

**Laboratory** Electrical Research and Development Association, R-336, TTC Industrial Area, MIDC Rabale, Thane-Belapur Road, Navi Mumbai, Maharashtra

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

**Certificate Number** CC-2640 (in lieu of C-1064)

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**Validity** 01.04.2018 to 31.03.2020

**Last Amended on** 04.07.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
<b><u>ELECTRO-TECHNICAL CALIBRATION</u></b>				
<b>1.</b>	<b>MEASURE</b>			
1.	DC Voltage <sup>#</sup>	10 mV to 1000 V DC	0.09 % to 0.005 %	Using 6½ Digital Multimeter Agilent 34401A by Direct Method
2.	DC Current <sup>#</sup>	1 mA to 3 A DC 3 A DC to 20 A DC	0.02 % 0.02 % to 0.20 %	Using 6½ Digital Multimeter Agilent 34401A by Direct Method/ Power Analyzer WT3000 by Direct Method
3.	AC Voltage <sup>#</sup>	<b>50 Hz</b> 50 mV to 750 V 750 V to 1 kV	0.93 % to 0.03 % 0.03 % to 0.06 %	Using 6½ Digital Multimeter Agilent 34401A/ Power Analyzer WT3000 by Direct Method
4.	AC Current <sup>#</sup>	<b>50 Hz</b> 10 mA to 120 A	0.10 % to 0.06 %	Using Zera Portable Energy Meter MT3000/ 6½ Digital Multimeter Agilent 34401A by Direct/ Comparison Method
5.	Frequency <sup>#</sup>	20 Hz to 300 kHz 300 kHz to 1 MHz	0.005 % to 0.002 % 0.002 % to 0.02 %	Using 6½ Digital Multimeter Agilent 34401A/ Power Analyzer WT3000 by Direct Method

**Rajeshwar Kumar**  
Convenor

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Program Manager

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6.	Resistance <sup>#</sup>	1m $\Omega$ to 10 $\Omega$ 10 $\Omega$ to 1M $\Omega$ 1M $\Omega$ to 100 M $\Omega$	0.10 % to 0.02 % 0.05 % to 0.01 % 0.01 % to 0.63 %	Using 6½ Digital Multimeter Agilent 34401A/ Universal Calibration System Fluke/ Wavetek 9100 by Direct Method / Comparison Method
7.	High Voltage <sup>#</sup>	1 kV to 100 kV AC 1 kV to 5 kV DC	2.32 % to 2.10 % 1.75 % to 1.90 %	Using AC/DC HV Divider with kV Meter / Oscilloscope by Direct / Comparison Method
8.	Current Transformer <sup>#</sup> Ratio Error/Phase Displacement	3200 to 5/1 & 5A	0.02 % 1.04 min	Using Std. CT and Eltel AITTS Bridge by Comparison Method
9.	Voltage Transformer <sup>#</sup> Ratio Error/Phase Displacement	220 to 2200//110V 220/ $\sqrt{3}$ -200/ $\sqrt{3}$ //110/ $\sqrt{3}$ V 3300 to 11000//110V 3300/ $\sqrt{3}$ - 11000/ $\sqrt{3}$ //110/ $\sqrt{3}$ V 22kV to 33kV//110V 22/ $\sqrt{3}$ kV-33/ $\sqrt{3}$ kV//110/ $\sqrt{3}$ V	0.08 % 1.72 min	Using Std. PTs and Eltel AITTS Bridge by Comparison Method
10.	Time <sup>#</sup>	10 s to 86400 s	1.64 s to 44.09 s	Using Digital Time Interval Meter by Direct / Comparison Method
11.	Power Factor <sup>#</sup>	UPF -0.01PF Lead/Lag 10 V to 300 V 0.05 A to 120 A 50 Hz	0.04 % to 2.65 %	Using Zera Portable Energy Meter MT 3000 by Direct Method/ Comparison Method

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12.	AC Power <sup>#</sup> 1-Phase / 3-Phase	0.25 W to 36 kW 10 V to 300 V 0.05 A to 120 A 50 Hz UPF -0.01PF Lead/Lag	5.83 % to 0.07 %	Using Zera Portable Energy Meter MT 3000 by Direct Method/Comparison Method
13.	AC Power <sup>#</sup> (Apparent Power) 1-Phase / 3-Phase	2 VA to 24 kVA 10 V to 300 V 0.05 A to 80 A 50 Hz	0.07 %	Using Zera Portable Energy Meter MT 3000 by Direct Method/Comparison Method
<b>II. SOURCE</b>				
1.	DC Voltage <sup>#</sup>	10 mV to 1000 V DC	0.03 % to 0.007 %	Using Universal Calibration System Fluke / Wavetek 9100 by Direct Method
2.	DC Current <sup>#</sup>	10 $\mu$ A to 300 mA 300 mA to 20 A 20 A to 990 A	0.06 % to 0.03 % 0.03 % to 0.02 % 0.42 % to 0.24 %	Using Universal Calibration System Fluke/ Wavetek 9100 With Current Coils by Direct Method
3.	Resistance <sup>#</sup>	0.1 m $\Omega$ 1 m $\Omega$ 10 m $\Omega$  0.1 $\Omega$ to 1 $\Omega$ 1 $\Omega$ to 45 k $\Omega$ 45 k $\Omega$ to 10 M $\Omega$	0.11 % 0.04 % 0.03 %  7.61 % to 2.12 % 1.46 % to 0.03 % 0.03 % to 0.31 %	Using Standard Resistors Vaisheshika/ Yokogawa by Direct Method  Decade Resistance Box Cropico / Universal Calibration System Fluke Wavetek 9100 by Direct Method

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		1 k $\Omega$ to 10 M $\Omega$ 10 M $\Omega$ to 1 T $\Omega$	0.07 % to 0.09 % 0.09 % to 2.92 %	Megohm Decade Box Tinsley by Direct Method
4.	AC Voltage #	<b>20 Hz to 100 kHz</b> 20 mV to 100 V AC  <b>20 Hz to 1 kHz</b> 100 V to 1000 V AC	0.68 % to 0.03 %  0.17 % to 0.02 %	Using Universal Calibration System Fluke/Wavetek 9100 by Direct Method
5.	AC Current #	<b>50 Hz</b> 100 $\mu$ A to 3 AAC 3 A to 20 A AC 20 to 950 A AC	0.48 % to 0.03 % 0.03 % to 0.04 % 0.44 % to 0.24 %	Using Universal Calibration System Fluke/ Wavetek 9100 with Current Coil by Direct Method
6.	Frequency #	10 Hz to 1 MHz	0.006 % to 0.007 %	Using Universal Calibration System Fluke/ Wavetek 9100 by Direct Method
7.	Capacitance #	1 nF to 1 mF	2.08 % to 0.77 %	Using Universal Calibration System Fluke/ Wavetek 9100 by Direct Method
8.	AC Power# 1-Phase / 3-Phase (Active Power)	3.75 W to 11.5 kW 15 V to 575 V 0.5 A to 20 A, 50 Hz 0.5 PF to UPF	0.10 %	Using Universal Calibration System Fluke / Wavetek 9100 by Direct Method
9.	AC Power# 1-Phase / 3-Phase (Active/Apparent Power)	0.005 W to 46 kW 10 V to 575 V 0.01 A to 80 A UPF- 0.01PF Lead/Lag 50 Hz	0.12 % to 0.018 %	Using Electrical Power Standard Master 6105A by Direct Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
		0.1 VA to 46 kVA 10 V to 575 V 0.01 A to 80 A 50 Hz	0.011 % to 0.018 %	
10.	Power Factor <sup>#</sup>	UPF to 0.1 PF Lead/Lag 50 V to 575 V 0.5 A to 20 A  UPF- 0.01PF Lead/Lag 10 V to 575 V 0.01 A to 80 A	0.10 % to 0.18 %	Using Universal Calibration System Fluke / Wavetek by Direct Method  Using Electrical Power Standard Master 6105A by Direct method
11.	AC Energy <sup>#</sup> 1-Phase/3-Phase, Active & Reactive Energy	45 Hz to 55 Hz 63.5 V to 240 V 0.01 A to 120 A UPF – 0.25 PF	0.03 %	Using MTE Std. SRS 400.3 /Zera Portable Energy Meter MT 3000 by Direct Method/ Comparison Method

\* Measurement Capability is expressed as an uncertainty ( $\pm$ ) at a confidence probability of 95%

<sup>s</sup> Only in Permanent Laboratory

<sup>#</sup> 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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