100 mm 100 mm to 400 mm	1.5 µm 4.0 µm	Using Slip Gauge & Long Slip 'O' Grade, With Slip Gauge Accessories By Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
23.	Thread Measuring Wires[$]	0.17 mm to 3.62 mm	1.1 µm	Using Ulm By Comparison Method
24.	Radius Gauge[$]	0.6 mm to 50 mm	30.0 µm	Using Profile Projector By Comparison Method
25.	Screw Thread Pitch Gauge[$]	0.4 mm to 6 mm	4.5 µm	Using Profile Projector By Comparison Method
26.	Measuring Pin/Flash Pin/Width Gauge[$]	0.1 mm to 20 mm 20 mm to 100 mm	1.1 µm 2.0 µm	Using Ulm By Comparison Method
27.	Test Sieves[$]	0 to 10 mm 10 mm to 200 mm	5.0 µm 37.0 µm	Using Profile Projector & Digital Vernier Caliper By Comparison Method
28.	Filler Gauge/ Thickness Foils[$]	0.01 mm to 5.0 mm	0.6 µm	Using Ulm By Comparison Method
29.	Coating Thickness Gauge/DFT Meter[$] L.C.: 0.001 mm	0.01 mm to 1.0 mm >1.0 mm to 2.0 mm	2.5 µm 35.0 µm	Using Thickness Foils By Comparison Method
30.	Ultrasonic Thickness Gauge[$] L.C.: 0.01 mm[φ]	1 mm to 200 mm	30.0 µm	Using Steel Slip Gauge Set '1' Grade By Comparison Method
31.	Weld Fillet Gauge[$]	0 to 30 mm Angle 90 ° Radius 0 to 25 mm	600.0 µm 0.6 ° 30.0 µm	Using Slip Gauge Set Grade O & Angle Gauge, Profile Projector By Comparison Method
32.	Wire Gauge[$]	0.19 mm to 7.82 mm	5.0 µm	Using Profile Projector By Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
33.	Dial Thickness Gauge[$] L.C.: 0.001 mm[φ]	0 to 100 mm	1.0 µm	Using Slip Gauge 'O' Grade By Comparison Method
34.	Dial Caliper Gauge[$] L.C.: 0.001 mm[φ]	6 mm to 100 mm	1.3 µm	Using Slip Gague & Slip Gauge Accessories Set By Comparison Method
35.	Flaking Index & Elongation Index Gauge[$]	4 mm to 100 mm	40.0 µm	Using Digital Vernier Caliper & Digital Micrometer By Comparison Method
36.	Pistol Caliper[$] L.C.: 0.01 mm[φ]	0 to 100 mm	7.0 µm	Using Slip Gauge 'O' Grade By Comparison Method
37.	Brinell Microscope/ Filar Eyepiece Micrometer [$] L.C.: 0.001 mm[φ]	Up to 10 mm	5.0 µm	Using Glass Scale By Comparison Method
38.	Microscope Eyepiece Graticule And Objective Magnification[#]	0 to 10 mm 4X to 1000 X	8.0 µm 0.06 % to 0.001 %	Using Glass Scale By Comparison Method
39.	Comparator Stand[$]	400 mm x 400 mm	5.0 µm	Using Lever Dial Indicator By Comparison Method
40.	Bench Center[#]	Up to 1500 mm	8.0 µm	Using Test Mandrel, Dial Indicator Lever Type By Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
41.	Surface Plate#	6000 mm x 4000 mm	$1.5\sqrt{\frac{L+W}{150}}$ µm (L & W in mm)	Using Electronic Level By Comparison Method
42.	Straight Edge$ (Straightness/ Parallelism)	1000 mm x 25 mm	8.1 µm	Using Slip Gauge, Surface Plate By Comparison Method
		2000 mm x 100 mm	15.0 µm	Using Electronic Level By Comparison Method
43.	Engineer Square$	Up to 600 mm	9.0 µm	Using Master Cylinder/ Slip Gauge Set 'O' Grade & Dig. Dial Gauge By Comparison Method
44.	Angle Plate/Box Angle Plate$ (Squareness/ Flatness/ Parallelism)	Up to 600 mm	9.0 µm	Using Master Cylinder, Electronic Level & Dial Indicator Lever Type By Comparison Method
45.	V-Block$ Parallelism Symmetry Perpendicularity	300 mm x100 mm x 100 mm	3.0 µm 3.0 µm 9.0 µm	Using Test Mandrel & Dial Indicator Lever Type By Comparison Method
46.	Mandrels$ Diametrical Variation Parallelism Difference in Height	Up to 300 mm	1.0 µm	Using Electronic Probe & Slip Gauge O Grade by comparison Method
47.	Bevel/Angle Protector/ Set Combination$ L.C.:1min/.5min/1deg	0 to 360º 0 to 360º 0 to 360º	1.0 min 3.0 min 0.6 deg	Using Angle Gauge 'O' Grade By Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
48.	Angle Gauge$	Up to 90º	8.0 "	Using Sine Bar, Slip Gauge And Electronic Probe By Comparison Method
49.	Inclinometer/ Clinometer$ L.C.: 1 Minφ	± 90 °	35.0 "	Using Angle Gauge Set 'O' Grade By Comparison Method
50.	Spirit Level$ L.C.: 0.01mm/mφ	0 to 2 mm/m	12 µm/m	Using Tilting Arm & Electronic Probe By Comparison Method
51.	Master Setting Disc/ Gauge$	0 to 100 mm 100 mm to 200 mm 200 mm to 300 mm 300 mm to 400 mm	1.3 µm 1.7 µm 2.5 µm 4.0 µm	Using Slip Gauge & Slip Gauge Accessories & ULM By Comparison Method
52.	Master Setting Plain Ring Gauges$	3 mm to 50 mm 50 mm to 100 mm 100 mm to 200 mm 200 mm to 300 mm	1.6 µm 1.7 µm 2.3 µm 2.4 µm	Using Slip Gauge & Slip Gauge Accessories & ULM By Comparison Method
II.	**DIMENSION (PRECISION INSTRUMENTS)**			
1.	Gauge Block Calibrator# L.C.: 0.00001 mm	0.5 mm to 100 mm	0.07 µm	Using Slip Gauge Set M11 Grade 'K' By Comparison Method
2.	Electronic / Mechanical Extensometer# L.C.: 0.001 mmφ	0 to 5 mm travel 0 to 25 mm travel Gauge Length 0 to 150 mm	1.0 µm 6.0 µm 6.0 µm	Using Electronic Probe With Extensometer Calibration Apparatus By Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
3.	Profile Projector[#] Linear Displacement (In X & Y Plane) Angle And Magnification	0 to 200 mm 0 to 360° 4x to 100 x	2.3 µm 11 " 0.5 % to 0.06 %	Using Glass Scale & Angle Gauge 'O Grade/ Angle Graticule & Digimatic Vernier By Comparison Method
4.	Uniaxial Length Measuring Machine (ULM)[#] L.C.: 0.0001 mm	0 to 100 mm	0.9 µm	Using Slip Gauge 'O' Grade By Comparison Method
5.	Dial Calibration Tester[$] L.C.: 0.0001 mm[φ]	0 to 25 mm	0.8 µm	Using Electronic Probe By Comparison Method
6.	Electronic Probe[$] L.C.: 0.00005 mm[φ]	0 to 10 mm 0 to 25 mm	0.3 µm 0.4 µm	Using Slip Gauge 'O' Grade By Comparison Method
7.	Caliper Checker/ Height Master[$]	Up to 600 mm Up to 1000 mm	5.1 µm 9.0 µm	Using Slip Gauge, Long Slip Gauge And 2D Height Gauge By Comparison Method
8.	2D Height Gauge[#] L.C.: 0.0001 mm[φ]	0 to 600 mm	6.0 µm	Using Slip Gauge & Long Slip Gauge 'O' Grade By Comparison Method
9.	Glass Angle Graticules[$]	0 to 360 °	33.0 "	Using Profile Projector By Comparison Method
10.	Slip Gauge Accessories Set[$]	As per set	1.1 µm	Using ULM-300 & Slip Gauge 'O' Grade By Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
11.	Sine Bar/Sine Center[$] C/C Angle Generation	100 mm to 300 mm	3.0 µm 4.2 µm	Using Angle Gauge, Slip Gauge & Electronic Probe By Comparison Method
12.	Tape And Scale Calibration Machine[#] L.C.: 0.001 mm	0 to 1000 mm	7.0 µm	Using Slip Gauge & Long Slip 'O' Grade By Comparison Method
III.	**ACCELERATION & SPEED**			
1.	Speed/RPM/ Tachometer/ Stroboscope[#] (Contact Type)	100 rpm to 1000 rpm >1000 rpm to 5000 rpm	2.1 % 0.05 %	Using Digital Tachometer & RPM Source As Per IS 12508
2.	Speed/Rpm/ Tachometer/ Stroboscope/Pulse Engine Tachometer[#] (Non-Contact Type)	100 rpm to 1000 rpm >1000 rpm to 10000 rpm >10000 rpm to 80000 rpm	2.1 % 0.03 % 0.03 %	Using Digital Tachometer & RPM Source As Per IS 12508
IV.	**ACCOUSTIC**			
1.	Sound Level Meter[$]	94 dB	0.45 dB	Using Sound Level Meter Calibrator At Single Point

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
V.	**MASS**			
1.	Weights$ (Calibration Of Weights Class E_2 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	0.0023 mg 0.0023 mg 0.0023 mg 0.0025 mg 0.0025 mg 0.0025 mg 0.0025 mg 0.0025 mg 0.0025 mg 0.0035 mg 0.0045 mg 0.0056 mg 0.0068 mg 0.0100 mg 0.0170 mg 0.0250 mg 0.0450 mg	Using E_1 Class Standard Weights And Micro Balance Of Readability:0.001mg Up To 20g And Semi Micro Balance Of Readability: 0.01mg Up To 200g As Per OIML R-111
	(Calibration Of Weights Class F_1 And Coarser)	500 g 1 kg 2 kg 5 kg 10 kg	0.85 mg 0.95 mg 9.0 mg 9.3 mg 11.0 mg	Using E_1 Class Standard Weights And Mass Comparator Readability:1mg Up To 1 Kg And 10 mg Up To 10 Kg As Per OIML R-111
	(Calibration Of Weights Class M_1 And Coarser)	20 kg 50 kg 100 kg	0.82 g 0.88 g 9.10 g	Using F_1 Class Standard Weights And Mass Comparators Readability: 1g Up To 50 Kg And 10g Up to 100 Kg As Per OIML R-111

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
2.	Electronic Weighing Micro/ Semi micro/ Precision/ Ordinary Balance#			
	Readeability:0.001mg	0 to 500 mg	0.003 mg	Using E_1 Class Standard Weights Calibration Of Electronic Weighing Balance Of Class I And II And Coarser As Per OIML R 76-1
	Readeability:0.001mg	>500 mg to 20 g	0.010 mg	
	Readeability:0.01mg	>20 g to 250 g	0.05 mg	
	Readeability:1 mg	>250 g to 1000 g	0.8 mg	Using E_1 Class Standard Weights Calibration Of Electronic Weighing Balance Of Class II And III And Coarser As Per OIML R 76-1
	Readeability:10 mg	>1 kg to 10 kg	8.0 mg	
	Readeability:1g	>10 kg to 50 kg	1.0 g	Using F_1 & M_1Class Standard Weights Calibration Of Electronic Weighing Balance Of Class II And III And Coarser As Per OIML R 76-1
	Readeability:10g	0 to 200 kg	10 g	
3.	Spring Balance$ Readeability: 0.1 g Readeability: 1 g Readeability: 10 g	0 to 1 kg 0 to10 kg 0 to 50 kg	0.1 g 1 g 10 g	F2 & M1 Class Standard Weights By Comparison Method
VI.	**VOLUME**			
1.	Micro-Pipettes$	1 µl to 10 µl >10 µl to 100 µl >100 µl to 1000 µl	0.016 µl 0.06 µl 0.22 µl	Using Micro And Semi Micro Weighing Balance With Resolutions

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		>1000 µl to 5000 µl >5000 µl to 10000 µl	1.2 µl 3.5 µl	(I)0.001 mg Up to 20g (II) 0.01mg Up to 250g Digital Micro & Semi Micro Balance Distilled Water Of Known Density Based On ISO-8655-6
2.	Glassware/ Laboratory Ware$			Using Semi Micro, Precision Weighing Balances And Distilled Water Of Known Density Based On ISO 4787 And ASTM E542
	Burette	1 ml to 100 ml	0.012 ml	
	Pipettes	0.1 ml to 1.0 ml >1 ml to 25 ml >25 ml to 200 ml	0.0006 ml 0.002 ml 0.1 ml	
	Measuring Cylinder/ Volumetric Flasks/ Beakers/ Jars/ Other Laboratory Wares	1 ml to 10 ml >10 ml to 100 ml >100 ml to 1000 ml >1000 ml to 5000 ml	0.001 ml 0.012 ml 0.1 ml 0.5 ml	
3.	Standard Capacity Measure#	1 L to 5 L >5 L to 15 L >15 L to 40 L	10 ml 50 ml 70 ml	Using Calibrated Ex & In Glass Wares/Volumetric Measures By Volumetric Method As Per Euramet Guidelines Cg-21
VII.	**PRESSURE INDICATING DEVICES**			
1.	**Hydraulic Pressure** Digital/Analogue Pressure Gauges, Pressure Transducer/ Transmitter With/Without Indicator, Pressure Comparator, Load Gauge$	3.5 bar to 50 bar 51 bar to 1020 bar	0.03 % rdg 0.03 % rdg	Using Hydraulic Dead Weight Tester Based On DKD-R6-1

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
2.	**Hydraulic Pressure** Digital/Analogue Pressure Gauges, Pressure Transducer/ Transmitter With/Without Indicator, Pressure Comparator, Oxygen Pressure Gauge, Load Gauge#	0 to 700 bar	1.0 bar	Using Digital Pressure Gauge And Hydraulic Comparator Based On DKD-R6-1
3.	**Pneumatic Pressure** Digital/Analogue Pressure Gauges, Pressure Transducer/ Transmitter With/Without Indicator, Pressure Comparator, Manometer, Magnehelic Gauge, Differential Pressure Gauge, B.P Apparatus#	0 to 500 mmWc 0 to 350 mbar	0.7 mmWc 1.3 mbar	Using Digital Low Pressure Gauge/ Digital Manometer And Low Pressure/Vacuum Comparator By Comparison Method Based On DKD-R6-1
4.	**Pneumatic Pressure** Digital/Analogue Pressure Gauges, Pressure Transducer/ Transmitter With/Without Indicator, Pressure Comparator, Oxygen Pressure Gauge, Manometer, Pressure Switch #	0 to 4 bar 0 to 16 bar	0.005 bar 0.05 bar	Using Digital Pressure Gauge And Pneumatic Pressure/Vacuum Comparator By Comparison Method Based On DKD-R6-1

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
5.	**Pneumatic Pressure** Digital/ Analogue Vacuum Gauge, Vacuum Transducer/ Transmitter With And Without Indicator #	0 to (-) 0.95 bar	0.002 bar	Using Digital Vacuum Gauge And Pneumatic Vacuum Comparator By Comparison Method Based On DKD-R6-2
6.	**Pneumatic Pressure** Absolute Pressure Indicator $	700 mbar to 1050 mbar	0.6% rdg	Using Absolute Pressure Meter & Low Pressure/ Vacuum Comparator
VIII.	**TORQUE GENERATING DEVICES**			
1.	Torque Tools $ Type I & II	0.5 Nm to 5 Nm >5 Nm to 200 Nm >200 Nm to 2000 Nm	2.9% rdg 1.7% rdg 1.5% rdg	Using Torque Transducers With Indicator As Per IS/ISO:6789
IX.	**MOBILE FORCE MEASURING SYSTEM**			
1.	Pull Push Gauge $	0 to 500 N	0.2% rdg	Using Newton (N) Weights And Fixture For Push Pull Calibration System And VDI/ VDE 2624

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		THERMAL CALIBRATION		
I.	**TEMPERATURE**			
1.	Liquid-in Glass Thermometer/Dial Temp. Gauge#	(-)30 ˚C to 250 ˚C	0.35 ˚C	Using SPRT, Precision Multimeter/ Dual Channel Temperature Indicator, Low Temperature Alcohol Bath And Silicon Oil Bath By Comparison Method
2.	RTD/Thermocouple (with & without indicator) Temperature Indicators/ Data Logger, Recorder, Temperature Transmitter with Sensors#	(-)95 ˚C to 0 ˚C 0 ˚C to 140 ˚C 140 ˚C to 250 ˚C 250 ˚C to 650 ˚C	0.12 ˚C 0.07 ˚C 0.1 ˚C 0.42 ˚C	Using SPRT, Precision Digital Multimeter, Low Temperature Dry Block Calibrator, Silicon Oil Bath And Dry Block Calibrators By Comparison Method
3.	Thermocouple (with & without Indicator) Temperature Indicators/ Data Logger, Recorder, Temperature Transmitter with Sensors#	300 ˚C to 600 ˚C 600 ˚C to 1000 ˚C 1000 ˚C to 1200 ˚C	1.35 ˚C 1.91 ˚C 2.02 ˚C	Using S-Type Thermocouple, Precision Digital Multimeter And Dry Block Calibrators By Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
4.	Cordless Data Loggers/Thermo Hygrometers / Dry & Wet Thermometers & Max/Min Thermometers, Temperature and RH indicator with Sensors[$]	0 ˚C to 50 ˚C	0.9 ˚C	Using SPRT, Precision Digital Multimeter/Dual Channel Temperature Indicator And RH & Temperature Controlled Chamber By Comparison Method
5.	Temperature Indicator of Cold Chambers, Ovens, autoclaves, incubators, furnaces, baths, COD Digester, Dry Block, Freezer, Bomb calorimeter, refrigerator, Tray Dryer, DHS [$]	(-)95 ˚C to 0 ˚C 0 ˚C to 140 ˚C 140 ˚C to 250 ˚C 250 ˚C to 650 ˚C	0.1 ˚C 0.03 ˚C 0.10 ˚C 0.30 ˚C	Using SPRT And Precision Digital Multimeter/ Precision Temperature Scanner (Single Position Calibration)
6.	Temperature Indicator of Ovens, Dry Blocks, Furnaces, Baths, DHS, Tray Dryer [#]	300 ˚C to 600 ˚C 600 ˚C to 1000 ˚C 1000 ˚C to 1200 ˚C	1.30 ˚C 1.65 ˚C 1.95 ˚C	Using S-Type Thermocouple and Precision Digital Multimeter (Single Position Calibration)
7.	Temperature Indicator of cold chamber, Oven, Incubators, refrigerator, bomb calorimeter, furnaces, DHS, Autoclave, COD Digester, Nitrogen Bath [♣]	(-)196 ˚C	0.14 ˚C	

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
8.	Temperature Indicator of cold chamber, Oven, Incubators, refrigerator, bomb calorimeter, furnaces, DHS, Autoclave, COD Digester, Nitrogen Bath #	(-) 80 ˚C to 0 ˚C 0 ˚C to 140 ˚C 140 ˚C to 250 ˚C 250 ˚C to 650 ˚C	0.12 ˚C 0.03 ˚C 0.10 ˚C 0.30˚C	Using SPRT and Precision Temperature scanner/Precision Digital Multimeter (Single Position Calibration)
9.	Freezer, Ovens, Environmental Chambers, Liquid Bath, COD Digester, Refrigerators, Cold Chambers, DHS, Nitrogen Bath, Furnaces by Spatial Thermal Mapping♣	(-)80 ˚C to 300 ˚C 300 ˚C to 1200 ˚C	0.8 ˚C 4.3 ˚C	Using Temperature scanner with RTD & Data Logger with N-type Thermocouples (Minimum 9 Sensors) (Multi Position Calibration)
II.	**SPECIFIC HEAT & HUMIDITY**			
1.	Digital/Analog Thermo-Hygrometers, RH Indicators/Data Loggers/ RH Transmitters with/ without Indicator, Moisture Meter$	15 % RH to 95 % RH at~25 ˚C	2.14 %RH	Using Digital RH Indicator with probe, RH & Temperature Controlled chamber
2.	RH Indicator of Environment Chambers/ RH Chambers/ RH Generators♣	15 %RH to 95 %RH at~25 ˚C	1.5 %RH	Using Digital RH Indicator with Probe (Single Position Calibration)

Laboratory	**Indiana Test, Calibration and Certification Services (A Division of Indiana Ferro Alloys), D-151, Industrial Area Phase-VII, Mohali, Punjab**
Accreditation Standard	**ISO/IEC 17025: 2005**
Certificate Number	**CC-2594** **Page 26 of 26**
Validity	**05.03.2018 to 04.03.2020** **Last Amended on -**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
3.	Environmental Chambers, Stability Chambers, RH cabinets, RH Generators by Spatial Mapping♣	15 % RH to 95 % RH at~25 ˚C	3.0 % RH	Using Cordless Data Loggers (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.
Φ Laboratory 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.

Sangeeta Kunwar
Convenor

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