

Laboratory **Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal**

Accreditation Standard **ISO/IEC 17025: 2017**

Certificate Number **CC-2008**

Page **1 of 18**

Validity **21.01.2019 to 20.01.2021**

Last Amended on **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
<b><u>ELECTRO-TECHNICAL CALIBRATION</u></b>				
<b>1.</b>	<b>MEASURE</b>			
		10 $\mu$ V to 1 mV 1 mV to 10 V 10 V to 1000 V	2 % to 0.014 % 0.014 % to 0.0004 % 0.0004 % to 0.0005 %	Using DC Reference Standard 7004 , Null Detector , Kelvin Verley Divider, FLK Multimeter 8508A by Direct/ Comparison method
		>1 kV to 40 kV	2.5 %	Using 80K40 HV probe by Direct/Comparison method
<b>2.</b>	DC Current <sup>#</sup>	10 $\mu$ A to 1 mA 1 mA to 20 A 20 A to 850 A	0.006 % to 0.002 % 0.002 % to 0.005 % 0.005 % to 0.05 %	Using Current Shunt & Standard Resistance, Agilent Current Source 875A& FLK DMM 8508A by Direct/Comparison Method
<b>3.</b>	DC Resistance <sup>#</sup>	0.0001 $\Omega$ to 0.001 $\Omega$  0.001 $\Omega$ to 1 M $\Omega$  1 M $\Omega$ to 20 G $\Omega$  20 G $\Omega$ to 1 T $\Omega$	0.03 % to 0.004 %  0.004 % to 0.001 %  0.001 % to 0.20 %  0.2 % to 2.5 %	Using DMM FLK8508A, Standard Resistance Set, High Resistance Meter Agilent 4339 by Direct/Comparison Method
<b>4.</b>	Inductance <sup>#</sup>	<b>1 kHz</b> 100 $\mu$ H to 10 H	0.2 % to 0.06 %	Using Digibridge 1689, Quadtech, USA STD "L", GR1482 Series by Direct/Comparison Method

**Vishal Shukla**  
Convenor

**Battal Singh**  
Program Manager



**Laboratory**                                **Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal**

**Accreditation Standard**    **ISO/IEC 17025: 2017**

**Certificate Number**            **CC-2008**

**Page**            **3 of 18**

**Validity**                                **21.01.2019 to 20.01.2021**

**Last Amended on**    **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
9.	Time Interval/ Time Period <sup>#</sup>	20 nsec to 2000 sec	0.0002 %	Using Freq. Counter Pendulam CNT-90 by Direct/Comparison Method
10.	High Frequency AC Voltage <sup>#</sup>	<b>1 MHz to 100 MHz</b> 10 mV to 10 V	3.3 %	Using URV-5 R&S by Direct/Comparison Method
		<b>100 MHz to 1 GHz</b> 10 mV to 7 V	3.5 %	
11.	AC Power & Energy 1 $\phi$ & 3 $\phi$ (50Hz)  (Active and Reactive) <sup>#</sup>	10 mA to 120 A 60 V to 240 V UPF – 0.5 PF (lead & Lag)  (0.03 W to 86.4 kW) (0.03 VAR to 86.4 kVAR)	0.023 % to 0.012 %	Using Three Phase Comparator, Make: Zera, Model: COM 3003 By Direct / Comparison Method
12.	Power Factor/ Phase Angle <sup>#</sup> (50 Hz) At 240 V, 5 A	<b>+/- 0.1 – 1.0 (lag &amp; lead)</b> 0° to 180° (Lead & Lag)	0.01 %	Using Three Phase Comparator, Make: Zera, Model: COM 3003 by Direct/comparison Method
13.	AC Resistance <sup>#</sup>	<b>1 kHz</b> 1 $\Omega$ to 100 k $\Omega$	0.3 % to 0.1%	Using Digibridge 1689, Quadtech, USA By Direct/ Comparison Method
14.	RF Power <sup>#</sup>	<b>50 MHz to 2 GHz</b> 1 nW to 1 mW 1 mW to 40 mW	6 % 4 %	Using RF mV Meter – URV-5, R&S Power Sensors, RF Attenuator , RF Amplifier By Direct/ Comparison Method
		<b>50 MHz to 1 GHz</b> 40 mW to 90 W	4 %	

**Vishal Shukla**  
Convenor

**Battal Singh**  
Program Manager

**Laboratory**                      **Electronics Regional Test Laboratory (East), Block: DN, Sector-V, Salt Lake City, Kolkata, West Bengal**

**Accreditation Standard**    **ISO/IEC 17025: 2017**

**Certificate Number**        **CC-2008**                                      **Page**        **4 of 18**

**Validity**                              **21.01.2019 to 20.01.2021**                                      **Last Amended on**    **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
15.	Attenuation# 10 MHz to 1 GHz	<b>50 MHz to 1 GHz</b> 1 dB to 10 dB 10 dB to 60 dB	0.15 dB 0.17 dB	Using RF Level Meter, URV-5,R & S (for Variable Attenuator Calibration, 1dB – 60dB) by Direct/Comparison Method
16.	VSWR#	1.05 to 3 (50 MHz to 2 GHz)	0.15 to 0.3 in VSWR	Using SWR Bridge R & S, ZRB2 , RF Level Meter, URV-5, By Return Loss Method
<b>II.</b>	<b>SOURCE</b>			
1.	DC Voltage#	10 µV to 10 V 10 V to 1000 V	2 % to 0.0003 % 0.0003 % to 0.0004 %	Using Wavetek 4808, DMM-FLK 8508A, DC Voltage Ref STD 7004N, FLK DC Cal System-Null Detector FLK 845AR, Kelvin Verley Divider FLK 720A By Direct / Comparison Method
2.	DC Current#	10 µA to 1 A  1 A to 20 A  20 A to 850 A 20 A to 1000 A	0.01 % to 0.005 %  0.005 % to 0.009 %  0.009 % to 0.06 % 0.53 %	Using FLK 5520A, 5080A, Wavetek 4808, STD"R", DMM-FLK8508A, Agilent 6680A, STD Shunt, By Direct / Comparison Method  Using Calibrator With Current Coil By Direct Method

**Vishal Shukla**  
**Convenor**

**Battal Singh**  
**Program Manager**

**Laboratory**                      **Electronics Regional Test Laboratory (East), Block: DN, Sector-V, Salt Lake City, Kolkata, West Bengal**

**Accreditation Standard**    **ISO/IEC 17025: 2017**

**Certificate Number**        **CC-2008**                                      **Page**        **5 of 18**

**Validity**                              **21.01.2019 to 20.01.2021**                                      **Last Amended on**    **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
3.	DC Resistance <sup>#</sup>	0.0001 $\Omega$ to 100 k $\Omega$ 100 k $\Omega$ to 10 M $\Omega$ 10 M $\Omega$ to 1 T $\Omega$	0.04 % to 0.001 % 0.001 % to 0.003 % 0.003 % to 2 %	Using STD "R", L&N, Tinsley DMM FLK 8508A, Agilent High Resistance Meter By Direct / Comparison Method
4.	Inductance <sup>#</sup>	<b>1 kHz</b> 100 $\mu$ H to 100 mH 100 mH to 10 H	0.1 % to 0.03 % 0.03 % to 0.09 %	Using STD "L", GR 1482 Series By Direct / Comparison Method
5.	Capacitance <sup>#</sup>	<b>1 kHz</b> 10 pF to 1000 pF 1000 pF to 1 mF 1.0 mF to 10 mF <b>1 kHz to 1 MHz</b> 1 pF to 1000 pF	0.003 % to 0.015 % 0.015 % to 0.05 % 0.05 % to 0.38 % 0.12 % to 0.3 %	Using STD "C", GR 1404 Series & 1409 Series By Direct / Comparison Method  Using HP 16380A Series By Direct / Comparison Method
6.	Frequency <sup>#</sup>	10 Hz to 100 kHz 100 kHz to 6 GHz	$5 \times 10^{-4}$ - $5 \times 10^{-6}$ $5 \times 10^{-8}$	Using Pendulum CNT-90, Func Gen Agilent 33250A, Signal Generator, Keysight, E8257D by Direct / Comparison Method
7.	AC Voltage <sup>#</sup>	<b>10 Hz to 45 Hz</b> 1 mV to 1000 V  <b>45 Hz to 10 kHz</b> 1 mV to 100 V 100 V to 1000 V	0.7 % to 0.025 %  0.4 % to 0.008 % 0.008 % to 0.02 %	Using Calibrator Wavetek4808 & IVD FLK 5790A HOLT TVC by Direct/Comparison Method

**Vishal Shukla**  
Convenor

**Battal Singh**  
Program Manager

**Laboratory**                                      **Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal**

**Accreditation Standard**      **ISO/IEC 17025: 2017**

**Certificate Number**              **CC-2008**                                      **Page**              **6 of 18**

**Validity**                                      **21.01.2019 to 20.01.2021**                                      **Last Amended on**      **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
		<b>10 kHz to 50 kHz</b> 1mV to 1 V 1V to 100 V  <b>50 kHz to 1 MHz</b> 1 mV to 100 mV 100 mV to 10 V	0.2 % to 0.014 % 0.014 % to 0.02 %  0.05 % to 1.2 % 0.25 % to 0.12 %	
8.	Time Interval/ Time Period <sup>#</sup>	20 nsec to 2000 sec	0.0002 %	Using Agilent Func. Gen. Freq. Counter Pendulam CNT-90 by Direct / Comparison Method
9.	High Frequency AC Voltage <sup>#</sup>	<b>1 MHz to 1 GHz</b> 10 mV to 7 V	3.5 %	Using Calibrator Wavetek 4808, RF Voltmeter with Insertion Unit, Signal Generator & RF Amplr., AR100W 1000MHz, RF Attenuator by Direct / Comparison Method
10.	AC Current <sup>#</sup>	<b>10 Hz to 5 KHz</b> 10 $\mu$ A to 1 A 1 A to 20 A  <b>50 Hz</b> 10 mA to 100 A  <b>50 Hz</b> 20 A to 1000 A	0.08 % to 0.05 % 0.05 % to 0.035 %  0.013 %  0.55 %	Using Calibrator FLK-5520A,5080A, Wavetek 4808, 8508A, FLK 5790 & Shunt by Direct/ Comparison Method  Using Zera COM3003 by Direct Method  Using Calibrator and Current Coil By Direct Method

**Vishal Shukla**  
Convenor

**Battal Singh**  
Program Manager

**Laboratory**                      **Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal**

**Accreditation Standard**    **ISO/IEC 17025: 2017**

**Certificate Number**        **CC-2008**

**Page**        **7 of 18**

**Validity**                      **21.01.2019 to 20.01.2021**

**Last Amended on**    **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
11.	AC Resistance <sup>#</sup>	<b>1 kHz</b> 1 $\Omega$ to 10 k $\Omega$	0.007 %	Using Tinsley 5685A & 5685B by Direct / Comparison Method
12.	RF Power <sup>#</sup>	<b>30 MHz to 2 GHz</b> 1 nW to 1 mW 1 mW to 40 mW  <b>50 MHz to 1 GHz</b> 40 mW to 90 W	6 % 4 %  4 %	Using RF mV Meter R & S, RF Attenuator, Amplifier Research RF Amplifier 100W1000B & Signal Gen by Direct / Comparison Method
13.	Attenuation <sup>#</sup>	<b>50 MHz to 1 GHz</b> 1 dB to 10 dB  10 dB to 60 dB	0.2 dB  0.2 dB	Using R & S RF Milli Voltmeter URV-5 ,Level Meter with Sensor, HP Power Meter, RF Step Attenuator, RSP By Power Ratio Method

---

**Vishal Shukla**  
Convenor

---

**Battal Singh**  
Program Manager

**Laboratory**                      **Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal**

**Accreditation Standard**    **ISO/IEC 17025: 2017**

**Certificate Number**        **CC-2008**

**Page**        **8 of 18**

**Validity**                      **21.01.2019 to 20.01.2021**

**Last Amended on**    **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
<b><u>MECHANICAL CALIBRATION</u></b>				
<b>1.</b>	<b>DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)</b>			
<b>1.</b>	Gauge Block <sup>§</sup>	Up to 10 mm 10 mm to 25 mm 25 mm to 50 mm 50 mm to 100 mm	0.25 $\mu$ m 0.30 $\mu$ m 0.45 $\mu$ m 0.60 $\mu$ m	Using Gauge Block Calibration Tester & Gauge Block Set K Grade By comparison Method (IS 2984)
<b>2.</b>	Vernier Caliper <sup>§</sup> (Dial/Digital/Analog) L.C.: 0.01 mm L.C.: 0.01 mm	0 to 300 mm 300 mm to 1000 mm	13.5 $\mu$ m 25.0 $\mu$ m	Using Gauge Block Set/Accessory Set By Comparison Method (IS 3651)
<b>3.</b>	External Micrometer <sup>§</sup> L.C.: 0.001 mm L.C.: 0.001 mm L.C.: 0.001 mm L.C.: 0.001 mm L.C.: 0.001 mm L.C.: 0.001 mm L.C.: 0.001 mm	0 to 25 mm 25 mm to 50 mm 50 mm to 75 mm 75 mm to 100 mm 100 mm to 150 mm 150 mm to 300 mm 300 mm to 400 mm	1.8 $\mu$ m 2.0 $\mu$ m 2.5 $\mu$ m 2.8 $\mu$ m 3.0 $\mu$ m 5.0 $\mu$ m 6.0 $\mu$ m	Using Slip Gauge Block Set/Long Gauge Block Set By Comparison Method (IS 2967)
<b>4.</b>	Internal Micrometer <sup>§</sup> L.C.: 0.001 mm	50 mm to 500 mm	6.1 $\mu$ m	Using Gauge Block Set/ Gauge Block Accessories, Long Gauge Block Set By Comparison Method (IS 2967)
<b>5.</b>	Micrometer Setting Standard /Length Bar <sup>§</sup>	25 mm to 600 mm	8.0 $\mu$ m	Using Long Gauge Block Set/Electronic Probe with DRO By Comparison Method (IS 2967)

**Vishal Shukla**  
Convenor

**Battal Singh**  
Program Manager



**Laboratory**                      **Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal**

**Accreditation Standard**    **ISO/IEC 17025: 2017**

**Certificate Number**        **CC-2008**

**Page**            **9 of 18**

**Validity**                      **21.01.2019 to 20.01.2021**

**Last Amended on**    **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
6.	Height Gauge (Dial/Digital/Analog <sup>§</sup> ) L.C.: 0.01 mm	0 to 1000 mm	15.0 $\mu$ m	Using Long Gauge Block Set/Surface Plate By comparison method (IS 2921)
7.	Depth Micrometer <sup>§</sup> L.C.: 0.01 mm	0 to 300 mm	10 $\mu$ m	Using Gauge Block Set/ Surface Plate By Comparison Method
8.	Wire Gauge <sup>§</sup>	Up to 10 mm	6.0 $\mu$ m	Using Profile Projector By comparison method
9.	Plain Plug Gauge <sup>§</sup>	Up to 100 mm	3.0 $\mu$ m	Using Gauge Block Set/ Electronic Comparator By comparison method (IS 3455)
10.	Plunger Dial <sup>§</sup> L.C.: 0.01 mm	0 to 25 mm	8.3 $\mu$ m	Using Dial Calibration Tester By comparison method (IS 2092)
11.	Lever Dial <sup>§</sup> L.C.: 0.01 mm	0 to 2 mm	3 $\mu$ m	Using Dial Calibration Tester By comparison method (IS 11498)
12.	Feeler Gauge <sup>§</sup>	0 to 1 mm	2.8 $\mu$ m	Using Electronic comparator with stand By comparison method (IS 3179)
13.	Test Sieves <sup>§</sup>	0.032 mm to 0.075 mm 0.075 mm to 25 mm	2 $\mu$ m 6 $\mu$ m	Using Profile Projector By comparison method (IS 460)

---

**Vishal Shukla**  
Convenor

---

**Battal Singh**  
Program Manager

**Laboratory**                      **Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal**

**Accreditation Standard**    **ISO/IEC 17025: 2017**

**Certificate Number**        **CC-2008**

**Page**        **10 of 18**

**Validity**                        **21.01.2019 to 20.01.2021**

**Last Amended on**    **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
14.	Radius Gauge Set <sup>§</sup>	R.4 – R25 mm	6 $\mu$ m	Using Profile Projector By comparison method (IS 5273)
15.	Measuring Scale <sup>§</sup> L.C.: 1 mm	0 to 2000 mm	220 $\sqrt{L}$ $\mu$ m L in m	Using Scale & Tape Calibrator By comparison method (IS 1481)
16.	Measuring Tape <sup>§</sup> L.C.: 1 mm	0 to 10 m	220 $\sqrt{L}$ $\mu$ m L in m	Using Scale & Tape Calibrator By comparison method (IS 1269)
17.	PI Tape <sup>§</sup>	0 to 1200 mm	220 $\sqrt{L}$ $\mu$ m L in m	Using Scale & Tape Calibrator By comparison method (IS 1269)
18.	Sine Bar <sup>§</sup>	Up to 500 mm	3.0 arc sec	Using Gauge Block Set/Angle Gauge, Dial Gauge By Comparison Method
19.	Profile Projector <sup>§</sup> L.C.: 0.001 mm L.C.: 1'	Linear 0 to 100 mm 0 to 360°	6.6 $\mu$ m 54 sec	Using Gauge Block Set/Angle Gauge By Comparison Method (JIS B 7184)
20.	Bore Gauge <sup>§</sup> L.C.: 0.01 mm	0 to 2 mm	6.3 $\mu$ m	Using Dial Calibration Tester By Comparison Method
21.	Dial Thickness Gauge <sup>§</sup> L.C.: 0.01 mm	0 to 10 mm	6 $\mu$ m	Using Gauge Block Set By comparison method

**Vishal Shukla**  
Convenor

**Battal Singh**  
Program Manager











**Laboratory**                      **Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal**

**Accreditation Standard**    **ISO/IEC 17025: 2017**

**Certificate Number**        **CC-2008**

**Page**            **16 of 18**

**Validity**                      **21.01.2019 to 20.01.2021**

**Last Amended on**    **01.02.2019**

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
8.	Luminous Flux (Lumen) <sup>\$</sup>	Up to 1500 lm	3.5% of Rdg.	Using Lumen Meter with Integrating Sphere, Standard CFL & LED by Direct Method

---

**Vishal Shukla**  
Convenor

---

**Battal Singh**  
Program Manager



**Laboratory** Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal

**Accreditation Standard** ISO/IEC 17025: 2017

**Certificate Number** CC-2008 **Page** 17 of 18

**Validity** 21.01.2019 to 20.01.2021 **Last Amended on** 01.02.2019

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
<b><u>THERMAL CALIBRATION</u></b>				
<b>I.</b>	<b>TEMPERATURE</b>			
<b>1.</b>	Temperature (Glass Thermometer, Indicator, Temp. Gauge, T/C & RTD, Digital Temp. Meter, Dry & Wet Bulb Thermometer, Dry Well, Sensors & Controller) <sup>§</sup>	(-) 80 °C to 250 °C 250 °C to 550 °C 550 °C to 1200 °C 1200 °C to 1300 °C	0.08 °C 0.12 °C 2.0 °C 3.0 °C	Using Liquid Baths, Dry Block Calibrator, SPRT, Std. PRT, Digital Indicator (Black Stack), Tube Furnace, Std. 'R' Type T/C by Comparison Method
<b>2.</b>	Non -Contact Temperature (IR Thermometer, Optical Pyrometer, Radiation Thermometer) <sup>§</sup>	600 °C to 1300 °C	3.7 °C	Using Black Body Radiation Source, IR Thermometer, Std. R Type T/C with Meter By Comparison Method
<b>3.</b>	Temperature (PRT, T/C, Indicator Temp. Gauge, Sensor & Calibrator) (Bath, Oven, Chamber Incubator (for Non-Medical Applications), Autoclave (for Non-Medical Applications) (Refrigerator & Cold Chamber) (Dry Well Calibrator Hot Chamber, Furnace)*	50 °C to 1200 °C  (-) 50 °C to 300 °C (-) 80 °C to 50 °C 300 °C to 1300 °C	2.0 °C  1.0 °C 1.0 °C 3.0 °C	Using PRT, Dry Block Calibrator, T/C Type 'K' & 'R' By Comparison Method  Using RTD & Data Logger  Using RTD & Data Logger  Using 'R' Type T/C & Four Channel Thermometer

**Vishal Shukla**  
Convenor

**Battal Singh**  
Program Manager

Laboratory Electronics Regional Test Laboratory (East), Block: DN, Sector-V,  
Salt Lake City, Kolkata, West Bengal

Accreditation Standard ISO/IEC 17025: 2017

Certificate Number CC-2008

Page 18 of 18

Validity 21.01.2019 to 20.01.2021

Last Amended on 01.02.2019

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
II.	<b>SPECIFIC HEAT &amp; HUMIDITY</b>			
1.	Relative Humidity (%RH) (Environmental & Humidity Chamber) *	35 % to 95 % RH 25 °C to 50 °C	2.5 % RH 1.0 °C	Using RTD, Data Logger & Humidity Indicator By Comparison Method
2.	Relative Humidity (% RH) (RH Sensor, RH Meter, RH Indicator, Digital Hygrometer) §	35 % to 95 % RH 25 °C to 50 °C	2.5 % RH 1 °C	Using Standard RH Meter Humidity Source (Chamber) RTD & Data Logger 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.

---

Vishal Shukla  
Convenor

---

Battal Singh  
Program Manager