

Laboratory Godrej & Boyce Mfg. Co. Ltd., Lawkim Motors Group, No.1, SIDCO Industrial Estate, Ambattur, Chennai, Tamil Nadu

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 1 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>ELECTRO-TECHNICAL CALIBRATION</u>				
I.	SOURCE			
1.	DC Voltage [#]	1 mV to 10 mV 10 mV to 100 mV 100 mV to 1000 V	0.43 % to 0.06 % 0.06 % to 0.009 % 0.009 % to 0.004 %	Using Multiproduct Calibrator 3041 Transmille By Direct Method
2.	DC Current [#]	100 μ A to 1 A 1 A to 30 A 20 A to 100 A 100 A to 1000 A	0.1 % to 0.06 % 0.06 % to 0.16 % 2.24 % to 2.32 % 2.32 % to 2.31 %	Using Multiproduct Calibrator 3041 Transmille By Direct Method Using Multiproduct Calibrator 3041 Transmille with Current Coil By Direct Method
3.	DC Resistance [#]	1 m Ω to 10 m Ω 10 m Ω to 100 m Ω 100 m Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 100 k Ω 100 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 10 G Ω 10 G Ω to 1 T Ω	2.58 % to 1.16 % 1.16 % to 0.58 % 0.58 % to 0.23 % 0.23 % to 0.058 % 0.058 % to 0.012 % 0.012 % to 0.12 % 0.12 % to 1.3 % 1.3 % 2.35 %	Using Decade Resistance Box By Direct Method
4.	AC Voltage [#]	@ 10 Hz 1 mV to 20 V @ 50 Hz 20 mV to 100 mV 100 mV to 1000 V	6.47 % to 0.25 % 0.2 % to 0.09 % 0.09 % to 0.12 %	Using Multiproduct Calibrator 3041 Transmille By Direct Method

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 2 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
		@ 10 kHz 200 mV to 100 V 100 V to 1000 V	0.4 % to 0.15 % 0.15 % to 0.22 %	
5.	AC Current #	@ 50 Hz 25 μ A to 1 A 1 A to 30 A @ 1 kHz 100 μ A to 1 A 1 A to 20 A @ 50 Hz 20 A to 100 A 100 A to 1000 A	1.28 % to 0.18 % 0.18 % to 0.22 % 1.22 % to 0.78 % 0.78 % to 0.38 % 2.40 % to 2.33 % 2.33 % to 2.30 %	Using Multiproduct Calibrator 3041 Transmille By Direct Method Using Multiproduct Calibrator 3041 Transmille with Current Coil By Direct Method
6.	Frequency #	1 Hz to 10 Hz 10 Hz to 10 MHz 10 MHz to 4 GHz 4 GHz to 22 GHz	0.005 % 0.0026 % 0.058 ppm 0.035 ppm	Using Multifunction Calibrator MC6 -Beamex by Direct Method Using Multiproduct calibrator 3041 Transmille by Direct Method RF Reference Source, Fluke 9640A-LPNX Signal Generator , R&S, SMF 100A
7.	RF & Microwave Power #	100 kHz to 10 MHz (-) 20 dBm to 13 dBm	0.32 dB	Using RF Reference Source, Fluke 9640A-LPNX

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 3 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

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		10 MHz to 4 GHz (-) 60 dBm to 13 dBm 4 GHz to 10 GHz (-) 50 dBm to 10 dBm 10 GHz to 22 GHz (-) 40 dBm to 10 dBm	0.39 dB to 0.68 dB 0.71 dB 0.71 dB	Signal Generator, R&S, SMF 100A
8.	Modulation # A.M Frequency Rate Depth	10 MHz to 1 GHz 50 Hz to 100 kHz 5 % to 99 %	1.9 % to 4.0 %	Using RF Reference Source, Fluke 9640A-LPNX by Direct Method
9.	DC Power #	0.003 W (10 mV, 0.3 A) to 1 W (1 V, 1 A) 1 W (1 V, 1 A) to 20 kW (1000 V, 20 A)	2 % to 0.37 % 0.37 % to 0.25 %	Using Multiproduct Calibrator 3041 Transmille By Direct Method
10.	AC Power # PF= \pm 0.1 to 1	@ 50 Hz 3.6 W to 7.2 kW (120 V to 240 V) (0.3 A to 30 A)	0.9 % to 0.53 %	Using Multiproduct Calibrator 3041 Transmille By Direct Method
11.	Power Factor # (120V - 240V) (0.3A - 30A)	\pm 0.1 to 1	0.03 PF	Using Multiproduct Calibrator 3041 Transmille By Direct Method
12.	Capacitance #	@ 1 kHz 90 pF to 10 nF 10 nF to 10 μ F 10 μ F to 100 μ F	7.41 % 7.41 % to 5.78 % 5.78 %	Using Capacitance Box By Direct Method
13.	Inductance #	@ 1 kHz 1 mH to 10 H	3.5 %	Using Capacitance Box By Direct Method

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Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 4 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
14.	Oscilloscope #	@ 1 kHz, Sine Wave	0.6 % to 0.7 %	Using Multiproduct Calibrator 3041 Transmille, RF Reference Source, Fluke 9640A-LPNX by Direct Method
	Amplitude	2 mV/ Div (12 mV) to 20 V/ Div (120 V)	0.3 % to 0.006 %	
	Time Base Band Width	20 nS/Div to 1 S/Div 50 kHz to 4 GHz	0.3 dB to 0.5 dB	
15.	Temperature Simulation #			Using Multifunction Calibrator MC6 -Beamex by Direct Method
	RTD	(-) 200 °C to 850 °C	0.10 °C	
	T/C 'B'	200 °C to 500 °C	1.73 °C	
		500 °C to 800 °C	0.70 °C	
		800 °C to 1800 °C	0.64 °C	
	T/C 'R'	(-) 50 °C to 150 °C	0.92 °C	
		150 °C to 1700 °C	0.40 °C	
	T/C 'S'	(-) 50 °C to 100 °C	0.81 °C	
		100 °C to 1700 °C	0.46 °C	
	T/C 'N'	(-) 200 °C to 0 °C	0.34 °C	
0 °C to 1300 °C		0.16 °C		
T/C 'T'	(-) 200 °C to 0 °C	0.24 °C		
	0 °C to 400 °C	0.09 °C		
T/C 'K'	(-) 200 °C to 0 °C	0.25 °C		
	0 °C to 1300 °C	0.18 °C		
T/C 'E'	(-) 200 °C to 1000 °C	0.15 °C		
T/C 'J'	(-) 200 °C to 1200 °C	0.20 °C		
II.	MEASURE			
1.	DC Voltage [§]	1 mV to 100 mV	0.5 % to 0.013 %	Using 7½ DMM TIME Electronics 5075 by Direct Method
		100 mV to 10 V	0.013 % to 0.003 %	
		10 V to 1000 V	0.003 % to 0.005 %	
2.	DC Current [§]	10 µA to 100 mA	0.11 % to 0.016 %	Using 7½ DMM TIME Electronics 5075 by Direct Method
		100 mA to 1 A	0.016 % to 0.03 %	
		1 A to 30 A	0.03 % to 0.18 %	

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Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 5 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

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3.	AC Voltage ^{\$}	@ 50 Hz 10 mV to 100 mV 100 mV to 300 V 300 V to 1000 V	0.5 % to 0.12 % 0.12 % to 0.40 % 0.40 % to 0.68 %	Using 7½ DMM TIME Electronics 5075 by Direct Method
4.	AC Current ^{\$}	@ 50 Hz 30 µA to 300 mA 300 mA to 3 A 3 A to 30 A	1.2 % to 0.35 % 0.35 % to 0.64 % 0.64 % to 0.40 %	Using 7½ DMM TIME Electronics 5075 by Direct Method
5.	DC High Voltage ^{\$}	1 kV to 20 kV	2.20 % to 2.01 %	Using HV Divider with kV Meter by Comparison Method
6.	AC High Voltage ^{\$}	@ 50 Hz 1 kV to 20 kV	2.45 % to 2.38 %	Using HV Divider with kV Meter by Comparison Method
7.	AC Voltage [#]	@ 1 kHz 10 mV to 1 V 1 V to 100 V 100 V to 1000 V @ 100 kHz 10 mV to 10 V	0.54 % to 0.10 % 0.1 % 0.1 % 1.65 % to 1.66 %	Using 6½ DMM Fluke 8846A by Direct Method
8.	AC Current [#]	@ 1 kHz 10 µA to 10 mA 10 mA to 1 A 1 A to 10 A @ 5 kHz 100 mA to 1 A 1 A to 10 A	1.05 % to 0.25 % 0.25 % to 0.17 % 0.17 % to 0.35 % 0.18% 0.17% to 1.13%	Using 6½ DMM Fluke 8846A by Direct Method

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Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 6 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

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9.	DC Resistance #	1 Ω to 1 k Ω 1 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω 100 M Ω to 1 G Ω	0.31 % to 0.03 % 0.03 % to 0.05 % 0.05 % to 0.08 % 0.08 % to 0.93 % 0.93 % to 2.6 %	Using 6½ DMM Fluke 8846A by Direct Method
10.	Frequency #	1 Hz to 10 Hz 10 Hz to 1000 kHz 1 MHz to 22 GHz	0.07 % 0.02 % to 0.02 % 0.17 ppm to 0.12 ppm	Using Multifunction Calibrator MC6 -Beamex by Direct Method Using 6½ DMM Fluke 8846A by Direct Method Signal analyser FSV-30
11.	RF & Microwave Power #	100 kHz to 18 GHz (-)30 dBm to 13 dBm 10 MHz to 22 GHz (-)50 dBm to 0 dBm	0.33 dB to 0.48 dB 0.55 dB to 1.59 dB	Using Power meter with Sensor (NRP-2,NRP-Z55) by Direct Method Using Signal analyser FSV-30 by Direct Method
12.	Reflection Coefficient #	300 kHz to 20 GHz 0.02 to 0.33	0.06 rho to 0.08 rho	Network Analyzer-E5071C
13.	Temperature Simulation #			
	RTD	(-)200 °C to 850 °C	0.10 °C	Using Multifunction Calibrator MC6 -Beamex by Direct Method
	T/C 'B'	200 °C to 500 °C	1.75 °C	
		500 °C to 800 °C	0.73 °C	
		800 °C to 1800 °C	0.51 °C	
	T/C 'R'	(-)50 °C to 150 °C	0.93 °C	
		150 °C to 1700 °C	0.42 °C	
	T/C 'S'	(-)50 °C to 100 °C	0.82 °C	
		100 °C to 1700 °C	0.49 °C	

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Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 7 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

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	T/C 'N'	(-)200 °C to 0 °C 0 °C to 1300 °C	0.35 °C 0.16 °C	
	T/C 'T'	(-)200 °C to 0 °C 0 °C to 400 °C	0.24 °C 0.13 °C	
	T/C 'K'	(-)200 °C to 0 °C 0 °C to 1300 °C	0.26 °C 0.18 °C	
	T/C 'E'	(-)200°C to 1000 °C	0.34°C	
	T/C 'J'	(-)200°C to 1200 °C	0.20°C	
14.	AC Power / Energy [#] @ (1 ϕ , 3 ϕ) \pm 0.5 to 1 PF	60 V to 240 V (0.2 A to 5 A) 12 W to 3.6 kW	0.2 %	Using 3 Phase Energy Meter HC 3100 by Comparison Method
15.	Power Factor/Phase Angle [#] (60 V to 240 V) (0.2A to 5 A)	0.5 to 1 (lead & lag)	0.0006 PF to 0.0008 PF	Using 3 Phase Energy Meter HC 3100 by Comparison Method
16.	Time [#]	0.1s to 1 s 1s to 60 s 60 s to 24 Hr	0.009 s 0.009 s to 0.036 s 0.036 s to 1.22 s	Using Timer Interval Meter by Comparison Method
17.	Impulse/Surge [#] Peak Voltage Rise Time / Fall Time	(\pm 1 kV to \pm 7 kV) 1 μ S to 700 μ S	1.94 % 1.79 %	Using HV Probe with Oscilloscope by Direct Method
18.	DC Voltage [*]	10 mV to 1 V 1 V to 100 V 100 V to 1000 V	0.05 % to 0.0038 % 0.0038 % to 0.0051 % 0.0051 % to 0.006 %	Using 6½ DMM Fluke 8846A by Direct Method
19.	DC Current [*]	10 μ A to 10 mA 10 mA to 1 A 1 A to 10 A	0.36 % to 0.08 % 0.08 % to 0.082 % 0.082 % to 0.192 %	Using 6½ DMM Fluke 8846A by Direct Method

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Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 8 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
20.	AC Voltage *	@ 50 Hz 10 mV to 1 V 1 V to 100 V 100 V to 1000 V	0.54 % to 0.10 % 0.1 % 0.10 % to 0.11 %	Using 6½ DMM Fluke 8846A by Direct Method
21.	AC Current *	@ 50 Hz 10 μ A to 10 mA 10 mA to 1 A 1 A to 10 A	1.05 % to 0.25 % 0.24 % to 0.21 % 0.21 % to 0.27 %	Using 6½ DMM Fluke 8846A by Direct Method
22.	DC High Voltage *	1 kV to 100 kV	2.14 % to 2 %	Using HV Divider with kV Meter by Direct Method
23.	AC High Voltage *	@ 50 Hz 1 kV to 100 kV	3.5 % to 2 %	Using HV Divider with kV Meter by Direct Method

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Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 9 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>MECHANICAL CALIBRATION</u>				
I. DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)				
1.	Analog / Dial / Digital Vernier Caliper [§] L.C.: 0.01 mm	0 to 1000 mm	14.1 μ m	Using Slip Gauge Set Grade '1', Caliper Checker & Slip Gauge Accessories as per IS 3651 (Part 1 & 2)
2.	Analog / Digimatic Vernier Depth Gauge [§] L.C.: 0.01 mm	0 to 300 mm	8.4 μ m	Using Slip Gauge Set Grade '1' as per IS 4213
3.	External Micrometer [§] L.C.: 0.001 mm	0 to 200 mm 200 mm to 600 mm 600 mm to 1000 mm	2.0 μ m 6.9 μ m 9.2 μ m	Using Slip Gauge Set Grade '0', '1', Optical Flat & Parallels as per IS 2967
4.	Lever Dial Indicator [§] L.C.: 0.001 mm	0 to 2 mm	1.1 μ m	Using Dial Calibration Tester & Electronic Comparator as per IS 11498
5.	Plunger Dial / Digital Indicator [§] L.C.: 0.01 mm L.C.: 0.001 mm	0 to 100 mm 0 to 50 mm	6.0 μ m 1.8 μ m	Using Dial Calibration Tester, Electronic Comparator & Slip Gauge Set Grade '1' as per IS 2092
6.	Plain Plug Gauge [§]	1 mm to 100 mm	1.2 μ m	Using Slip Gauge Set Grade '1' & Electronic Comparator As per IS 3455 & IS 7859

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Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 10 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
7.	Snap Gauge / Gap Gauge ^s	1 mm to 100 mm 100 mm to 200 mm 200 mm to 300 mm	1.6 μ m 3.1 μ m 4.3 μ m	Using Slip Gauge Set Grade ' 1 ' as per IS 3455, IS 7859 & IS 3477
8.	Coating Thickness Gauge ^s L.C.: 0.0001 mm L.C.: 0.001 mm L.C.: 0.01 mm	0 to 1 mm 1 mm to 2 mm 2 mm to 5 mm	0.6 μ m 4.7 μ m 22.6 μ m	Using Master Foils by Comparison Method
9.	Dial Calibration Tester / Micrometer Head ^s L.C.: 0.0002 mm	0 to 50 mm	0.8 μ m	Using Electronic Comparator & Optical Flat by IS 9483
10.	Depth Micrometer ^s L.C. : 0.001 mm	0 to 300 mm	4.9 μ m	Using Slip Gauge Set Grade ' 0 ' & ' 1 ' as per JIS B7544
11.	Feeler Gauge ^s	0 to 1 mm	2.1 μ m	Using Digimatic Micrometer as per IS 3179
12.	Slip Gauge ^s	0 to 25 mm 25 mm to 50 mm 50 mm to 75 mm 75 mm to 100 mm	0.17 μ m 0.26 μ m 0.35 μ m 0.46 μ m	Using Slip Gauge Set Grade ' K ' & Slip Gauge Calibrator as per IS 2984
13.	Thread Plug Gauge ^s (Parallel) Metric, Unified, BSP, BA Threads)	2 mm to 100 mm	4.2 μ m	Using FCDM, Thread Measuring Wire & Cylindrical Setting Master as per IS 2334, IS 4218 (Part I to IV), IS 10216, IS 8999

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Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 11 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

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14.	Dial / Digital Thickness Gauge [§] L.C.: 0.001 mm	0 to 50 mm	4.0 μ m	Using Slip Gauge Set Grade ' 1' as per IS 2092
15.	Scale [§]	0 to 3000 mm	80 $\sqrt{(L/1000)}$ μ m L in mm	Using Scale & Tape Calibrator as per IS 1481
16.	Tape/Pie Tape [§]	0 to 90 m 0 to 10 m	300 $\sqrt{(L/1000)}$ μ m L in mm	Using Scale & Tape Calibrator as per IS 1269 (Part 1 & 2)
17.	Foils [§]	0.005 mm to 5 mm	0.7 μ m	Using Electronic Comparator by Comparison Method
18.	Spirit Level / Electronic Level [§] (For Ensitivity) L.C.: 0.01 mm/m L.C.: 0.001 mm/m	300 mm length 150 mm length	10 μ m/m 1.5 μ m/m	Using Electronic Level as per IS 5706
19.	Dial Bore Gauge / Bore Gauge [§] (For Transmission) L.C.: 0.001	0 to 2 mm	2.7 μ m	Using Dial Calibration Tester & Dial Indicator (P) as per IS 2092
20.	'V' Block [§] (For Flatness, Squareness, Symmetry & Parallelism)	200 mm length	3.2 μ m	Using Electronic Comparator, Slip Gauge Set Grade ' 1' & Cylindrical Setting Master & Mandrel as per IS 2949

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Page 12 of 26

Validity 15.01.2018 to 14.01.2020

Last Amended on 13.04.2018

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21.	Plain Ring Gauge [§]	2 mm to 100 mm 100 mm to 200 mm 200 mm to 300 mm	2.0 μ m 4.7 μ m 5.6 μ m	Measuring Machine & Master Setting Ring Using Slip Gauge Set Grade ' 1' & Dial Indicator (L) as per IS 3485
22.	Inside Micrometer [§] (Jaw/Stick Type) L.C.: 0.001 mm L.C.: 0.001 mm L.C.: 0.01 mm	5 mm to 50 mm 50 mm to 500 mm 500 mm to 1050 mm > 500 mm to 5000 mm (In steps of 1000 mm)	2.7 μ m 7.6 μ m 18.2 μ m 18.2 μ m	Using Slip Gauge Set Grade ' 1' '0', Gauge Block Accessories set & Caliper Checker as per IS 2966
23.	Engineer Square [§] (Parallelism/ Squareness)	300 mm length	3.8 μ m	Using Electronic Comparator, Lever Dial Gauge as per IS 2103
24.	Bevel Protractor/ Clinometer/ Combination Set/Degree Protractor [§] L.C.: 0.01°	0 to 360°	1.9 min	Using Angle Gauge Set, Scale & Tape Calibrator & Electronic Comparator as per IS 5812 & IS 4239
25.	Protractor [§] L.C.: 1°	0 to 360°	35.1 min	Using Profile Projector by Comparison Method
26.	Sine Bar [§] (Angle Setting)	0 to 300 mm 0 to 45°	24 Sec	Using Slip Gauge Set Grade ' 1', Angle Gauge, & Electronic Comparator As Per IS 5359
27.	Hegmann Gauge [§]	0 to 100 μ m	0.8 μ m	Using Electronic Comparator by Comparison Method

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Page 13 of 26

Validity 15.01.2018 to 14.01.2020

Last Amended on 13.04.2018

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28.	Electronic Comparator (LVDT)/ Mikrokator [§] L.C. : 0.0002 mm L.C. : 0.0001 mm	Up to 1 mm Up to 25 mm	0.8 μ m 0.5 μ m	Using Slip Gauge Set Grade ' K ' by Comparison Method
29.	Width Gauge [§]	0 to 100 mm	2.6 μ m	Using Slip Gauge Set Grade ' 1 ' & Electronic Comparator
30.	Caliper Checker [§]	0 to 600 mm	7.0 μ m	Using Slip Gauge Set Grade ' 1 ' & Level Dial Indicator & Electronic Comparator
31.	Pin Gauge [§]	Up to 20 mm	0.9 μ m	Using LMM as per IS 11103
32.	Engineer Parallel/ Rectangular Block [§]	300 mm length	2.7 μ m	Using Electronic Comparator & Slip Gauge Set Grade '1' as per IS 4241
33.	Taper Scale [§] L.C.: 0.1 mm	0 to 200 mm	59 μ m	Using Profile Projector by Comparison Method
34.	Inside / Outside Dial Gauge / Pistol Caliper [§] L.C.: 0.01 mm	0 to 50 mm	11 μ m	Using Slip Gauge Set & Slip Gauge Accessories by Comparison Method
35.	Slip Gauge Accessories [§] (For Flatness)	0 to 300 mm	0.9 μ m	Using Optical Flat, Electronic Comparator & Slip Gauge Set Grade 1 As per IS 4440

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Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 14 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

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36.	Master Rod / Length Bar [§]	0 to 200 mm 200 mm to 400 mm 400 mm to 600 mm 600 mm to 1000 mm	2.9 μ m 5.7 μ m 8.3 μ m 8.9 μ m	Using Slip Gauge Set Grade '1', Length Bar & Electronic Comparator by Comparison Method.
37.	Cylindrical Setting Master [§]	2 mm to 100 mm	1.2 μ m	Using Slip Gauge Set Grade '1' & Electronic Comparator FCDM as per IS 4349, IS 2393
38.	Angle Plate [§] (Parallelism, Squareness, Flatness)	300 mm length	4.6 μ m	Using Electronic Comparator & Lever Dial Gauge as per IS 6973
39.	Comparator Stand [§] (For Flatness)	300 mm x 300 mm	1.8 μ m	Using Slip Gauge Set Grade '1', Electronic Comparator & Optical Flat as per IS 7599 (Part II)
40.	Thread Ring Gauge [§] (Parallel) (Metric, G Thread & Unified)	2 mm to 100 mm	2.0 μ m	Using Length Measuring Machine & Master Setting Ring as per IS 4218, IS 2334
41.	Ultrasonic Thickness Gauge [§] L.C.: 0.01 mm	0 to 500 mm	11.6 μ m	Using Steel Slip Gauges
42.	Mandrel [§] (Diameter & Runout)	2 mm to 100 mm	4.9 μ m	Using Slip Gauge Set Grade '1' & Electronic Comparator FCDM

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593)

Page 15 of 26

Validity 15.01.2018 to 14.01.2020

Last Amended on 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
43.	3 Point (Bore) Micrometer [§] L.C.: 0.001 mm	2 mm to 50 mm	2.5 μ m	Using Set of Master Setting Ring Gauges by Comparison Method
44.	Pitch Gauge [§]	Up to 6.35 mm Angle	11.1 μ m 4.0 min	Using Profile Projector as per IS 4211
45.	Test Sieves [§]	Up to 1.7 mm Up to 25 mm	10.2 μ m 72 μ m	Using Profile Projector & Digital Caliper as per IS 460
46.	Weld Gauge Scale/Depth [§]	Up to 50 mm	120 μ m	Using Profile Projector by Comparison Method
47.	Glass Scale [§] (L.C 0.1mm/0.05mm)	0 to 300 mm	14.9 μ m	Using Profile Projector by Comparison Method
48.	Standard Wire Gauge [§]	Up to 10 mm	20.9 μ m	Using Profile Projector as per IS 5273
49.	Straight Edge [§]	0 to 1000 mm	1.6 x $\sqrt{(L/125)}$ L in mm	Using Blue Level & Slip Gauge Set Grade '1' as per IS 2220
50.	Thread Measuring Wire (2/3 Wire) [§]	0.17 mm to 6.35 mm	0.8 μ m	Using Slip Gauge Set Grade '1' & Electronic Comparator as per IS 6311
51.	Length Measuring Machine [§] (L.C.: 0001 mm)	Up to 100 mm	1.5 μ m	Using Slip Gauge Set Grade 'k' by Comparison Method
52.	Scale & Tape Calibrator [§] (L.C.: 0.001 mm)	Up to 1000 mm	11.2 μ m	Using Lever Dial and Slip Gauge Set Grade '1' by comparison Method

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593)

Page 16 of 26

Validity 15.01.2018 to 14.01.2020

Last Amended on 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
53.	Analog / Dial / Digital Vernier Height Gauge/2D Electronic Height Gauge [§] L.C.: 0.0001 mm	0 to 1000 mm	15.9 μ m	Using Slip Gauge Set Grade ' 1', Caliper Checker & Slip Gauge Accessories as per IS 2921
54.	Surface Plate [§]	1 m x 1 m	$0.3 \times \sqrt{(L+W)/125}$ L & W in mm	Using Electronic Level as per IS 7327, IS 2285, IS 12937
55.	Radius Gauge [§]	Up to 15 mm > 15 mm to 30 mm	10.7 μ m 27.3 μ m	Using Profile Projector as per IS 5273
56.	Inclinometer [§] L.C.: 0.01 °	0 to 45 ° (1000 mm length)	5.6 min	Using Angle Gauge Set as per IS 5812 & IS 4239
57.	Thread Plug Gauge (Taper) [§] (BSPT,NPT, NPTF)	9 mm to 100 mm	6.0 μ m	Using FCDM, Thread Measuring Wire & Cylindrical Setting Master as per IS 8999, ANSI/ASME B.20.1-1983
58.	Analog / Dial / Digital Vernier Height Gauge/2D Electronic Height Gauge [*] L.C.: 0.0001 mm	0 to 1000 mm	15.9 μ m	Using Slip Gauge Set Grade ' 1', Caliper Checker & Slip Gauge Accessories as per IS 2921
59.	Surface Plate [*]	5 m x 5 m	$0.4 \times \sqrt{(L+W)/125}$ L & W in mm	Using Electronic Level as per IS 7327, IS 2285, IS 12937
60.	Scale & Tape Calibrator [*]	0 to 1000 mm	11.2 μ m	Using Lever Dial and Slip Gauge Set Grade '1' by Comparison Method

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593)

Page 17 of 26

Validity 15.01.2018 to 14.01.2020

Last Amended on 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
61.	Straight Edge *	0 to 5000 mm	$1.6 \times \sqrt{L/125}$ L in mm	Using Blue Level & Slip Gauge Set Grade '1' as per IS 2220
II.	DIMENSION (PRECISION INSTRUMENTS)			
1.	Profile Projector [§] Linear L.C.: 0.001mm Angular L.C.: 36Sec. Magnification	0 to 300 mm Upto 360° 10X 20X 50X	9.6 μ m 2.2 min 0.22%	Measuring Glass Scale as per JIS B 7184 Glass Angular Graticule Linear Graticule & Digital Caliper
2.	Profile Projector/ Video Measuring Machine Linear * L.C.: 0.0001 mm Angular L.C.: 1sec. Magnification	0 to 300 mm Upto 360° 10X 20X 50X	9.6 μ m 2.2 min 0.22%	Using Measuring Glass Scale, Linear Graticule, Glass Angular Graticule & Digital Caliper as per JIS B 7184
3.	Length Measuring Machine/Universal Length Measuring Machine *	0 to 100 mm	1.5 μ m	Using Slip Gauge Set Grade 'k' by Comparison Method
III.	MOBILE FORCE MEASURING SYSTEM			
1.	Push Pull Gauge [§]	0.5 N to 500 N	0.24N	Using Newton weights as per VDI/VDE2624-2.1

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593)

Page 18 of 26

Validity 15.01.2018 to 14.01.2020

Last Amended on 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
IV.	ACCOUSTIC			
1.	Sound Level Meter [§]	@1 kHz 94 dB & 114 dB	0.52 dB	Using Sound Level Calibrator as per IS:9779:1981
V.	ACCELERATION AND SPEED			
1.	Tachometer [§] (Non-Contact)-	10 RPM to 100 RPM >100 RPM to 10000 RPM >10000 RPM to 90000 RPM	0.63 RPM 3.89 RPM 9.55 RPM	Using Digital Tachometer and RPM Source As per Sanas 45-02
2.	Tachometer [§] (Contact)-	50RPM to 3000RPM	0.63 RPM to 3.03 RPM	Using Digital Tachometer and RPM Source As per Sanas 45-02
3.	Centrifuge, RPM Source [#] (Non-Contact)	10 RPM to 100 RPM >100 RPM to 10000 RPM >10000 to 60000 RPM	0.63 RPM 3.89 RPM 9.55 RPM	Using Digital Tachometer As per Sanas 45-02
VI.	DUROMETER			
1.	Rubber Hardness Tester [§] Shore A Shore D Shore A Shore D	0 to 100 Shore A 0 to 100 Shore D 0 to 100 Shore A 0 to 100 Shore D	1.8 Shore A 1.8 Shore D 0.4 Shore A 0.4 Shore D	Using Rubber Hardness Tester Calibrator (Spring Force Method) Depth Indentation Method as per ASTM D2240

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 19 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
VII.	TORQUE GENERATING DEVICES			
1.	Torque Wrench / Gauge/ Torque Screw Driver [§] Type I & II Classes	0.5 Nm to 12 Nm 15 Nm to 300 Nm 300 Nm to 1000 Nm	1.5 % 1.4 % 0.7 %	Using Digital Torque Meter Using Electronic Torque Wrench Tester Using Digital Torque Meter As per ISO 6789:2003
VIII.	PRESSURE INDICATING DEVICES			
1.	Pressure (Pneumatic) [§] (Pressure gauges, Pressure Calibrators, Pressure Switches , Pressure Transmitters)	0.2 bar to 35 bar	0.016 %	Using Pneumatic DWT by Comparison Method , As per DKD R-6-1
2.	Low Pressure (Pneumatic) [#] (Maghnelic Gauges/Low Pressure Gauges, Calibrators)	0 to 10 mbar 0 to 400 mbar	0.18 % 0.03 %	Using Digital Pressure calibrator by Comparison Method , As per DKD R-6-1
3.	Absolute Pressure (Pneumatic) [#] (Absolute pressure gauges/Barometers / Manometers/ Absolute pressure calibrators, Pressure Switches, Pressure Transducers/ Transmitters)	0.8 bar to 1.2 bar	0.02 %	Using Absolute Pressure Calibrator Beemex by Comparison Method ,As per DKD R-6-1

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 20 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
4.	Pressure (Hydraulic) [§] (Pressure Gauges, Pressure Calibrators, Pressure Switches , Pressure Transmitters)	3.5 bar to 35 bar 20 bar to 700 bar	0.025 % 0.025 %	Using Hydraulic DWT by Comparison Method ,As per DKD R-6-1
5.	Negative Pressure [#] (Maghnelic Gauges/ Low Pressure Gauges, Calibrators)	(-) 400 mbar to 0 mbar (-) 10 mbar to 0 mbar	0.03 % 0.28 %	Using Digital Pressure calibrator by Comparison Method As per DKD R-6-1
6.	Negative Pressure [§] (Pressure Gauges, Pressure Calibrators, Pressure Switches , Pressure Transmitters)	(-) 0.95 bar to (-) 0.08 bar	0.015 %	Using Pneumatic DWT by Comparison Method As per DKD R-6-1
7.	Pressure (Hydraulic) [§] (Dead Weight Tester)	3.5 bar to 35 bar 20 bar to 700 bar	0.02 % 0.02 %	Using Hydraulic DWT by Cross float / Comparison Method Cg-3
8.	Pressure (Pneumatic) (Pressure gauges, Pressure Calibrators, Pressure Switches , Pressure Transmitters) *	0 to 10 bar	0.04 %	Using Digital Pressure Calibrator Druck by Comparison Method as per DKDR6-1
9.	Pressure (Hydraulic) / (Pressure gauges, Pressure Calibrators, Pressure Switches , Pressure Transmitters) *	0 to 70 bar	0.08 %	Using Digital Pressure Calibrator Druck By Comparison Method as per DKDR6-1

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 21 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
10.	Pressure (Hydraulic) (Pressure gauges, Pressure Calibrators, Pressure Switches , Pressure Transmitters) *	0 to 700 bar	0.044 %	Using Digital Pressure calibrator Druck by Comparison Method as per DKDR6-1
11.	Negative pressure (Pressure gauges, Pressure Calibrators, Pressure Switches , Pressure Transmitters) *	(-) 0.95 bar to 0 bar	0.43 %	Using Digital Pressure calibrator Druck by Comparison Method as per DKDR6-1
IX.	MASS			
1.	Weights [§] Calibration of Weights of F2 Class & coarser	1 mg 2 mg 5 mg 10 mg	0.009 mg 0.009 mg 0.009 mg 0.009 mg	Using E1 &E2 Class Weights and Precision balance of 0.01mg/ 0.1mg/1mg readability as per ABBA method OIML-R111
	Calibration of Weights of F1 Class & Coarser	20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200g 500 g	0.009 mg 0.009 mg 0.009 mg 0.009 mg 0.009 mg 0.009 mg 0.010 mg 0.010 mg 0.011 mg 0.013 mg 0.014 mg 0.019 mg 0.09 mg 0.893 mg	Using E1 &E2 Class Weights and Precision balance of 0.01mg/ 0.1mg/1mg readability as per ABBA method OIML-R111

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 22 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
	Calibration of Weights of F2 Class & Coarser	1 kg 2 kg 5 kg 10 kg 20 kg	0.98 mg 8.32 mg 8.4 mg 82 mg 82 mg	Using E2 Class Weights and Precision balance of 1mg /10 mg/100mg readability as per ABBA method . OIML-R111
X.	VOLUME			
1.	Volume ^s Micropipette	@27°C 10 μ l to 100 μ l >100 μ l to 500 μ l >500 μ l to 1 ml >1 ml to 5 ml >5 ml to 10 ml	0.02 μ l 0.18 μ l 0.18 μ l 0.65 μ l 5.97 μ l	Using Precision balance with resolution 0.01mg/ 0.1mg by Gravimetric Method based on ISO 8655-Part 6
	Glasswares Burette, Pipette, Measuring Cylinder, Volumetric flask, Graduated Jar ^s	@27°C 0.1 ml to 100 ml >100 ml to 1 l >1 l to 10 l	3.9 μ l 0.16 ml 1.40 ml	Using Weighing balance with resolution 0.01mg/ 0.1mg/ 1mg/ 10mg by Gravimetric Method based on ISO 4787
XI.	DENSITY AND VISCOSITY			
1.	Hydrometer - Density Hydrometer, Twaddle Hydrometer, Baume Hydrometer Specific Gravity Hydrometer Brix Hydrometer, Lactometer, Alcometer ^s	0.600 g/ml to 2.000 g/ml	0.00016g/ml	Using Weighing balance with resolution 0.01mg by Hydrostatic weighing method as per NIST SP 250 -78 Standard

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 23 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
XII.	WEIGHING SCALE AND BALANCE			
1.	Weighing Balance #			
	Readability : 0.001 mg	1 mg to 21 g	0.009 mg	Using E1,E2,F1,M1 Class Weights Calibration of Weighing Balance of Accuracy Class I & Coarser based on OIML-R-76-1
	0.01 mg	>21g to 100 g	0.027 mg	
	0.01 mg	>60 g to 200 g	0.04 mg	
	1 mg	>200 g to 700 g	0.35 mg	
	10 mg	>700 g to 6 kg	3 mg	
	100 mg	>6 kg to 20 kg	63 mg	
	1 g	>20 kg to 60 kg	63 mg	
	10 g	>60 kg to 300 kg	60 g	

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593)

Page 24 of 26

Validity 15.01.2018 to 14.01.2020

Last Amended on 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>OPTICAL CALIBRATION</u>				
I.	OPTICAL			
1.	Lux Meters ^s	100 Lux to 25000 Lux	3 %	Using Lux Meter with Light Source by Comparison Method

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 25 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	Glass Thermometers [§]	(-) 30 °C to 250 °C	0.30 °C	Using Standard PRT , Liquid Bath, DMM (6½) by Comparison Method
2.	RTD [§] Thermocouple Temperature Indicator with Sensor Temperature Gauges	(-)30 °C to 250 °C 250 °C to 650 °C 650 °C to 1000 °C 1000 °C to 1200 °C	0.09 °C 0.40 °C 1.85 °C 2.6 °C	Using Standard PRT, Thermocouple (S-Type), Liquid Bath, Dry Block Calibrator and DMM(6½) by Comparison Method
3.	Temperature Baths [§] Dry block calibrators	(-)30 °C to 250 °C 250 °C to 650 °C 650 °C to 1000 °C 1000 °C to 1200 °C	0.09 °C 0.32 °C 1.94 °C 2.63 °C	Using Standard PRT, Thermocouple (S-Type), DMM (6½) by Comparison Method
4.	Temperature [§] (Infrared / Non-Contact Thermometers)	50 °C to 500 °C 500 °C to 1200 °C	1.7 °C 3.2 °C	Using Non-Contact pyrometer with Black body source by Comparison Method
5.	RTD [*] Thermocouple Temperature Indicator with sensor Temperature gauges	(-)30 °C to 250 °C 250 °C to 650 °C 650 °C to 1000 °C 1000 °C to 1200 °C	0.09 °C 0.40 °C 1.85 °C 2.6 °C	Using Standard PRT , Thermocouple (R-Type), Liquid bath, Dry block calibrator and DMM (6½) by Comparison Method

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2559 (in lieu of C-0591, C-0592 & C-0593) **Page** 26 of 26

Validity 15.01.2018 to 14.01.2020 **Last Amended on** 13.04.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
6.	Deep Freezers* Refrigerators Incubators Temperature Bath Temperature Calibrator Chambers Oven Furnace (Multipoints)	(-) 80 °C to 0 °C 0 °C to 100 °C 100 °C to 500 °C 500 °C to 1200 °C	0.7 °C 0.7 °C 1.0 °C 3.5 °C	Using Standard RTDs , Thermocouples and Multi channel Recorder By Comparison Method
II.	SPECIFIC HEAT AND HUMIDITY			
1.	Humidity / Thermo Hygrometer [§]	10 % to 95 % 10 °C to 60 °C @ 50 %RH	1.4 % 0.36 °C	Using Humidity Chamber with Digital ThermoHygrometer by Comparison Method
2.	Humidity Chamber* (Multi Points)	10 % to 95 % 10 °C to 60 °C	2 % 0.53 °C	Using Humidity Data Loggers 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.

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