

Laboratory Essjay Technomeasure Pvt. Ltd., 36, Kantapukur 3rd Bye Lane, Flat No. D-1, 3rd Floor, Howrah, Kolkata, West Bengal

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2628 (In lieu of C-0351, C-0572, C-0611) **Page** 1 of 13

Validity 03.02.2018 to 02.02.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO TECHNICAL CALIBRATION</u>				
I.	SOURCE MODE			
1.	DC Voltage [#]	1 mV to 10 mV 10 mV to 300 mV 300 mV to 300 V 300 V to 1000 V	0.52 % to 0.06 % 0.06 % to 0.01 % 0.01 % 0.01 %	Using Fluke9100 Multifunction Calibrator by Direct Method
2.	AC Voltage [#]	50 Hz to 10 kHz 10 mV to 100 mV 100 mV to 500 V 50 Hz to 1 kHz 500 V to 1000 V	4.39 % to 0.07 % 0.07 % to 0.12 % 0.12 % to 0.07 %	Using Fluke9100 Multifunction Calibrator by Direct Method
3.	DC Current [#]	1 μ A to 10 μ A 10 μ A to 300 μ A 300 μ A to 300 mA 300 mA to 1A 1 A to 20 A 20 A to 100 A 100 A to 550 A 550 A to 1000 A	1.58 % to 0.17 % 0.17 % to 0.02 % 0.02% 0.02 % to 0.09 % 0.09 % to 0.1 % 2.05 % to 1.8 % 1.8 % to 0.91 % 0.91 %	Using Fluke9100 Multifunction Calibrator by Direct Method With Current coil
4.	AC Current [#]	50 Hz to 3 kHz 300 μ A to 1 mA 1 mA to 30 mA 30 mA to 300 mA 300 mA to 1A 1 A to 20 A 50 Hz	0.19 % to 0.14 % 0.14 % to 0.21 % 0.21% to 0.11 % 0.11 % to 0.19 % 0.19 % to 0.27 %	Using Fluke9100 Multifunction Calibrator by Direct Method

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		20 A to 100 A 100 A to 550 A 550 A to 1000 A	2.87 % to 1.87 % 1.87 % to 0.87 % 0.87 % to 0.55 %	With Current coil
5.	Resistance [#]	1 Ω to 300 Ω 300 Ω to 300 k Ω 300 k Ω to 400 M Ω 50 $\mu\Omega$ to 200 $\mu\Omega$ 200 $\mu\Omega$ to 1 m Ω 1 m Ω to 200 m Ω 200 m Ω to 0.5 Ω 0.5 Ω to 19.99 k Ω 1 M Ω to 100 V 2 G Ω to 1000 V 5 G Ω to 1000 V 10 G Ω to 5000 V	1.38 % to 0.04 % 0.04 % 0.04 % to 0.36 % 1.65 % to 0.98 % 0.98 % to 0.89 % 0.89 % to 0.14 % 0.14 % to 0.18 % 0.18 % to 0.12 % 1.49 % 1.33 % 1.30 % 1.15 %	Using Fluke9100 Multifunction Calibrator by Direct Method Using Time Electronics 5070 Ductor Tester/Micro Ohmmeter Calibrator and 1051 Decade Resistance Box by Direct Method Using Cropico RH9A Megaohm Decade Box by Direct Method
6.	Frequency [#]	10 Hz to 400 kHz	0.008 % to 0.002 %	Using Fluke9100 Multifunction Calibrator by Direct Method
7.	DC Capacitance [#]	1 nF to 300 μ F	5.37 % to 0.95 %	Using Fluke9100 Multifunction Calibrator by Direct Method
8.	Temperature Simulation [#] K,J,R,S-Type Thermocouple E-Type Thermocouple N-Type Thermocouple T-Type Thermocouple L-Type Thermocouple	(-)250 $^{\circ}$ C to 1700 $^{\circ}$ C (-)250 $^{\circ}$ C to 1000 $^{\circ}$ C (-)200 $^{\circ}$ C to 1300 $^{\circ}$ C (-)250 $^{\circ}$ C to 400 $^{\circ}$ C (-)200 $^{\circ}$ C to 900 $^{\circ}$ C 500 $^{\circ}$ C to 1800 $^{\circ}$ C	1.12 $^{\circ}$ C 0.52 $^{\circ}$ C 0.38 $^{\circ}$ C 0.67 $^{\circ}$ C 0.48 $^{\circ}$ C 0.97 $^{\circ}$ C	Using Fluke9100 Multifunction Calibrator by Simulation Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	B-Type Thermocouple RTD-Type	(-)199.9 °C to 850 °C	0.35 °C	
II.	MEASURE MODE			
1.	DC Voltage [#]	1 mV to 1 V 1 V to 1000 V	0.43 % to 0.013 %	Using 6 ½ Fluke 8846A DMM by Direct Method
2.	DC High Voltage [*]	1 kV to 5 kV 5 kV to 35 kV	7.8 % to 3 % 3 % to 2.8 %	Using HV Probe 80k40 & DMM by Direct method
3.	AC Voltage [#]	50 Hz 10 mV to 1 V 1 V to 1000 V	0.74 % to 0.15 % 0.15 % to 0.19 %	Using 6 ½ Fluke 8846A DMM by Direct Method
4.	AC High Voltage [*]	50 Hz 1 kV to 5 kV 5 kV to 35 kV	8.1 % to 5.8 % 5.8 % to 6 %	Using HV Probe 80k40 & DMM by Direct method
5.	DC Current [#]	100 μ A to 100 mA 100 mA to 1 A 1 A to 10 A	0.70 % to 0.1 % 0.1 % to 0.17 % 0.17 % to 0.20 %	Using 6 ½ Fluke 8846A DMM by Direct Method
6.	AC Current [#]	50 Hz 10 mA to 100 mA 100 mA to 1 A 1 A to 10 A	0.30 % to 0.17 % 0.17 % to 0.63 % 0.63 %	Using 6 ½ Fluke 8846A DMM by Direct Method
7.	Resistance [#]	1 Ω to 1 k Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω 100 k Ω to 100 M Ω	0.77 % to 0.46 % 0.46 % to 0.14 % 0.14 % to 0.06 % 0.06 % to 1.06 %	Using 6 ½ Fluke 8846A DMM by Direct Method
8.	Frequency ^{\$}	10 Hz to 1 kHz	0.10 % to 0.09 %	Using 6 ½ Fluke 8846A DMM by Direct Method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
9.	RTD ^{\$}	(-) 200 °C to 600 °C	0.17 °C to 0.29 °C	Using 6 ½ Fluke 8846A DMM by Direct Method
10.	Energy Phase I ^{\$}	50 Hz 220 V, 1 A to 5 A 0.9 to UPF	1.18 %	Using Power line Analyzer By Direct Method
11.	DC Capacitance [#]	1 nF to 100 μ F	2.51 % to 0.95 %	Using 6 ½ Fluke 8846A DMM by Direct Method
12.	Time ^{\$}	0 to 15 Minute	0.08 s to 12 s	Using Digital Timer by Direct Method

MECHANICAL CALIBRATION

I.	DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)			
1.	Digital Indicator/Plunger Dial Gauge ^{\$} L.C: 0.001 mm	0 to 25 mm	1.90 μ m	Using Dial Calibration Tester by Comparison method,IS:2092

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
2.	Foils ^s	0.01 to 2 mm	2.10 μ m	Using Digital Outside Micrometer by Comparison method
3.	Feeler Gauge ^s	0.05 to 2 mm	1.70 μ m	Using Digital Outside Micrometer by Comparison method
4.	Plain Plug Gauge ^s	Upto 250 mm	4.50 μ m	Using Slip Gauge & Digital Indicator by Comparison method
5.	Snap Gauge ^s	5 to 250 mm	2.20 μ m	Using Slip Gauge & Digital Indicator by Comparison method,
6.	Depth Vernier Gauge ^s L.C: 0.02 mm	0 to 300 mm	12.00 μ m	Using Slip Gauge & Surface Plate by Comparison method
7.	Depth Micrometer ^s L.C: 0.01 mm	0 to 150 mm	5.95 μ m	Using Slip Gauge & Surface Plate by Comparison method,
8.	Thickness Gauge ^s	0 to 10 mm	8.25 μ m	Using Slip Gauge by Comparison method
9.	Test Sieve ^s	45 μ m to 2.36 mm 2.36 mm to 125 mm	4.50 μ m 20.80 μ m	Using Profile Projector by Comparison Using Digimatic Caliper by Comparison
10.	Lever type Dial Gauge ^s L.C:0.01 mm	0 to 1 mm	1.90 μ m	Using Dial Calibration Tester by Comparison

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11.	Bore Dial Gauge (For Transmission movement) [§] , L.C:0.01 mm	0 to 2 mm	1.90 μ m	Using Dial Calibration Tester by Comparison
12.	Inside Micrometer [§] L.C: 0.01 mm	50 mm to 1000 mm	9.50 μ m	Using Slip Gauge & Digital Indicator by Comparison method
13.	Outside Micrometer [§] L.C: 0.001 mm Head L. C.:0.01 mm Head	0 to 25 mm Above 25 mm to 600 mm	1.80 μ m 4.50 μ m	Using Slip Gauge by Comparison method
14.	Setting Rod [§]	25 to 600 mm	7.20 μ m	Using Slip Gauge, Digital Indicator & Comparator Stand By Comparison Method
15.	Digimatic Caliper [§] L.C:0.005 mm L. C.: 0.01 mm	0 to 300 mm 0 to 1000 mm	4.60 μ m 9.90 μ m	Using Slip Gauge, Long gauge block Digital Micrometer By Comparison Method
16.	Height Gauge [§]	0 to 600 mm	8.60 μ m	Using Slip Gauge, Surface Plate By Comparison Method
17.	Steel Scale [§]	0 to 2000 mm	58.40 μ m	Using Tape Scale Calibrator by comparison Method
18.	Steel Tape Fiber Tape (Wooven) Pie Tape [§]	0 to 50 m	120 μ m/m	Using Tape Scale Calibrator by comparison method,IS:1269

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
19.	Radius Gauge (Concave/Convex) [§]	0.25 mm to 40 mm	6.00 μ m	Using Profile Projector by comparison method
20.	Thread Pitch Gauge [§]	Pitch 0.25 mm to 6 mm Angle 55° /60 °	4.60 μ m 27s	Using Profile Projector by comparison method
21.	Bevel Protector [§]	0 to 180°	5.4 Arc min	Using Profile Projector by comparison method
22.	Scale for Eye Piece/Brinell Microscope [§]	10 mm	4.50 μ m	Using Profile Projector by comparison method,IS:8275
23.	Pistol Caliper [§] L.C:0.01 mm	0 to 250 mm	40 μ m	Using Slip Gauge by comparison method
24.	Coating Thickness Gauge [§]	0 to 2000 μ m	3.2 μ m	Using Standard Foils by comparison method
II.	Torque Generating Devices			
1.	Torque Wrench [§] (Type-I Class B,C) (Type-II Class A,B,C)	10 Nm to 100 Nm 100 Nm to 715 Nm	2.2 % 4.5 %	Using Torque Sensor & Indicator
III.	ACCELERATION AND SPEED			
1.	RPM [§] (Non-Contact Type)	20 RPM to 40000 RPM	0.88 %	Using Digital Tachometer & LED type RPM by Comparison Method
IV.	DUROMETER			

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
1.	Rubber Hardness Tester (Shore A/D) §	0 to 100 Shore (A/D)	2.1 %	Using Shore A and Shore D Calibrator

V.	UTM, TENSION CREEP AND TORSION TESTING MACHINE			
1.	Static Uniaxial Testing Machine (Compression mode) (Tension mode) *	200 N to 2000 Kn 200 N to 200 kN	1.1 % 0.51%	Using Proving Ring and Dynameters
VI.	HARDNESS TESTING MACHINES			
1.	Rockwell Hardness Tester *	HRA HRB HRC	1.9 HRA 1.4 HRB 0.7 HRC	Using Standard Hardness Test blocks by comparison method
2.	Brinell Hardness Tester *	HBW 10/3000	2.0 %	Using Standard Hardness Test blocks by comparison method
3.	Vickers Hardness Tester *	HV 5 HV 30	2.8 % 2.7 %	Using Standard Hardness Test blocks by comparison method
VII.	IMPACT TESTING MACHINE			
1.	Impact Testing Machine for Metallic materials *	Charpy: 0 to 300 J	2.4 %	Using Force Proving Instrument, Clinometers and other gauges & instruments
		Izod: 0 to 170 J	1.3 %	

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				Instrument, Clinometers and other gauges & instruments
VIII.	WEIGHTS			
1.	Mass/Weights ^{\$}	1 mg	0.02 mg	Using E2 class standard weights ABBA method with Digital weighing balance up to 60g/200 g of d=0.01 mg and d=0.1 mg
		2 mg	0.02 mg	
		5 mg	0.02 mg	
		10 mg	0.02 mg	
		20 mg	0.03 mg	
		50 mg	0.03 mg	
		100 mg	0.03 mg	
		200 mg	0.03 mg	
		500 mg	0.03 mg	
		1 g	0.03 mg	
		2 g	0.03 mg	
		5 g	0.03 mg	
		10 g	0.03 mg	
		20 g	0.03 mg	
		50 g	0.05 mg	
		100 g	0.2 mg	
		200 g	0.2 mg	
		500 g	0.04 g	Using F1 class weights and Digital Weighing balance up to 3 kg with d=10 mg and upto 30 kg with d=0.1 g
		1 kg	0.04 g	
		2 kg	0.04 g	
		5 kg	0.2 g	
		10 kg	0.2 g	
		20 kg	0.2 g	For calibration of M2 class weights and coarser

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IX.	WEIGHING SCALE AND BALANCE			
1.	Electronic weighing balance [#] d>0.01 mg d>10 mg d>0.1 g	1 mg to 60 g >60 g to 200 g >200 g to 3 kg >3 kg to 30 kg	0.05 mg 0.16 mg 0.05 g 0.2 g	Using E1 class standard weights(1 mg to 200 g) For calibration of Class I weighing balances and coarser as per OIML R-76 Using F1 class standard weights(>200 g to 30 kg) & Calibration of Class II weighing balances and coarser as per OIML R-76
X.	VOLUME			
1.	Piston Pipettes- Micro pipettes ^{\$}	>10 μ l to 100 μ l >100 μ l to 1000 μ l >1000 μ l to 2000 μ l >2000 μ l to 5000 μ l	0.2 μ l 0.75 μ l 0.75 μ l 0.75 μ l	Using Digital balance up to 80 g/200 g readability 0.01/0.2 mg and distilled water of known density)
2.	Glass wares- Glass pipettes Graduated/non graduated ^{\$}	0.1 ml to 25 ml	17.5 μ l	Using Digital balance up to 80 g/200 g readability 0.01/0.2 mg and up to 3000 g distilled water of known density & Glass wares .
3	Glass Burettes ^{\$}	1 ml to 50 ml	19.6 μ l	Using Digital balance up to 80 g/200 g readability 0.01/0.2 mg and up to 3000

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
				g distilled water of known density & Glass wares
4.	Measuring Cylinder/Volumetric flask/Conical flask/Beaker	2 ml to 100 ml >100 ml to 200 ml >200 ml to 1000 ml >1000 ml to 2000 ml	30 μ l 62 μ l 0.5 ml 1.1 ml	Using Digital balance up to 80 g/200 g readability 0.01/0.2 mg and up to 3000 g distilled water of known density & Glass wares
XI.	PRESSURE INDICATING DEVICES			
1.	Pressure-Hydraulic ^s (Dial/Digital Pressure Gauges and calibrators)	5 bar to 1000 bar	0.21 % of reading	Using Hydraulic Dead Weight Tester by comparison method as per (DKD-R-6-1)
2.	Hydraulic Pressure [#] (Dial/Digital Pressure Gauges and calibrators, Pressure Switches and Pressure Transmitters)	0 to 400 bar >400 bar to 700 bar >700 bar to 1000 bar	0.59 bar 0.29 bar 0.21 % of reading	Using Calibrated Digital Pressure and Vacuum Gauge by comparison method as per (DKD-R-6-1)
3	Pressure-Pneumatic [#] (Dial/Digital Pressure Gauges and calibrators, Pressure Switches and Pressure Transmitters)	0 to 20 bar	0.008 bar	Using Calibrated Digital Pressure and Vacuum Gauge by comparison method as per (DKD-R-6-1)
4.	Dial/Digital Vacuum [#] Gauges/indicators	(-0.85 bar to 0 bar)	0.008 bar	Using Calibrated Digital Pressure and Vacuum

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	and calibrators			Gauge by comparison method as per (DKD-R-6-1)

THERMAL CALIBRATION

I	TEMPERATURE			
1.	Liquid in Glass Thermometer, RTDs/ Thermocouples Temperature sensor with or without	>(-)30 °C to 50 °C >50 °C to 250 °C	0.2 °C 0.3 °C	Using Standard Master Sensor (Pt-100) with 6 ½ Digit multimeter as a readout and liquid Temperature baths by comparison method.

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	Indicator, Dial Thermometer, Thermistor [#]			
2.	RTDs/ Thermocouples Temperature sensor with or without Indicator, Dial Thermometer, Thermistor [§]	>250 °C to 400 °C >400 °C to 1200 °C	0.82 °C 2.5 °C	Using Standard Master Sensor (Pt-100) & R type thermocouple with 6 ½ Digit multimeter as a readout & Dry Block temperature baths by comparison method.
3.	Temperature indicator of Digital/Analogue BOD incubator, Industrial Furnaces/Ovens/Defreeze/Cooler [*]	>(-)80 °C to 0 °C >0 °C to 50 °C >50 °C to 250 °C	0.5 °C 0.8 °C 1 °C	Using Standard Master Sensor (Pt-100) with Yokogawa Handy calibrator/Digital Multimeter as a readout by comparison method (Single Position)
4.	Temperature indicator of Digital/Analogue BOD incubator, Industrial Furnaces/Ovens/Defreeze/Cooler [*]	>250 °C to 1000 °C >1000 °C to 1400 °C	3.5 °C 3.7 °C	Using Standard Master Sensor R-type thermocouple with Yokogawa Handy calibrator/Digital Multimeter as a readout by comparison method (Single Position)

* 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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