

Laboratory **Oorja Technical Services Pvt. Ltd., 501-503, 520 Block MS1-A,
314-318 Block MS1-B, New Siyaganj, Indore, Madhya Pradesh**

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

Certificate Number **CC-2547** Page **1 of 27**

Validity **20.10.2018 to 19.10.2020** Last Amended on **-**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO-TECHNICAL CALIBRATION</u>				
1.	SOURCE			
1.	Voltage (DC) [#]	1 mV to 10 mV 10 mV to 100 mV 100 mV to 1000 V	0.38 % to 0.042 % 0.042 % to 0.010 % 0.010 % to 0.007 %	Using Fluke Multi Product Calibrator 5502E By Direct Method
2.	Current (DC) [#]	1 μ A to 10 μ A 10 μ A to 100 μ A 100 μ A to 100 mA 100 mA to 1 A 1 A to 20 A	2.33 % to 0.25 % 0.246 % to 0.041 % 0.041 % to 0.015 % 0.015 % to 0.054 % 0.053 % to 0.13 %	Using Fluke Multi Product Calibrator 5502E By Direct Method
3.	Voltage (AC) [#] (Sine Wave)	50 Hz to 10 kHz 1 mV to 3 mV 3 mV to 100 mV 100 mV to 1 V 1 V to 1000 V	2.62% to 0.922 % 0.922 % to 0.060 % 0.060 % to 0.047 % 0.047 % to 0.063 %	Using Fluke Multi Product Calibrator 5502E By Direct Method
4.	Current (AC) (Sine Wave) [#]	50 Hz to 1 kHz 30 μ A to 100 μ A 100 μ A to 1 mA 1 mA to 100 mA 100 mA to 1 A 1 A to 20 A 0.5 A to 120 A	0.55 % to 0.27 % 0.27 % to 0.143 % 0.143 % to 0.087 % 0.087 % to 0.12 % 0.12 % to 0.20 % 0.061 %	Using Fluke Multi Product Calibrator 5502E and Power Calibrator & Tester By Direct Method
5.	DC Resistance [#]	10 $\mu\Omega$ 50 $\mu\Omega$ 100 $\mu\Omega$ 1 m Ω 10 m Ω 100 m Ω 1 Ω	6.12 % 1.23 % 1.01 % 0.68 % 0.22 % 0.20 % 0.065 %	Using 4 Wire Low Resistance Standard By Direct Method

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		1 Ω to 100 Ω 100 Ω to 10k Ω 10k Ω to 1 M Ω 1M Ω to 10M Ω 10M Ω to 100M Ω 100M Ω to 1000M Ω	0.096 % to 0.016 % 0.010 % to 0.010 % 0.010 % to 0.018 % 0.018 % to 0.069 % 0.069 % to 0.60 % 0.60 % to 1.742 %	Using Fluke Multi Product Calibrator 5502E By Direct Method
6.	Insulation Resistance [#]	Up to 5 kV 100 k Ω to 1000 M Ω 10 G Ω to 1 T Ω	0.10 % to 0.732 % 0.931 % to 7.65 %	Using Decade Megohmbox Standard By Direct Method
7.	Frequency/Period [#]	1 Hz to 50Hz @ (1 V) 50Hz to 2MHz @ (1 V)	0.59 % to 0.019 % 0.019 % to 0.009 %	Using Fluke Multi Product Calibrator 5502E By Direct Method
8.	Temperature Calibration by Simulation of Thermocouple (K Type) [#]	(-) 200 $^{\circ}$ C to 1372 $^{\circ}$ C	0.231 $^{\circ}$ C	Using Fluke Multi Product Calibrator 5502E By Simulation Method
	Temperature Calibration by Simulation of Thermocouple (E Type) [#]	(-) 250 $^{\circ}$ C to 1000 $^{\circ}$ C	0.311 $^{\circ}$ C	
	Temperature Calibration by Simulation of Thermocouple (J Type) [#]	(-) 210 $^{\circ}$ C to 1200 $^{\circ}$ C	0.153 $^{\circ}$ C	
	Temperature Calibration by Simulation of Thermocouple (T Type) [#]	(-) 250 $^{\circ}$ C to 400 $^{\circ}$ C	0.50 $^{\circ}$ C	

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	Temperature Calibration by Simulation of Thermocouple (N Type)#	(-) 200 °C to 1300 °C	0.32 °C	
	Temperature Calibration by Simulation of Thermocouple (R Type)#	145 °C to 1767 °C	0.70 °C	
	Temperature Calibration by Simulation of Thermocouple (S Type)#	145 °C to 1767 °C	0.70°C	
	Temperature Calibration by Simulation of Thermocouple (B Type) #	600 °C to 1800 °C	0.6°C	
	Temperature Calibration by Simulation of Thermocouple (L Type)#	(-) 200 °C to 900 °C	0.10°C	
	Temperature Calibration by Simulation of Thermocouple (U Type)#	(-) 200 °C to 600 °C	0.15°C	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	Temperature Calibration by Simulation of RTD Type [#]	(-) 200 °C to 850 °C	0.242 °C	Using Fluke Multi Product Calibrator 5502E By Simulation Method
9.	Current (AC/DC) Source By 50 Turn Current Coil Transformer (Sine Wave) [#]	20 A to 1000 A (DC)	0.66 % to 0.65 %	Using Fluke Multi Product Calibrator 5502E with Fluke Current Coil By Direct Method
		50 Hz 20 A to 1000 A(AC)	0.72 % to 0.64 %	
10.	AC Inductance [#]	1 kHz 100 μ H to 1000 mH	1.20 % to 0.19 %	Using Decade Inductance Box By Direct Method
11.	Capacitance [#]	1 nF to 100 mF	1.168 % to 1.33 %	Using Decade Capacitance Box / Multi-Product Calibrator By Direct Method
12.	Power /Energy [#] 1 \emptyset Active Cos \emptyset \pm 0.5 to 1	40 Hz to 60 Hz 40 V to 300 V 120 A to 50 mA 36 kW to 1 W 50 mA to 20 mA 15 W to 0.4W	0.065 % to 0.13 %	Using Calmet C300B Power Calibrator and Tester By Direct Method
	Power /Energy [#] 1 \emptyset Re-Active Sin \emptyset \pm 0.5 to 1	40 Hz to 60 Hz 40 V to 300 V 120 A to 50 mA 36 kVar to 1Var 50 mA to 20 mA 15 Var to 0.4Var	0.065 % to 0.13 %	
	Power /Energy [#] 3 \emptyset Active Cos \emptyset \pm 0.5 to 1	40 Hz to 60 Hz 40 V to 300 V 120 A to 50 mA	0.065% to 0.075%	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		108 kW to 3 W 50 mA to 20 mA 45 W to 1.2W		
	Power /Energy# 3 Ø Re-Active Sin Ø ± 0.5 to 1	40 Hz to 60 Hz 40 V to 300 V 120 A to 50 mA 108 kVar to 3 Var 50 mA to 20 mA 45 Var to 1.2Var	0.065 % to 0.075 %	
II.	MEASURE			
1.	Voltage (DC) [§]	0.1 mV to 1mV 1mV to 100mV 100mV to 10V 10V to 1000V	0.33% to 0.031% 0.031% to 0.001% 0.001% to 0.0005% 0.0005% to 0.0007%	Using Fluke 8508A 8½ Digit Reference Multi Meter By Comparison/ Direct Method
	Voltage (DC)*	1 mV to 10 mV 10 mV to 10 V 10 V to 1000 V	0.07 % to 0.007 % 0.007 % to 0.058 %	Using Fluke 8846A 6½ Digital Precision MultiMeter By Comparison/Direct Method
2.	High Voltage (DC) [§]	1 kV to 5 kV	1.633%	Using Fluke 80 K-15 High Voltage Probe and Multimeter By Direct/ Comparison Method
	High Voltage (DC)*	1 kV to 5 kV	1.633 %	Using Fluke 80 K-15 High Voltage Probe and Multimeter By Direct/ Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
3.	Current (DC) [§]	1 μ A to 100 mA 100 mA to 1 A 1 A to 20 A	0.11 % to 0.005 % 0.005 % to 0.022 % 0.022 % to 0.05 %	Using Fluke 8508A 8½ Digit Reference Multi Meter By Comparison/Direct Method
	Current (DC) [*]	1 μ A to 10 μ A 10 μ A to 1 A 1 A to 10 A	6.518 % to 0.677% 0.677 % to 0.100% 0.100% to 0.191%	Using Fluke 8846A 6½ Digital Precision MultiMeter By Comparison/Direct Method
4.	Voltage (AC) [§]	50 Hz to 10 kHz 1 mV to 100 mV 100 mV to 1000 V	1.03 % to 0.018 % 0.018 % to 0.019 %	Using Fluke 8508A 8½ Digit Reference Multi Meter By Comparison/Direct Method
	Voltage (AC) [*]	50 Hz to 10 kHz 1 mV to 100 mV 100 mV to 100 V 100 V to 1000 V	7.503 % to 0.131 % 0.131 % to 0.105 % 0.105 % to 0.117 %	Using Fluke 8846A 6½ Digital Precision MultiMeter By Comparison/ Direct Method
5.	High Voltage (AC) [§]	50 Hz 1 kV to 10 kV	1.633 %	Using Fluke 80 K-15 High Voltage Probe and Multimeter By Comparison/Direct Method
	High Voltage (AC) [*]	1 kV to 10 kV	1.633 %	Using Fluke 80 K-15 High Voltage Probe and Multimeter By Direct/ Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
6.	Current (AC) [§]	50 Hz to 1 kHz 30 µA to 100 mA 100 mA to 1 A 1 A to 20 A	0.11% to 0.053% 0.053% to 0.094% 0.094% to 0.12%	Using Fluke 8508A 8½ Digit Reference Multimeter By Comparison/ Direct Method
		40 Hz to 70 Hz 0.5A to 100 A 100A to 120 A	0.060% 0.062%	Using Calmet C300B By Comparison/ Direct Method
	Current (AC) [*]	50 Hz to 10 kHz 33 µA to 100 µA 100 µA to 1 mA 1 mA to 10 mA 10 mA to 1 A 1 A to 10 A	0.431 % to 0.252 % 0.252 % to 0.600 % 0.600 % to 0.251 % 0.251 % to 0.177 % 0.177 % to 0.252 %	Using Fluke 8846A 6½ Digital Precision MultiMeter By Comparison/ Direct Method
7.	Resistance [§]	10 µΩ to 50µΩ 50 µΩ to 1mΩ 1 mΩ to 100mΩ 100 mΩ to 1Ω	0.06% to 0.017% 0.017% to 0.056% 0.054% to 0.011% 0.011% to 0.021%	Using Fluke 8508A 8½ Digit Reference Multimeter and Multi Product Calibrator By V/I Method
		1Ω to 100 kΩ 100kΩ to 10MΩ 10MΩ to 100MΩ 100MΩ to 1000MΩ	0.0059% to 0.0010% 0.0010% to 0.0025% 0.0025% to 0.017% 0.017% to 0.20%	Using Fluke 8508A 8½ Digit Reference Multimeter By Comparison /Direct Method
8.	Frequency/ Period [§]	1 Hz to 50 Hz 50 Hz to 100 kHz 100 kHz to 2 MHz	0.00085 % to 0.000017 % 0.000017 % to 0.0000081 % 0.0000081% to 0.0005%	Using Timer/ Counter / Analyzer By Direct / Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	Frequency/ Period*	1 Hz to 50 Hz 50 Hz to 100kHz 100 kHz to 2MHz	0.00081% to 0.00091% 0.00091% to 0.00082% 0.00082% to 0.0062%	Using Timer/ Counter / Analyzer By Direct / Comparison Method SM5052
9.	Time Interval [§]	1Sec. to 9900Sec. 9900 Sec. to 54000Sec. 54000Sec. to 86340Sec.	0.35Sec to 3.08 Sec 1.41Sec to 10.09 Sec 10.09Sec to 22.10 Sec	Using Time Interval Meter By Comparison Method
	Time interval*	1Sec. to 9900Sec. 9900 Sec. to 54000Sec. 54000Sec. to 86340Sec.	0.07Sec to 1.41 Sec 1.41Sec to 10.09 Sec 10.09Sec to 22.10 Sec	Using Time Interval By Comparison Method
10.	Temperature Calibration by Simulation of Thermocouple (K Type) [§]	(-) 200 °C to 1372 °C	0.035 °C	Using Fluke 8508A 8½ Digit Reference Multi Meter By simulation Method
	Temperature Calibration by Simulation of Thermocouple (E Type) [§]	(-) 250 °C to 1000 °C	0.059 °C	
	Temperature Calibration by Simulation of Thermocouple (J Type) [§]	(-) 210 °C to 1200 °C	0.028 °C	
	Temperature Calibration by Simulation of Thermocouple (T Type) [§]	(-) 250 °C to 400 °C	0.088 °C	

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	Temperature Calibration by Simulation of Thermocouple (N Type) [§]	(-) 200 °C to 1300 °C	0.053 °C	
	Temperature Calibration by Simulation of Thermocouple (R Type) [§]	145 °C to 1767 °C	0.106 °C	
	Temperature Calibration by Simulation of Thermocouple (S Type) [§]	147 °C to 1767 °C	0.106 °C	
	Temperature Calibration by Simulation of Thermocouple (B Type) [§]	600 °C to 1820 °C	0.088 °C	
	Temperature Calibration by Simulation of Thermocouple (L Type) [§]	(-) 200 °C to 900 °C	0.020 °C	
	Temperature Calibration by Simulation of Thermocouple (U Type) [§]	(-) 200 °C to 600 °C	0.030 °C	
	Temperature Calibration by Simulation of RTD Type [§]	(-) 200 °C to 850 °C	0.0004°C to 0.017 °C	Using Fluke 8508A 8½ Digit Reference Multimeter By Simulation Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
11.	Power /Energy ^s 1 \emptyset Active Cos $\emptyset \pm 0.5$ to 1	40 Hz to 60 Hz 40 V to 300 V 120 A to 50 mA 36 kW to 1 W 50 mA to 20 mA 15 W to 0.4W	0.065 % to 0.13 %	Using Calmet C300B By Direct Method
	Power /Energy ^s 1 \emptyset Re-Active Sin $\emptyset \pm 0.5$ to 1	40 Hz to 60 Hz 40 V to 300 V 120 A to 50 mA 36 kVar to 1Var 50 mA to 20 mA 15 Var to 0.4Var	0.065% to 0.13%	
	Power /Energy ^s 3 \emptyset Active Cos $\emptyset \pm 0.5$ to 1	40 Hz to 60 Hz 40 V to 300 V 120 A to 50 mA 108 kW to 3 W 50 mA to 20 mA 45 W to 1.2W	0.065% to 0.075%	
	Power /Energy ^s 3 \emptyset Re-Active Sin $\emptyset \pm 0.5$ to 1	40 Hz to 60 Hz 40 V to 300 V 120 A to 50 mA 108 kVar to 3 Var 50 mA to 20 mA 45 Var to 1.2Var	0.065% to 0.075%	
12.	Power /Energy ^s 1 \emptyset Active/Reactive Cos/Sin $\emptyset \pm 0.5$ to 1	50 Hz 63.5 V to 276 V 120 A to 50 mA 33.12 kW/kVar to 1.58 W/Var	0.070% to 0.071%	Using Calmet TE30 By Comparison Method
	Power /Energy ^s 3 \emptyset Active/Reactive Cos/Sin $\emptyset \pm 0.5$ to 1	50 Hz 63.5 V to 276 V 120 A to 50 mA 99.36 kW/kVar to 4.74 W/Var	0.070% to 0.071%	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
13.	Power /Energy* 1 \emptyset Active/Reactive Cos $\emptyset \pm 0.5$ to 1/ Sin $\emptyset \pm 0.5$ to 1	50 Hz 63.5 V to 276 V 120 A to 50 mA 33.12 kW/kVar to 1.58 W/Var	0.075%	Using Calmet TE30
	Power /Energy* 3 \emptyset Active/Reactive Cos $\emptyset \pm 0.5$ to 1/ Sin $\emptyset \pm 0.5$ to 1	50 Hz 63.5 V to 276 V 120 A to 50 mA 99.36 kW/kVar to 4.74 W/Var	0.075%	
14.	DC High Resistance ^s	0.1 M Ω to 1G Ω 10 G Ω to 1T Ω	0.1 % to 0.7% 0.73% to 5%	Using DMM & High Voltage Probe (Upto 5 kV) By V/I method
15.	Resistance*	50 $\mu\Omega$ to 100 $\mu\Omega$ 100 $\mu\Omega$ to 10m Ω 10 m Ω to 100m Ω 100 m Ω to 1 Ω	0.851% to 0.415% 0.415% to 0.046% 0.046% to 0.014% 0.014% to 0.023%	Using Fluke8846A 6½ Digital Precision Multi Meter and Multi Product Calibrator By V/I Method
		1 Ω to 10 Ω 10 Ω to 1M Ω 1M Ω to 10M Ω 10M Ω to 100M Ω 100M Ω to 1000M Ω	0.363% to 0.048% 0.048% to 0.014% 0.014% to 0.048% 0.048% to 0.938% 0.938% to 2.327%	Using Fluke 8846A 6½ Digital Precision Multimeter By Comparison/ Direct Method

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<u>MECHANICAL CALIBRATION</u>				
I.	WEIGHTS			
1.	Mass ^s DUC : Analytical Weights of class E1&Coarser from 1 mg to 200 g	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	0.001 mg 0.001 mg 0.001 mg 0.001 mg 0.001 mg 0.001 mg 0.001 mg 0.001 mg 0.002 mg 0.003 mg 0.004 mg 0.005 mg 0.006 mg 0.007 mg 0.010 mg 0.014 mg 0.024 mg	Using Standard Reference Weights/ Masses in E1 Class and Micro Balance Semi Micro Weighing Balance By Substitution Method & ABBA Weighing Cycles as per OIML R-111-1: 2004
2.	Mass ^s DUC: Individual Weights of class F1 & Coarser	500 g 1 kg	0.82 mg 0.84 mg	Using Standard Reference Weights/ Masses in E1 Class and Precision Weighing Balance of Readability=1 mg By Substitution Method & ABBA Weighing Cycles as per OIML R-111-1: 2004

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3.	Mass ^s DUC: Individual Weights of class F2 & Coarser	2 kg 5 kg	0.008 g 0.01 g	Using Standard Reference Weights/ Masses in F1 Class, and Precision Weighing of Readability=10 mg By substitution method & ABBA Weighing Cycles as per OIML R-111-1: 2004
4.	Mass ^s DUC: Individual Weights of class M1 & Coarser from 10 kg to 20 kg	10 kg 20 kg	0.09 g 0.1 g	Using Standard Reference Weights/ Masses in F1 Class, and Precision Weighing Balance of Readability= 0.1 g By substitution method & ABBA Weighing Cycles as per OIML R-111-1: 2004
5.	Mass ^s DUC: Individual Weights of class M3	50 kg	4.1 g	Using Standard Reference Weights/ Masses in F1 & M1 Class, and Precision Weighing Balance of Readability= 5g By substitution method & ABBA Weighing Cycles as per OIML R-111-1: 2004

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II.	WEIGHING SCALE & BALANCE			
1.	Mass# DUC : Weighing Balances of Accuracy Class I and Coarser	1 to 500 mg >500 mg to 20 g >20 g to 200 g	0.003 mg 0.007 mg 0.016 mg	Using E1 Class Standard Reference Weights Based on OIML R 76-I
2.	Mass# DUC : Weighing Balances of Accuracy Class I and Coarser	>200 g to 1 kg	2.3 mg	Using E1 & F1 Class Standard Reference Weights Based on OIML R 76-I
	Mass# DUC : Weighing Balances of Accuracy Class II	Up to 6 kg	13 mg	
3.	Mass# DUC : Weighing Balances of Accuracy Class II & Coarser	Up to 20 kg	95 mg	Using F1 Class Standard Reference Weights Based on OIML R 76-I
4.	Mass# DUC : Weighing Balances of Accuracy Class III & Coarser	Up to 75 kg	3 g	Using F1 & M1 Class Standard Reference Weights Based on OIML R 76-I
5.	Mass# DUC : Weighing Balances of Accuracy Class IV & Coarser	Up to 200 kg	8 g	Based on OIML R 76-I

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III.	VOLUME			
1.	Volume [§] DUC: Micro pipettes	10 μ l to 100 μ l >100 μ l to 1000 μ l >1000 μ l to 10000 μ l	0.4 μ l 2 μ l 50 μ l	Using Standard Micro and Semi Micro Weighing Balance & Distilled Water By Gravimetric Method as per ISO 8655-6 at Temp. 27°C
2.	Volume DUC : Measuring Cylinders, Burettes, Flasks, Beakers Glass Wares, Other Volumetric Vessels [§]	1 ml to 50 ml > 50 ml to 1000 ml >1000 ml to 2000 ml	3 μ l 0.3 ml 0.5 ml	Using Standard Micro and Semi Micro Weighing Balance & Distilled Water By Gravimetric Method as per ISO 4787: 2010 at Temp. 27°C
IV.	DENSITY & VISCOSITY			
1.	Density / Specific Gravity Hydrometer [§]	0.600 to 1.000 (Sp. Gr.) 1.000 to 2.000 (Sp. Gr.)	0.16% 0.15%	Using Standard Hydrometers and Liquids of Appropriate Density By Comparison Method as per IS-3104:1982
2.	Density / Specific Gravity Hydrometer [§]	0.6 to 2 (Sp. Gr.)	0.18 %	Using Precision Standard Reference Weighing Balance & Standard Weight By Hydrostatic Weighing- (Cuckow's Method)

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V.	HARDNESS TESTING MACHINES			
1.	Rubber Hardness Tester (Shore A & D) [§]	0 to 100 Shore Units	0.32 Shore A & D	Using Digital Weighing Balance as per ASTM-D-2240-03
2.	Rockwell Hardness Testing Machine*	HRA HRBW HRC	1.25 % 1.25 % 2.28 %	Using Reference Hardness Blocks As per IS 1586-2-2012 Indirect Method
3.	Brinell Hardness Testing Machine*	2.5/187.5	1.26 %	Using Reference Hardness Blocks As per IS 1500-2-2013 Indirect Method
VI.	MOBILE FORCE MEASURING SYSTEM			
1.	Push Pull Gauge/ Mobile Force Measuring System) [§]	0 to 500 N	2.9 % rdg	Using Standard weights as per VDE/VDI 2624
VII.	TORQUE GENERATING DEVICES			
1.	Torque Tools (Type I) [§]	1 Nm to 100 Nm	5 %	Using torque transducer with digital display as per IS 6789:2003
2.	Torque Tools (Type II) [§]	1 Nm to 20 Nm 20 Nm to 540 Nm 540 Nm to 2000 Nm	0.9 % 1.0 % 1.2 %	Using torque transducer with digital display as per IS 6789:2003
VIII.	PRESSURE INDICATING DEVICES			
1.	Pneumatic Positive Pressure (Digital / Analogue Pressure Indicator	0.2 bar to 35 bar	0.012 % rdg	Using Pneumatic Pressure Dead Weight Tester As per DKD R-6-1

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	Instruments, Pressure Transmitters with Electrical Outputs) ^{\$}	(-) 30 mbar to (-) 1000 mbar	0.012 %rdg	Using Pneumatic Pressure/ Vacuum Dead Weight Tester As per DKD R-6-1
2.	Hydraulic Positive Pressure (Digital / Analogue Pressure Indicator Instruments, Pressure Transmitters with Electrical Outputs) ^{\$}	1 bar to 20 bar 20 bar to 700 bar 700 bar to 1200 bar	0.012 %rdg 0.012 %rdg 0.050 %rdg	Using Hydraulic Pressure Dead Weight Tester As per DKD R-6-1
3.	Pressure: Pneumatic Positive Pressure (Digital / Analogue Pressure Indicator Instruments, Pressure Transmitters with Electrical Outputs) [#]	0 to 2 bar 2 bar to 20 bar 20 bar to 35 bar	0.0002 bar 0.002 bar 0.005 bar	Using Standard Pressure Transmitter with Indicator by Comparison Method As per DKD R-6-1
4.	Pneumatic Negative Pressure (Digital / Analogue Pressure Indicator Instruments, Pressure Transmitters with Electrical Outputs) [#]	(-) 1 bar to 0 bar	0.0001 bar	Using Standard Pressure Transmitter with Indicator by Comparison Method As per DKD R-6-1

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5.	Hydraulic Positive Pressure (Digital / Analogue Pressure Indicator Instruments, Pressure Transmitters with Electrical Outputs)#	0 to 350 bar 0 to 700 bar	0.04 bar 0.08 bar	Using Standard Digital Pressure Gauge by Comparison Method As per DKD R-6-1
6.	Low Pressure (Pneumatic) (Digital / Analogue Low Pressure Indicator Instruments Low Pressure Transmitter with Electrical Output)#	(-) 400 mbar to 0 mbar 0 to 400 mbar	0.24 mbar 0.08 mbar	Using Standard Low Pressure Transmitter with Indicator by Comparison Method As per DKD R-6-1
7.	Absolute Pressure (Manometer, Dial Gauge, Digital Indicator, Barometer, Transmitter & Recorder)#	0.7 bar (abs) to 20 bar (abs)	0.0024 bar (abs)	Using Standard Absolute Pressure Transmitter with Indicator by Comparison Method As per (DKD-R-6-1)
8.	Differential Pressure (Digital / Analogue Differential Pressure Indicator Instruments)#	(-) 40 kPa to +40 kPa	0.005 kPa	Using Differential Pressure Transmitter with Indicator by Comparison Method as per (DKD-R-6-1)

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IX.	DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)			
1.	Vernier Caliper [§] (Dial/Digital/Analog) L.C.: 0.01 mm L.C.: 0.02 mm	0 to 150 mm 0 to 600 mm 0 to 1000 mm	9.1 μ m 13.1 μ m 16 μ m	Using Slip Gauge Set, Caliper Checker, Long Slip Gauge by Comparison Method (IS 3651)
2.	Depth Vernier [§] L.C.: 0.02 mm	0 to 300 mm	14.1 μ m	Using Gauge Block Set, Surface Plate by Comparison Method (IS 4213)
3.	External Micrometer [§] L.C.: 0.001 mm	0 to 25 mm 0 to 150 mm 150 mm to 300 mm	2.3 μ m 3.8 μ m 4.1 μ m	Using Gauge Block Set, Long Slip Gauge Set by Comparison Method (IS 2967)
4.	Inside Micrometer [§] L.C.: 0.01 mm	50 mm to 300 mm	8.8 μ m	Using Slip Gauge Accessories, Long Slip Gauges by Comparison Method (IS 2966)
5.	Plunger Dial [§] L.C.: 0.001 mm	0 to 25 mm	2 μ m	Using Dial Calibration Tester by Comparison Method (IS 2092)
6.	Lever Dial [§] L.C.: 0.01 mm L.C.: 0.001 mm L.C.: 0.002 mm	0 to 0.8 mm 0 to 0.2 mm 0 to 0.14 mm	3.7 μ m 1.8 μ m 1.8 μ m	Using Dial Calibration Tester by Comparison Method (IS 11498)
7.	Bore Gauge [§] (Transmission Error) L.C.: 0.01 mm	0 to 1 mm	4 μ m	Using Dial Calibration Tester by Comparison Method

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8.	Dial Thickness Gauge [§] L.C.: 0.01 mm	0 to 25 mm	8.1 μ m	Using Gauge Block Set by Comparison Method
9.	Tape & Scale Calibrator [#] L.C.: 0.001 mm	0 to 1000 mm	6.3 μ m	Using Gauge Block Set & Long Slip Gauge Set By Comparison Method
10.	Measuring Tape [§] L.C.: 1 mm	0 to 30 mtr	$90\sqrt{L}$ μ m where is L is in mtr	Using Tape & Scale Calibrator by Comparison Method (IS 1269)
11.	Measuring Scale [§] L.C.: 1 mm	0 to 1000 mm	90.0 μ m	Using Tape & Scale Calibrator by Comparison Method (IS 1269)
12.	Feeler Gauge [§]	0.005 to 1 mm	4 μ m	Using Digital Micrometer by Comparison method (IS 3179)
13.	Plain Plug Gauge / Width Gauge / Height Block [§]	2 mm to 100 mm	2.5 μ m	Using Slip Gauge & Comparator Stand by Comparison method (IS 3455)
14.	Bevel Protector [§] L.C.: 5 min.	0°-90°-0°	3.0 Min	Using Angle Gauge Block Set & Surface Plate by Comparison method (IS 4239 & 5812)
15.	Combination Set / Angle Protractor [§] L.C.: 1°	0 to 180°	35 Min	Using Angle Gauge Block Set & Surface Plate by Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
16.	Micrometer Setting Standard [§]	25 mm to 300 mm	3 μ m	Using Slip Gauge & Comparator Stand by Comparison method (IS 2967)
17.	Height Gauge (Dial/Digital /Analog) [§] L.C.: 0.01 mm	0 to 600 mm	13.6 μ m	Using Long Slip Gauge / Surface Plate by Comparison method (IS 2921)
18.	Test Sieves [§]	0.032 mm to 4.0 mm	13.6 μ m	Using Profile Projector by Comparison Method (IS 460)
		4.0 mm to 125 mm	23 μ m	Using Digital Caliper by Comparison Method (IS 460)
19.	Radius Gauge Set [§]	Up to 15 mm	14.3 μ m	Using Profile Projector by Comparison method (IS 5273)
20.	Coating Thickness Gauge [§] L.C.: 0.0001 mm	Up to 2 mm	2.5 μ m	Using Thickness Foil by Comparison Method
21.	Ultrasonic Thickness Gauge [§] L.C.: 0.1 mm	Up to 200 mm	81 μ m	Using Gauge Block by Comparison Method
22.	Snap Gauge [§]	3 to 300 mm	6.9 μ m	Using Gauge Block Set , Long Slip Gauge Set by Comparison Method IS 3455

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
23.	Profile Projector# L.C.: 0.001 mm	Linear 0 to 200 mm	4.3 μ m	Using Linear Glass Scale by Comparison Method
		Magnification 10 x to 100 X	0.1%	Using Gauge Block , Digital Caliper by Comparison Method
		Angular 0 to 360°	1.9 Min	Using Angle Gauge by Comparison Method
X.	ACCELERATION & SPEED			
1.	Tachometer, Rotation Meter, RPM Indicators, Encoder and Taco Generator with and without Electrical Outputs (Contact Mode)#	100 rpm to 10000 rpm	4.3 rpm	Using Precision Digital Tachometer with Tachometer Calibration Zig By Comparison Method
2.	Tachometer, RPM Indicators (Non Contact/ Optical Mode)#	100 rpm to 5000 rpm 5000 rpm to 99999 rpm	2.5 rpm 20 rpm	Using Precision Digital Tachometer with Tachometer Calibration Zig By Comparison Method
XI.	ACOUSTICS			
1.	Sound Level Meter\$	94 & 114 dB	0.41 dB	Using Sound Level Calibrator by Comparison Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	Temperature Sensor DUC: Thermocouples, Resistance Temperature Detectors (RTD's)/ Thermistors), Temperature Transmitters with Electrical Output (Connected to Sensors)	(-) 196 °C	0.40 °C	Using Standard Fluke RTD and Standard Precision Fluke Digital Readout and LN2 By Comparison Method
		(-) 95 °C to 140 °C	0.01 °C	Using Standard Fluke RTD and Standard Precision Fluke Digital Readout and Liquid/ Dry Block Dry-Block Calibrator By Comparison
	Temperature Sensor With Digital / Analogue Readouts : DUC: Digital Thermometer, Temperature Gauges, Glass Thermometers, Multichannel Temperature Indicators/Recorders with Externally Connected Sensor	140 °C to 280 °C	0.02 °C	Using Standard Fluke RTD and Standard Precision Fluke Digital Readout and Calibration Bath By Comparison Method
		280 °C to 590 °C	0.32 °C	Using Standard Fluke RTD and Standard Precision Fluke Digital Readout and Calibration Dry Block By Comparison Method
	Temperature Switches: Thermostat, Digital/ Analogue Temperature	590 °C to 1200 °C	2.75 °C	Using Standard Precision Fluke "S" Type Thermocouple, Fluke Standard Precision Digital

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	Controller with Externally Connected Sensor Temperatures Calibrators: Temperature Liquid Bath Calibrators, Temperature Dry Block Calibrators, Temperature Furnace ^s			Readout Temperature Furnace Calibrator By Comparison Method
2.	Temperature Only: Stand-Alone Temperature Indicators / Recorders (Battery Operated): Temperature Loggers/ Recorders With Display & Without Display [#]	(-) 25 °C to 60 °C	0.11 °C	Using Standard Fluke RTD and Standard Precision Fluke Digital Readout and Stabilized Temperature Chamber By Comparison Method
3.	Relative Humidity only: DUC: Thermo Hygrometers, Digital Humidity Meters, Humidity indicators, Humidity Sensors, with Indicators, Humidity Transmitter With Indicators, Temperature & Humidity Logger with Display and without Display [#]	7 % RH, @ \approx 25 °C 12 % RH, @ \approx 25°C	0.45 % RH 0.80 % RH	Using Standard Precision Digital Readout & Humidity Fixed Point Source Fixed Point

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	Temperature & Relative Humidity : DUC: Thermo Hygrometers, Digital Humidity Meters, Humidity Indicators', Humidity Sensors, with Indicators, Humidity Transmitter With Indicators, Temperature & Humidity Transmitter, Temperature & Humidity Logger with Display and without Display#	30 % RH to 90 % RH @ \approx 25 °C 5 °C to 50 °C @ \approx 50 % RH	0.85 % RH 0.35 °C	Using Standard Precision Digital Readout for Temperature and Relative Humidity ,and Stable Relative Humidity & Temperature Chamber By Comparison
4.	Infrared Thermometer: DUC: Infrared Thermometer, Infrared Temperature Sensor /Transmitter, Thermal Imaging Camera#	(-) 25 °C to 50 °C 50 °C to 600 °C 600 °C to 1200 °C	1 °C 3.87 °C 7.36 °C	Using Contact/Non contact Thermometer as Reference thermometer and Flat Surface calibrator By Comparison
5.	Calibration (Multi Point Temperature Mapping) : DUC: Temperature Chambers, Incubators (for Non-Medical Applications), Refrigerators and Deep Freezers Cold Rooms, Cool Rooms, Storage Rooms#	(-) 25 °C to 100 °C	0.80 °C	Using Temperature Recorder (Minimum 9 Points) With Data Acquisition System By Comparison

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
6.	Calibration (Multi Point Temperature & Humidity Mapping) : DUC: Temperature & Humidity (Stability) Chambers, Cold Rooms, Cool Rooms, Storage Rooms#	30 % RH to 90 % RH @ \approx 25 °C	2.43 % RH	Using Wireless Temperature & Humidity Recorder (Minimum 9 Points) With Data Acquisition System By Comparison
		5 °C to 50 °C @ \approx 50 % RH	1.15 °C	
7.	Calibration (Multi Point Temperature) : DUC: Temperature Liquid Bath Calibrators, Temperature Dry Block Calibrators, Temperature Furnace Temperature Chambers, Incubators (for Non-Medical Applications), Refrigerators and Deep Freezers Cold Rooms, Cool Rooms, Storage Rooms#	(-) 25 °C to 1200 °C	4.22 °C	Using Temperature sensor (Minimum 9 Points) With Data Acquisition System By Comparison
8.	Temperature Sensor: DUC: Thermocouples, Resistance Temperature Detectors (RTD"s)/ Thermistors), Temperature Transmitters with	(-) 196 °C	0.40 °C	Using Standard Fluke RTD and Standard Precision Fluke Digital Readout and LN2 By Comparison Method By Comparison

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	Electrical Output (Connected to Sensors) Temperature Sensor With Digital / Analogue Readouts : DUC: Digital Thermometer, Temperature Gauges, Glass Thermometers, Multichannel Temperature Indicators/ Recorders, Temperature Switches: Thermostat, Digital/ Analogue Temperature Controller. Temperatures Calibrators: Temperature Liquid Bath Calibrators, Temperature Dry Block Calibrators, Temperature Furnace*	(-)95 °C to 140 °C	0.01 °C	Using Standard Fluke RTD and Standard Precision Fluke Digital Readout and Liquid/Dry Block Dry-Block Calibrator By Comparison Method
		140 °C to 250 °C	0.15 °C	Using Standard Fluke RTD and Standard Precision Fluke Digital Readout and Calibration Bath By Comparison Method
		250 °C to 590 °C	0.32 °C	Using Standard Fluke RTD and Standard Precision Fluke Digital Readout and Calibration Dry Block By Comparison Method
		590 °C to 1200 °C	2.75 °C	Using Standard Precision Fluke "S" Type Thermocouple, Fluke Standard Precision Digital Readout Temperature Furnace Calibrator 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.

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