Laboratory	**C & I Calibrations Pvt. Ltd., J-448, Sitapura Industrial Area, Jaipur, Rajasthan**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Certificate Number	**CC-2216**	**Page**	**1 of 25**
Validity	**15.11.2017 to 14.11.2019**	**Last Amended on**	**31.07.2018**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
ELECTRO TECHNICAL CALIBRATION				
I.	**SOURCE**			
1.	DC Voltage#	0.1mV to1mV 1 mV to 100 mV 100 mV to 10 V 10 V to1100 V	0.5 % to 0.047 % 470 ppm to 11 ppm 11 ppm to 3 ppm 3 ppm to 6.5 ppm	Using MFC Fluke 5720A / 9100/5080A By Direct Method
2.	AC Voltage#	**1 mV to 22 mV** 10 Hz to 20 kHz 20 kHz to100 kHz 100 kHz to1 MHz	 1640 ppm to 126 ppm 0.012 % to 0.3% 0.3 % to 1.4%	Using AC Standard 5790A & MFC Fluke 5720A /9100/5080A By Comparison Method
		22 mV to 22 V 10 Hz to 10 kHz 10 kHzto1 MHz	 165 ppm to 28 ppm 28 ppm to1715 ppm	
		22 V to 220V 10 Hz to 100kHz	 28 ppm to100 ppm	
		220 V to 1000 V 10 Hz to 10 kHz	 40 ppm to 85 ppm	
		50 Hz to 20 kHz 1 mV to 20 mV 20 mV o 200 mV 200 mV to 200V	 4700 ppm to 300 ppm 300 ppm to 120 ppm 120 ppm to 59 ppm	Using MFC Fluke 5720A /9100/5080A By Direct Method
		20 kHz to 1 MHz 10 mV to 20 V	 6500 ppm to 120 ppm	
		50 Hz to1 kHz 200 V to 1100 V	 60 ppm to 65 ppm	

Pankaj Varshney
Convenor

Avijit Das
Program Manager

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	AC High Voltage#	**50 Hz** 550V to 33kV **50 Hz**, 0 to 200 kV	0.6 % 0.6 % to 3%	Using EPD 33kV + Standard Capacitor, 6&1/2 Digital Multimeter, High Voltage source HV Divider & H V probe by By Direct Method
3.	RF Voltage#	10 MHz to 3 GHz (-) 60 dB to 33 dB 7 mV to 1 V	1 to 4.1%	Using leveled sine Gen /9100 MFC By Comparison Method
4.	DC Current#	0.05 nA to 1 µA 1 µA to 100 µ A 100 µA to 20 A 2 A to 120 A 120 A to 1000 A	3% to 0.25 % 1836 ppm to 30 ppm 30 ppm to 20 ppm 30 ppm to 200ppm 0.02 % to 0.45 %	Using PA meter Keithely 6485 by Comp. Method Using Fluke 5720A /5080 /9100 Fluke Shunt 40B/DMM 8508A by Direct Method Using Fluke 5720 with Amplifier Fluke 5720A/ 5080A/52120A & Current Coil by Direct Method
5.	AC Current#	**10 Hz to 10 kHz** 10 µA to 20 A **40Hz to 70Hz** 1mA to 120 A	285 ppm to 44 ppm 0.045% to 0.008%	Using Fluke Shunt 40B / 5790 A Fluke 5720A, 5080/9100 with Amplifier By Direct Method Using Fluke 5720 /5080 with Amplifier, Com3003 / MTS/SY-3102 by By Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		50 Hz 120 A to 2000 A 2000 A to 3200 A	 0.06 % 0.10 %	Using Com3003/MTS/Std. CT Current Coil By Direct Method
6.	DC Resistance#	1mΩ 10 m Ω 100mΩ 1 Ω to 19 Ω 19 Ω to 1 MΩ 1 MΩ to 100 MΩ 100 MΩ to 400 MΩ	0.01% 0.01% 0.01% 42 ppm to 13 ppm 7 ppm to 12 ppm 12 ppm to 65 ppm 65 ppm to 900 ppm	Using Standard Resistance By Direct Method Using Fluke 5720A/5080 / 9100 By Direct Method Using MFC 9100 By Direct Method
7.	Insulation Resistance#	10 kΩ to 18 GΩ 10 GΩ to 10 TΩ (Up to10 kV)	0.2% to 1.5% 1.5% to 2.5%	Using Fluke 5080 MEG with 10 kV divider By Direct Method
8.	AC Resistance#	**1kHz** 1 Ω to 100 kΩ	 0.04% to 0.055%	Using Decade Resistance box by Direct Method
9.	Frequency /Period#	1 Hz to 3 GHz.	4ppm to 0.1ppm	Using MFC 9100 by Direct Method
10.	Time Interval#	10 nsec to10^5 sec	0.11 ppm to 6.02 ppm	Using Counter CNT90 & 9100 by Direct Method
11.	Capacitance#	**1 kHz** 1 pF to 1000 pF 1000 pF to100 µf	 0.12% to 0.04% 0.04% to 0.38%	Using MFC 9100 by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
12.	Inductance#	**1 kHz** 100 µH to 1000µ H 1000 µH to 10 H	 0.3% to 0.04% 0.04% to 0.06%	Using Decade Inductance box by Direct Method
13.	RF Power #	10 MHz to 3 GHz 1 µW to 20 mW (-)60 dB to 33 dB	4.1%	Using 9100 By Direct Method
14.	Temperature Simulation# (Recorder /Controller) B Type Thermocouple E Type Thermocouple C Type Thermocouple J Type Thermocouple K Type Thermocouple L Type Thermocouple R Type Thermocouple S Type Thermocouple N Type Thermocouple T Type Thermocouple RTD/PRT	 (-)600°C to 1800 °C (-)250°C to 1000 °C (-)400°C to 2320 °C (-)200°C to 1200 °C (-)200°C to 1370 °C (-)200°C to 1300 °C (-)50°C to 1770 °C (-)50°C to 1770 °C (-)200°C to 1300 °C (-)200°C to 400 °C (-)200°C to 850 °C	 0.06 °C 0.08 °C 0.03 °C 0.011 °C 0.013 °C 0.011 °C 0.07 °C 0.07 °C 0.02 °C 0.017 °C 0.002 °C	Using Fluke 5720/5080A/9100/8508 A by Direct / Simulation Method
15.	Turn Ratio#	0.8 Turn to 2000 Turn	0.05% to 0.08 %	Using DMM 8508 HP/Agilent with Std. Ratio Standard by Direct Method
16.	AC Power#	320 V to 600 V 0.5 A to 20 A PF ± 0.1 to 1	0.16% to 0.45%	Using Yokogawa , MFC Fluke 5080 A by Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
17.	DC Power#	**1.5 V to 1000 V** **0.1 A to 20 A** 0.15 W to 20 kW	0.011 % to 0.055 %	Using Fluke MFC 5080 by Direct Method
18.	Power Factor#	40 Hz to 70 Hz (-)1 to 1	0.0005 PF	Using 3Phase reference Standard COM3003/MTS by Direct Method
19.	Frequency#	40Hz to 70Hz	0.025%	Using 3Phase reference Standard COM3003/MTS by Direct Method
20.	AC Power / Energy# 1 phase & 3 phase Active Cos Ø ± 0.10 to 1	**40Hz to 60Hz** **40V to 320V** **120A to >10A** 115.2kW to 40W **40Hz to 60Hz** **40V to 320V** **10A to >50mA** 9.6kW to 0.2W **40Hz to 60Hz** **40V to 320V** **50mA to >5mA** 48W to 0.02W **40Hz to 60Hz** **40V to 320V** **5mA** 0.02W	0.011% 0.010% 0.018% 0.023%	Using 3Phase reference Standard COM3003 / SY-3102 By Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	Cos Ø ± 0.01 to 0.1	**40Hz to 60Hz** **40V to 320V** **10A to 0.10A** 960W to 40mW	0.010%	
	Cos Ø ± 0.25 to 1	**40Hz to 70Hz** **40V to 320V** **120A to >100mA** 115.2kW to 1W	0.025%	
		40Hz to 70Hz **40V to 320V** **100mA to >10mA** 96W to 0.1W	0.030%	
		40Hz to 70Hz **40V to 320V** **10mA to 1mA** 9.6W to 0.01W	0.04%	
	Cos Ø ± 0.10 to 1	**50Hz** **40V to 320V** **100 A to 1000 A** 400 W to 960 kW	0.15%	
21.	AC Power / Energy[#] 1 phase & 3 phase Reactive Sin Ø ± 0.10 to 1	**40Hz to 60Hz** **40V to 320V** **120A to >10A** 115.2kVar to 40Var	0.011%	Using3Phase reference Standard COM3003 / SY-3102 Direct Method
		40Hz to 60Hz **40V to 320V** **10A to >50mA** 9.6kVar to 0.2Var	0.010%	

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	Sin Ø ± 0.2 to 1	**40Hz to 60Hz** **40V to 320V** **50mA to >5mA** 48Var to 0.02Var	0.018%	
		40Hz to 60Hz **40V to 320V, 5mA** 0.02Var	0.023%	
		40Hz to 70Hz **40V to 320V** **120A to >100mA** 115.2kVar to 0.8Var	0.025%	
		40Hz to 70Hz **40V to 320V** **100mA to >10mA** 96Var to 0.08Var	0.027%	
	Sin Ø ± 0.10 to 1	**40Hz to 70Hz** **40V to 320V** **10mA to 1mA** 9.6Var to 0.008Var	0.04%	
		50Hz , 40V to 320V **100 A to 1000 A** 400 Var to 960 Var	0.15%	
22.	AC Power / Energy[#] 1 phase & 3 phase Apparent	**40Hz to 60Hz** **40V to 320V** 120A to >10A 115.2kVA to 400VA	0.011 %	Using 3Phase reference Standard COM3003 / SY-3102 by Direct Method
		10A to >50mA 9.6kVA to 2VA	0.010 %	

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		50mA to >5mA 48VA to 0.2VA 5mA (0.2VA)	0.018 % 0.023 %	
	AC Power / Energy 1 phase & 3 phase Apparent	**40Hz to 70Hz** **40V to 320V** 120A to >100mA 115.2kVA to 4VA 100mA to >10mA 96VA to 0.4VA 10mA to 1mA 9.6VA to 0.04VA	 0.025% 0.030% 0.04%	Using 3Phase reference Standard COM3003 / SY-3102 by Direct Method
23.	Harmonics in Voltage & Current#	Fundamental Frequency 50 Hz (1 to40)% (Up to 240 V) (1 to40)% (Up to 24 A)	 0.47 % 0.8 %	Using 3Phase reference Standard SY-3102 by Direct Method
II.	**MEASURE**			
1.	DC Voltage#	1 mV to 10 V 10V to 1000 V 1 kV to 30kV	200 ppm to 4 ppm 4 ppm to 7.7 ppm 2.5% to 2%	UsingFluke 8508A DMM , HP ,Agilent by Direct Method Using HV Probe with DMM& Source by Direct / Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
2.	AC Voltage#	**1 mV to 22 mV** 10 Hz to 20 kHz 20kHz to 100 kHz 100 kHz to 1 MHz **22 mV to 22 V** 10 Hz to 10 kHz 10 kHz to 1 MHz	 1640 ppm to 126 ppm 0.012 % to 0.3% 0.3 % to 1.4% 165 ppm to 28 ppm 28 ppm to1715 ppm	Using AC Std. Fluke 5790, 8508A DMM , HP ,Agilent Direct Method
		22 V to 220V 10 Hz to 100kHz **220 V to 1000 V** 10 Hz to 10 kHz **30V to 480V** 40 to 70Hz **10V to 30V** 40 to 70Hz	28 ppm to100 ppm 40 ppm to 85 ppm 70 ppm 0.015%	Using 3Phase ref. StandardCOM3003/ SY- 3102 by Direct / Comparison Method
3.	AC High Voltage#	**50 Hz** 550V to 33kV **50Hz** 1kV to 200 kV	 0.6 % 0.6% to 3 %	Using EPD 33kV with Standard Capacitor, 6 ½ Digital Multimeter By Direct Method Using HV Divider with DMM/KV Meter & HV Probe (Direct Method)

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
4.	RF Voltage#	10MHz to 3GHz 7mV to 1 V (-) 60 dB to 33 dB	4.1%	Using R&S Meter & MFC 9100 By Direct / Comparison Method
5.	DC Current#	0.05 nA to 1 µA 1µA to 100 µA 100 µA to 100 mA 100 mA to 20 A 20 A to1000 A	3% to 0.25% 460ppm to 13 ppm 13ppm to 30 ppm 30ppm to 50 ppm 0.05% to 0.5 %	Using PA meter Keithley6485 by Direct Method Using Fluke 8508A DMM , Agilent, Shunt Fluke 40 B By Direct Method
6.	AC Current#	**10 Hz to 10 kHz** 10 µA to 20 A **40 to70 Hz** 1mA to120A **50 Hz** 120A to 2000 A 2000 to3200 A	 285 to 44 ppm 0.045% to 0.008% 0.06 % 0.10 %	Using Fluke 8508A DMM Agilent, Fluke Shunt 40B, 5790 A By Direct Method UsingCom3003/MTS/ SY-3102/ Std. CTby Direct Method
7.	DC Resistance#	0.001Ω to 1Ω 1 Ω to 1 MΩ 1 MΩ to 100 MΩ 100 MΩ to 20 GΩ 20GΩ to 10TΩ	0.01% to 0.02% 19 ppm to11 ppm 11 ppm to160 ppm 160 ppm to1800 ppm 1 % to 2%	Using Std. Resistance Direct / VI Method Using Fluke 8508A DMM , Agilent by Direct / VI Method Using pA Meter/ Fluke 5080 by Direct / VI Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
8.	AC Resistance#	**1 kHz** 1 Ω to 100 KΩ	400 ppm to 550 ppm	Using LCR Meter, Box by Direct / Comparison Method
9.	Frequency/period#	0.01 Hz to 3 GHz	4ppm to 0.1ppm	Using Fluke 8508A DMM , Agilent /Freq. Counter/ 9100 by Direct / Comparison Method
10.	Time Interval#	10 nsec to10^5 sec	0.11ppm to 6.02ppm	Using Frequency Counter / 9100 by Direct / Comparison Method
11.	Capacitance #	**1 kHz** 1pF to 1000 pF 1000 pF to 100 µF	 0.12% to 0.04% 0.04% to 0.38%	Using LCR Meter, DMM Agilent ,box Direct / Comparison Method
12.	Inductance #	**1 kHz** 100 µH to 1000µ H 1000 µH to 10 H	 0.3% to 0.04% 0.04% to 0.06%	Using LCR Meter ,Box Direct / Comparison Method
13.	RF Power#	10MHz to 3 GHz 1 µW to 20 mW (-60 dB to 33 dB)	4.2%	Using R&S Meter Direct / Comparison Method
14.	Turn Ratio#	0.8 Turn to 2000 Turn	0.04 % to 0.05%	Using Fluke 8508A/Agilent/ HP Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
15.	Temp. Simulation# (Process Calibrator/Recorder / Controller)			Using Fluke 8508 A / Agilent by Direct/Simulation Method
	B Type Thermocouple	(-)600°C to 1800 °C	0.03 °C	
	E Type Thermocouple	(-)250°C to 1000 °C	0.023 °C	
	C Type Thermocouple	(-)400°C to 2320 °C	0.06 °C	
	J Type Thermocouple	(-)200°C to 1200 °C	0.018 °C	
	K Type Thermocouple	(-)200°C to 1370 °C	0.014 °C	
	L Type Thermocouple	(-)200°C to 1300 °C	0.02 °C	
	R Type Thermocouple	(-)50°C to 1770 °C	0.03 °C	
	S Type Thermocouple	(-)50°C to 1770 °C	0.03 °C	
	N Type Thermocouple	(-)200°C to 1300 °C	0.028 °C	
	T Type Thermocouple	(-)200°C to 400 °C	0.018 °C	
	RTD/PRT	(-)200°C to 850 °C	0.002 °C to 0.017 °C	
16.	Current Transformer Primary Injection method Ratio error, Phase error#	**50Hz**		Using Precision current transformer, Automatic Instrument transformer test set (AITTS) and High Current Source By Direct Method
		5A to 2000A(Primary) 1A,5A(Secondary)	RE : 0.03% PE : 2.5 minute	
		2000A to 3200 A (Primary) 1A , 5A (Secondary)	RE : 0.05% to 0.067% PE : 3 min. to 5.64 min.	
		1A to 5A(Primary) 1A, 5A (Secondary)	RE : 0.12% to 0.46% PE: 6.2 min. to17 min.	

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
17.	Potential Transformer / Capacitor Voltage Transformer/ Voltage Divider# Primary Injection method Ratio error, Phase error	**50Hz** 3.3kV to 33kV 3.3kV/√3 to 33kV/√3 (Primary) 63.5/110V 50V to 144V (Secondary) **50Hz** 110V to 3.3kV 110V/√3 to 3.3kV/√3 (Primary) 63.5/110V 50V to 144V (Secondary) 66 kV/√3(Primary) 110V/√3(Secondary) 50V to 144V	 RE : 0.07% PE : 3 minute RE : 0.14% PE : 7 minute RE : 0.12% PE : 7 minute	Using Electronic Potential Divider 33kV with Standard Transformer /Voltage Capacitor, Automatic instrument transformer test set (AITTS),and High Voltage Source By Direct Method
18.	CT-VT Comparator # (AITTS)	CT Mode 1 A to 5 A PT Mode 110 to 110V /√3	RE : 0.012% PE : 0.54 min RE : 0.01% PE : 0.5 min	Using Precision current transformer, Automatic Instrument transformer test set (AITTS) and Standard VT Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
19.	AC Power / Energy[#] 1 phase & 3 phase Active Cos Ø ± 0.10 to 1	**40Hz to 60Hz** **40V to 320V** 120A to >10A 115.2kW to 40W 10A to >50mA 9.6kW to 0.2W 50mA to >5mA 48W to 0.02W 5mA (0.02W)	 0.011% 0.010% 0.018% 0.023%	Using 3Phase Reference Standard COM3003 / SY-3102 by Direct Method Using 3Phase reference Standard COM3003 / SY-3102 By Direct Method
	Cos Ø ± 0.01 to 0.1	**40Hz to 60Hz** **40V to 320V** 10A to 0.10A 960W to 40mW	 0.010%	
	Cos Ø ± 0.25 to 1	**40Hz to 70Hz** **40V to 320V** **120A to >100mA** 115.2kW to 1W **100mA to >10mA** 96W to 0.1W **10mA to 1mA** 9.6W to 0.01W	 0.025% 0.030% 0.04%	Using 3Phase reference Standard COM3003 / SY-3102 By Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	Cos Ø ± 0.10 to 1	**50Hz , 40V to 320V** **100 A to 1000 A** 400 W to 960 kW	0.15%	With Turn Coil
20.	AC Power / Energy# 1 phase & 3 phase Reactive Sin Ø ± 0.10 to 1	**40Hz to 60Hz** **40V to 320V** **120A to >10A** 115.2kVar to 40Var **10A to >50mA** 9.6kVar to 0.2Var **50mA to >5mA** 48Var to 0.02Var **5mA** 0.02Var	 0.011% 0.010% 0.018% 0.023%	Using 3Phase reference Standard COM3003 / SY-3102 by Direct Method
	Sin Ø ± 0.2 to 1	**40Hz to 70Hz** **40V to 320V** **120A to >100mA** 115.2kVar0.8Var **100mA to >10mA** 96Var to 0.08Var **10mA to 1mA** 9.6Var to 0.008Var	 0.025% 0.027% 0.04%	Using 3Phase reference Standard COM3003 / SY-3102 by Direct Method
	Sin Ø ± 0.10 to 1	**50Hz , 40V to 320V** **100 A to 1000 A** 400 Var to 960 kVar	 0.08%	With Turn Coil

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
21.	AC Power / Energy# 1 phase & 3 phase Apparent	**40Hz to 60Hz** **40V to 320V** **120A to >10A** 115.2kVA to 400VA **10A to >50mA** 9.6kVA to 2VA **50mA to >5mA** 48VA to 0.2VA **5mA** 0.2VA	 0.011% 0.010% 0.018% 0.023%	Using 3Phase reference Standard COM3003 / SY-3102 by Direct Method
		40Hz to 70Hz **40V to 320V** **120A to >100mA** 115.2kVA to 4VA **100mA to >10mA** 96VA to 0.4VA **10mA to 1mA** 9.6VA to 0.04VA	 0.025% 0.030% 0.035%	Using 3Phase reference Standard COM3003 / SY-3102 by Direct Method
22.	AC Power#	320 to 600 V, 0.5 to 20 A, PF ± 0.1 to 1	0.16% to 0.45%	Using Power Meter Yokogawa by Direct Method
23.	DC Power#	1.5 V to1000 V 0.1 A to 20 A 0.15 W to 20 kW	0.011 % to 0.055 %	Using Fluke 8508/5080 Yokogawa & 6 ½ DMM By Direct/Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
24.	Power Factor#	40 to70 Hz -1 to 1 PF	0.0005 PF	Using3Phase reference Standard COM3003/SY-3102 by Direct Method
25.	Frequency#	40 to 70Hz	0.025%	Using3Phase reference Standard COM3003 by Direct Method
26.	Harmonics# in Voltage & Current	Fundamental Frequency 50 Hz (1 to 40) % (Upto 240V) (1 to 40) % (Upto 24A)	 0.4 % 0.8 %	Using 3Phase reference Standard SY-3102 By Direct Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		FLUID FLOW CALIBRATION		
I.	**FLOW MEASUREMENTS**			
1.	Mass Flow Rate# (Medium : Liquid)	0.1 to 8 kg/min 42 to 725 kg/min	0.072 % rdg. 0.06% of rdg	
2.	Cumulative Mass Of Fluid#	100 to 10000 kg	0.06% rdg	
3.	Volume Flow Rate# (Medium : Liquid)	0.06 to 43 m^3/h	0.12% rdg.	Using Mass Flow Meter by Comparison Method
4.	Volume Flow Rate$ (Medium : Liquid)	5 m^3/h to 40 m^3/h	0.36 % rdg.	Using Electro Magnetic/Mass Flow Meter by Comparison Method
5.	Quantity of volume# (Medium : Liquid)	0.1 to 10 m^3	0.08% rdg.	Using Electro Magnetic Flow Meter by Comparison Method
6.	Volume Flow Rate♣ (Medium : Liquid)	1 to 70 m^3/h 70 m^3/h to 2300 m^3/h	0.90 % rdg. 0.90 % rdg	Using Ultrasonic Flow Meter by Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	MECHANICAL CALIBRATION			
I.	**DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)**			
1.	Vernier/Digital Caliper[$] L.C.: 0.01 mm[φ]	0 to 600 mm 0 to 1000 mm	9.5 µm 31.8 µm	Using Gauge Block Set &Caliper Checker
2.	External Micrometer[$] L.C. 0.001 mm[φ]	0 to 100 mm	1.2 µm	Using Gauge Block Set
	L.C. 0.01 mm	0 to 200 mm 200 mm to 600mm 600 mm to 1000mm	7 µm 10.0 µm 15.0 µm	Using Gauge Block Set and caliper Checker with Gauge Block Accessories Set
	Internal Micrometer[$] L.C. 0.001 mm	5 mm to 30 mm	1.2 µm	
	L.C. 0.01 mm	5 mm to1000 mm	15.0 µm	
4.	Dial Gauge [$] L.C 0.001 mm[φ]	0 to 25 mm	0.9 µm	Using Gauge Block Set / Digital Gauge Sylvac
5.	Dial Bore Gauge[$] L.C. 0.001 mm (transmission movement only)	1.8 mm travel	3.5 µm	Using Gauge Block Set / Digital Gauge Sylvac

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
6.	Height Gauge[$] L.C. 0.01 mm[φ]	0 to 300 mm 0 to 1000 mm	9.0 µm 11.0 µm	Using Gauge Block Set & caliper checker
7.	Feeler Gauge[$]	0.01 to1 mm	1.5 µm	Using Digital Micrometer
8.	Foils[$]	10 µm to 2000 µm	1.3 µm	Using Digital Micrometer
9.	Coating Thickness Gauges [$]	10 µm to 2000 µm	1.8 µm	Using Foils & Digital Micrometer
10.	Steel Scale / Measuring Tape[$]	0 to 10000 mm	0.25 mm /L (where L is in meter)	Using Digital scale cal. system
11.	Angle Bevel Protector/ Combination Set / Clinometers[$] LC: 5 min.	0 to 180 °	4 min.	Using Angle Gauges
12.	Sprit Level[$] L.C.: 0.02 mm/Meter	Upto 300 mm	16 µm/meter	Using Sine bar / Slip Gauge Set
II.	**ACCOUSTIC**			
1.	Sound Level Meter[#]	94dB & 114dB	0.4dB	Using Sound Level Calibrator by Direct Method
III.	**MASS**			
1.	Weights[$N] (Class Of Weights F1,F2,M1,M2,M3)	1 mg 2 mg 5mg 10mg 20mg	0.008 mg 0.008 mg 0.008 mg 0.008 mg 0.008 mg	

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		50mg 100mg 200mg 500 mg 1g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500g 1000 g 2000 g 5000g 10000g 20000g	0.008 mg 0.008 mg 0.008 mg 0.009 mg 0.018 mg 0.018 mg 0.018 mg 0.065 mg 0.065 mg 0.065 mg 0.16 mg 0.16 mg 6.5 mg 6.5 mg 6.5 mg 10 mg 0.44g 0.44g	Using Standard Weights E1/E2 Balance Readability 0.01 mg Using Weights E2 Balance Readability 0.1 mg Using Weights F1 Balance Readability 10 mg Using Weights F1/F2/M1 Balance Readability :1g
IV.	**WEIGHING BALANCE AND SCALE**			
1.	Balance# (Class I-Class Iv) Readeability:0.01 mg	Upto 220 g upto 8 kg upto 38 kg upto 100 kg 100 kg to 300 kg	0.13 mg 0.01 g 0.71 g 2.4g 10.5 g	Using Standard Weights E1/E2/F1/F2/M1
V.	**VOLUME**			
1.	Micro Pipettes	10 µl to 1000 µl	0.016 µl	Using Standard Weights E1 ,E2& F1

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
2.	Glassware, Pipettes / Burettes / Measuring Flask & Cylinders	1 ml to 50 ml 50 ml to 150 ml 150 ml to 5 l	0.065 µl 0.16 µl 0.065 ml	Using Balance Readability 0.01 mg / 0.1 mg /10 mg
VI.	**ACCELERATION & SPEED**			
1.	RPM Non Contact type # Contact Type#	 100 to 12000 RPM 12000 RPM to 90000 RPM 100 to 11000 RPM	 5RPM 26RPM 11 RPM	Using Tachometer
VII.	**PRESSURE INDICATING DEVICES**			
1.	Deadweight Testers$	6 bar to 60 bar 60 to 1200 bar	0.012%rdg 0.012%rdg	Using Deadweight Tester by Cross Float Principle Comparison method based on EURAMET eg-3
2.	Pressure Indicating Devices$ (Pressure Calibrator, Analog & Digital Pressure Gauges, Pressure Transducers, Transmitters)	6 to 1200 bar	0.012%rdg	Using Deadweight Tester, Digital Pressure Calibrator, DMM based on DKD R - 1
3.	Digital/Analog Pressure Gauges Transmitters#	0 to 700 bar	0.034% rdg	Using Precision Digital Gauges by Comparison Method

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
4.	Digital/Analog Pressure Gauges Transmitters#	0 to 2 bar	0.045% rdg	Using Precision Digital Gauges
5.	Pressure Gauges Absolute Gauge Barometers#	0 to 2 bar Abs 300 to 1200 mbar	0.048% rdg 0.048% rdg	Using Precision Digital Gauges
6.	Vacuum Gauges Transducers, Transmitters#	(-) 0.93 bar to 0 bar	0.07% rdg	Using Precision Digital Gauges
VIII.	**DENSITY AND VISCOSITY**			
1.	Hydrometer (Density/Specific Gravity)	0.600 to 2.000 g/ml	0.0019 g/ml	Using Standard Hydrometer

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		THERMAL CALIBRATION		
I.	**TEMPERATURE**			
1.	RTD, Thermocouple Sensors With Indicator, Glass Thermometer, Thermocouple Sensor Without Indicator, Analog Temperature Gauge $	(-) 35 °C to 0 °C 0 °C to 650 °C 500 °C to 1000 °C 1000 °C to 1200 °C	0.13 °C 0.08 °C 1.91 °C 2.02 °C	Using Liquid Bath, Dry Block Calibrator Std. RTD, DMM, Standard Thermocouple by Comparison Method Using S Type & DMM Thermocouple
2.	RTD, Thermocouple Sensors With Indicator, Thermocouple Sensor Without Indicator, Analog Temperature Gauge♣	(-) 80 °C to 200 °C 200 °C to 650 °C 500 °C to 1000°C 1000°C to 1200°C	0.13 °C 0.08 °C 1.91 °C 2.02°C	Using Liquid Bath, Dry Block Calibrator Std. RTD, DMM, Standard Thermocouple by Comparison Method Using S Type & DMM Thermocouple
3.	Oven, Furnace, Temp. Bath/Deep Freezer♣ (Thermal Validation Mapping)	(-) 35 °C to 400 °C 400 °C to 1200 °C 1200 °C to 1600°C	0.7 °C 3 °C 4.6	Using Multichannel Data Logger with RTD & N Type Thermocouple

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
4.	Pyrometer, Black Body Source , IR Thermometer Sensors#	50°C to 500°C 500°C to 1200°C	2.3 °C 3.9 °C	Using Standard Non Contact Pyrometer & Black Body source by Comparison Method
II.	**SPECIFIC HEAT & HUMIDITY**			
1.	Humidity Sensor With Indicator / Controller, Thermo Hygrometer#	20% to 90 % RH (@ 25 °C) Temp 20 to 50 °C (@ 50%RH)	0.8% RH 0.45 °C	Using Standard Humidity Indicator, Chamber / Generator by Comparison Method

*** 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.

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