

**Laboratory**                      **Electronics Test & Development Centre, Housefed Complex, Central Block, 1<sup>st</sup> & 2<sup>nd</sup> Floor, Beltola-Basistha Road, Dispur, Guwahati, Assam**

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

**Certificate Number**         **CC-2009** (in lieu of C-0024, C-0526, C-0527, C-0824)

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**Validity**                         **20.11.2016 to 19.11.2018**

**Last Amended on**    **27.02.2017**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
<b><u>ELECTRO-TECHNICAL CALIBRATION</u></b>				
<b>I.</b>	<b>SOURCE</b>			
<b>1.</b>	DC Voltage <sup>#</sup> DC Voltage <sup>\$</sup>	1mV to 100mV 100mV to 10V 10V to 1000V	0.16% to 0.0016% 0.0016% to 0.0006% 0.0006% to 0.0010%	Using MFC Fluke 5720A/ 5522A
<b>2.</b>	AC Voltage <sup>\$</sup>	<b>50Hz to 20kHz</b> 10mV to 100mV 100mV to 100V 100V to 1000 V	0.06% to 0.015% 0.015% to 0.01% 0.01% to 0.018%	Using MFC Fluke 5720A/ 5522A
<b>3.</b>	AC Voltage <sup>*</sup>	<b>50Hz to 10kHz</b> 10mV to 1000V	0.096 % to 0.04%	Using MFC Fluke 5522A
<b>4.</b>	DC Current <sup>\$</sup>	100 $\mu$ A to 2A 2 A to 10 A 10 A to 20 A 20 A to 1000 A	0.014% to 0.010% 0.01% to 0.05% 0.05% to 0.12% 0.58% to 0.33%	Using MFC Fluke 5720A/ 5522A  With Current Coil
<b>5.</b>	DC Current <sup>*</sup>	100 $\mu$ A to 300 mA 300mA to 20 A 20 A to 1000 A	0.11% to 0.015% 0.015% to 0.12% 0.58% to 0.33%	Using MFC Fluke 5522A With Current Coil
<b>6.</b>	AC Current <sup>\$</sup>	<b>50Hz to 1kHz</b> 100 $\mu$ A to 200 mA 200 mA to 2A 2 A to 10 A 10 A to 20 A 20 A to 1000 A	0.04% to 0.017% 0.017% to 0.03% 0.03% to 0.07% 0.07% to 0.17% 0.87% to 0.39%	Using MFC Fluke 5720A/ 5522A  With Current Coil

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Convenor

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Program Director

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7.	AC Current*	<b>50Hz to 1kHz</b> 100 $\mu$ A to 30mA 300mA to 20A 20A to 1000A	0.25% to 0.05% 0.05% to 0.2% 0.87% to 0.39%	Using MFC Fluke 5522A With Current Coil
8.	DC Resistance <sup>s</sup>	100 $\mu\Omega$ 1 m $\Omega$ to 1 $\Omega$ 1 $\Omega$ to 1k $\Omega$ 1 k $\Omega$ to 100 M $\Omega$ 100 M $\Omega$ to 1T $\Omega$	0.01% 0.001% to 0.0006% 0.0006% to 0.0007% 0.0007% to 0.0025% 0.0025% to 0.38%	Using Guildline-9334A Std. Resistor series/ MFC Fluke 5720A/ 5522A
9.	DC Resistance*	100m $\Omega$ to 1M $\Omega$ 1M $\Omega$ to 1G $\Omega$	1.5 % to 0.0035% 0.0035% to 1.8%	Using MFC Fluke 5522A
10.	Capacitance <sup>#</sup>	<b>1 kHz</b> 10 pF to 100 pF 100 pF to 1 $\mu$ F	0.14% to 0.24% 0.24% to 0.06%	Using IET Labs 1423 & GR HACS-Z Decade Capacitance Box
11.	Inductance <sup>#</sup>	<b>1 kHz</b> 100 $\mu$ H 100uH to 10H	0.35% 2.3% to 1.0 %	Using 100uH Std Inductor 1482 IET Labs Decade Inductance Box 1491 GR
12.	Frequency <sup>#</sup>	10 Hz to 3GHz	0.002 % to 0.000015%	Using Signal generator R&S SMA-100
13.	3 $\Phi$ Power / Energy <sup>s</sup>	9W-7.22kW, 120/240V 0.05A to 10A 0.5pF to UPF 50Hz	0.015% to 0.065%	Using Source with Zera Power/Energy comparator

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II.	<b>MEASURE</b>			
1.	DC Voltage <sup>#</sup>	1mV to 100mV 100mV to 10V 10V to 1000V	0.07% to 0.0010% 0.0010% to 0.0006% 0.0006% to 0.001%	Using 8 ½ DMM Fluke 8508/ Wavetek 1271
2.	DC High Voltage*	1kV to 10kV	0.40 kV	Using Fluke 80k-40 HV Probe with DMM
3.	AC Voltage <sup>#</sup>	<b>50 Hz to 10 kHz</b> 10mV to 100mV 100mV to 1000V	0.057% to 0.015% 0.015% to 0.01%	Using 8 ½ DMM Fluke 8508/ Wavetek 1271
4.	AC High Voltage*	<b>50 Hz</b> 1 kV to 5 kV	0.37 kV	Using Fluke 80k-40 HV Probe with DMM
5.	DC Current <sup>#</sup>	100 $\mu$ A to 200 mA 200 mA to 2A 2A to 20A	0.0021% to 0.005% 0.005% to 0.02% 0.02% to 0.051%	Using 8 ½ DMM Fluke 8508/ Wavetek 1271
6.	AC Current <sup>#</sup>	<b>50Hz to 1kHz</b> 100 $\mu$ A to 200mA 200mA to 2A 2A to 20A	0.05 % to 0.04% 0.04% to 0.082% 0.082% to 0.1%	Using 8 ½ DMM Fluke 8508/ Wavetek 1271
7.	DC Resistance <sup>§</sup>	100 $\mu\Omega$ to 1 $\Omega$ 1 $\Omega$ to 10M $\Omega$ 10M $\Omega$ to 100M $\Omega$ 100M $\Omega$ to 20G $\Omega$	0.01% to 0.001% 0.001% to 0.002% 0.002% to 0.01% 0.01% to 0.1%	Using DCC Bridge 6622 & 6520 Tera ohmmeter
	DC Resistance*	1 $\Omega$ to 10M $\Omega$ 10M $\Omega$ to 100M $\Omega$ 100M $\Omega$ to 20G $\Omega$	0.03% to 0.002% 0.002% to 0.01% 0.01% to 0.12%	Using 8 ½ DMM Fluke 8508A / Wavetek 1271 8 ½ DMM

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8.	Capacitance <sup>#</sup>	<b>1kHz</b> 10pF to1uF	0.2% to 0.02 %	Using RLC Digibridge Quad Tech 1689
9.	Inductance <sup>#</sup>	<b>1kHz</b> 100 $\mu$ H to10H	0.11% to 0.25%	Using RLC Digibridge Quad Tech 1689
10.	Frequency <sup>#</sup>	10Hz to 3GHz	0.00001%	Using CNT90XL Pendulum Freq Counter
11.	3 $\Phi$ Power / Energy <sup>#</sup>	<b>50Hz</b> 9W-7.22kW, 120/240V 0.05A to 10A 0.5pF to UPF	0.025% to 0.065%	Using Zera COM 3003 Power/Energy Comparator/MT3000

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<b><u>MECHANICAL CALIBRATION</u></b>				
<b>I. DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)</b>				
1.	External Micrometer <sup>§</sup> L.C.:0.001 & 0.01 mm	0 to 25 mm 0 to 150 mm	2.0 $\mu$ m 5.77 $\mu$ m	Using Ceramic Gauge Block, M-112, K-grade
2.	Vernier Caliper <sup>§</sup> L.C.:0.01 & 0.02 mm	0 to150 mm 0 to 300 mm	17.0 $\mu$ m 19.6 $\mu$ m	Using Ceramic Gauge Block, M-112, K-grade
3.	Scale <sup>§</sup>	0 to1000 mm	22 $\mu$ m	Using Tape & Scale Calibration
4.	Digital Dial Gauge <sup>§</sup>  Analogue Dial Gauge <sup>§</sup>	0 to 50 mm  0 to 10 mm	2.19 $\mu$ m  2.19 $\mu$ m	Using I-CHECKER Make:Mitutoyo;Model: 170-321E;S.N.: 109061504
5.	Bore Gauge <sup>§</sup>	35 mm to 60 mm	2 $\mu$ m	Using I-CHECKER Make:Mitutoyo;Model: 170-321E;S.N.: 109061504
6.	Bevel Protractor <sup>§</sup>	5 min to 90°	3.6 Min.	Using Angle Gauge Block;Make: Starrett;Model: AG16LM;S.N.: 122700.1

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<b>II.</b>	<b>WEIGHTS</b>			
<b>1</b>	Weights <sup>#</sup> (F1, F2, M1, M2, M3 Classes)	1mg to 200mg 500 mg 1g to 5g 10g to 20g 50g 100g 200g 500g to 20kg	0.01mg 0.02mg 0.05mg 0.08mg 0.15mg 0.27mg 0.54mg 0.11g	Using E2 Class Reference Weights; Make: Mettler Toledo SNos: B245502045; 15849; 15850; 15851 & B245491730 and Balance MT(At-201)(Reso.0.01 mg) & Balance Citizen (35kg,Resol.-0.1g)
<b>III.</b>	<b>WEIGHING SCALE AND BALANCE</b>			
<b>1.</b>	Balance <sup>§</sup> d = 100gm to 0.01mg	0 to 200g > 200g to 35000g	0.25 mg 0.23g	Using E2 Class Reference Weights; Make: Mettler Toledo SNos: B 245502045; 15849; 15850; 15851 & B245491730 and Balance MT(At- 201) (Reso.0.01 mg) & Balance Citizen (35kg,Resol.-0.1g)
<b>2.</b>	Balance <sup>*</sup> d =100gm to 0.01mg	0 to 200g > 200g to 35000g	0.25 mg 0.47 g	Using E2 Class Reference Weights; Make: Mettler Toledo SNos: B 245502045 ; 15849; 15850; 15851 & B 245491730 and Balance MT(At-201) (Reso.0.01 mg) & Balance Citizen (35kg,Resol.-0.1g)

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<b><u>OPTICAL CALIBRATION</u></b>				
1.	Optical Wavelength	700 nm to 1650 nm	0.6nm	Using IQ-12002 Optical Calibration System
2.	Optical Power	+10 dBm to (-) 60dBm	0.22 dBm	Using IQ-12002 Optical Calibration System
3.	Light Source Calibration			
	Wavelength	700nm to 1650 nm	0.6nm	
	Optical Power	+10 dBm to (-) 60dBm	0.22 dBm	
	Stability (power)	1310 nm	0.22 dBm	
	Optical Length	1310 nm & 1550 nm 14.8339 km	0.28m 0.28m	Using Agilent OTDR & Fiber Spools.

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<b><u>THERMAL CALIBRATION</u></b>				
<b>I.</b>	<b>TEMPERATURE</b>			
<b>1.</b>	Temperature for RTD/PRT/ T/C with or without Indicator <sup>§</sup>	(-) 50 °C to 30 °C	0.98 °C	Using Standard PRT with Indicator, Low Temperature liquid Bath
		30 °C to 300 °C	0.98 °C	Using Standard PRT with Indicator, Temperature liquid / Oil Bath / Dry Block
		300 °C to 1000 °C	3.07 °C	Using Standard PRT / Thermocouple with Indicator, Temperature Dry Block
<b>2.</b>	Temperature for RTD/PRT/ T/C with or without Indicator <sup>*</sup>	30 °C to 300 °C	0.98 °C	Using Standard PRT with Indicator, Dry Block
		300 °C to 1000 °C	3.08 °C	Using Standard PRT / Thermocouple with Indicator, Temperature Dry Block

\* 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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