FEDERATION FOR DEVELOPMENT OF ACCREDITATION SERVICES

118-119, First Floor, Sushant Tower, Sector – 56, Gurugram – 122011, Haryana, India.

CERTIFICATE OF ACCREDITATION

(AS PER ISO/IEC 17025:2017)

This is to attest that

SIGMA TEST AND RESEARCH CENTRE.

B-8/5, Phase-1, Badli Industrial Area,
New Delhi-110042 (Delhi), India

Calibration Laboratory

has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories and supplementary criteria for calibration laboratories.

Certificate Number: CL-113

Issue Date: 16.11.2023 **Valid Until:** 15.11.2025

***Amended On:** 08.11.2024

The certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard and the relevant requirements of FDAS. (for scope of accreditation visit website www. fdasindia.org).

***This amended certificate is issued, due to change in location of the lab.**

DEVI SARAN TEWARI
Director

FEDERATION FOR DEVELOPMENT OF ACCREDITATION SERVICES

118-119, First Floor, Sushant Tower, Sector – 56, Gurugram – 122011, Haryana, India.

SCOPE OF ACCREDITATION

(Annexure to Certificate of CL-113)

Laboratory Name: Sigma Test and Research Centre
B-8/5, Phase-1, Badli Industrial Area, New Delhi-110042

Validity: 16-11-2023 to 15-11-2025 **Amended on: 08.11.2024

Electro technical Calibration (Laboratory based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Group-Direct Current (Measure Mode)				
1	DC Current	Using Digital Multimeter $6^{1/2}$ Fluke/8846A by direct method	10 µA to 10 A	0.4 % to 0.2 %
2	DC Voltage	Using Digital Multimeter $6^{1/2}$ Fluke/8846A by direct method	1 mV to 100 mV	0.42 % to 0.01 %
			100 mV to 10 V	0.01 % to 0.005 %
			10 V to 1000 V	0.005 % to 0.006 %
3	DC High Voltage	Using HV Probe Fluke/80k-40 & Digital Multimeter by direct method	>1 kV to 27 kV	3.1%
4	DC Resistance (Discrete)	Using Digital Multimeter $6^{1/2}$ Fluke/8846A by direct method	1 ohm to 1 M ohm	0.36 % to 0.015 %
			1 M ohm to 100 M ohm	1.0%
Group - Direct Current (Source Mode)				
1	DC Current	Using Calibration System, Fluke/9100 by direct method	1 µA to 300 mA	1.5 % to 0.03%
			300 mA to 10 A	0.03 % to 0.08 %
		Using Calibration System, Fluke/9100 with 50 Turn Current Coil by direct method	10 A to 1000 A	0.12 %
2	DC Voltage	Using Calibration System, Fluke/9100 by direct method	1 mV to 300 V	0.5 % to 0.01 %
			300 V to 1000 V	0.01 % to 0.012 %
3	DC Resistance (2 & 4 Wire)	Using Standard Resistance Box & Decade Resistance Box by direct method	1m ohm to 1k ohm	1.04 % to 0.58 %
			1 k ohm to 1 M ohm	0.58 % to 2.82 %

Jitendra Parmar
Dealing Officer

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Validity: 16-11-2023 to 15-11-2025 **Amended on: 08.11.2024

Electro technical Calibration (Laboratory based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
4	DC Resistance (2 Wire)	Using Mega Ohm Box by direct method	1 M ohm to 2 G ohm	2.82 % to 1.16%
5	Insulation Resistance @ 1kV/5 kV	Using HV Mega Ohm Box by direct method	2 M ohm to 2 G ohm	1.6%
Group-Alternate Current (Measure Mode)				
1	AC Current @ 50 Hz	Using Digital Multimeter $6^{1/2}$ Fluke/8846A by direct method	100 µA to 10 A	0.25 %
2	AC Voltage @ 50 Hz	Using Digital Multimeter $6^{1/2}$ Fluke/8846A by direct method	10 mV to 100 mV	0.54% to 0.12 %
			100 mV to 1000 V	0.12 % to 0.2 %
3	AC High Voltage @ 50 Hz	Using HV Probe Fluke/80k-40 & Digital Multimeter by direct method	>1 kV to 27 kV	3.5 %
4	AC Resistance @ 1 kHz	Using LCR Meter/ Aplab 4912 by direct method	1 Ω to 10 MΩ	0.45%
5	Capacitance @ 1 kHz	Using LCR Meter/ Aplab 4912 by direct method	1 nF to 10 µF	0.51%
6	Inductance @ 1 kHz	Using LCR Meter/ Aplab 4912 by direct method	1 mH to 10 H	0.5%
Group - Alternate current (Source Mode)				
1	AC Current @ 50 Hz /1 kHz	Using Calibration System, Fluke/9100 by direct method	100 µA to 300 mA	0.45 % to 0.12 %
			300 mA to 10 A	0.12 % to 0.27 %

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Electro technical Calibration (Laboratory based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
		Using Calibration System, Fluke/9100 with 50 Turn Current Coil by direct method	10 A to 1000 A	0.32 %
2	AC Voltage @ 50 Hz/1 kHz	Using Calibration System, Fluke/9100 by direct method	10 mV to 30 mV	1.2 % to 0.42 %
			30 mV to 300 V	0.42 % to 0.07 %
			300 V to 1000 V	0.07 % to 0.08%
Group-Low frequency (Measure Mode)				
1	Timer/Hour Meter/Stop Watch	Using Digital Time Calibrator by direct method	1 s to 18000 s	0.15 s to 2.4 s
			18000 s to 36000 s	2.4 s to 4.5 s
			36000 s to 86400 s	4.5 s to 10.2 s
2	Frequency	Using Digital Multimeter $6^{1/2}$ Fluke/8846A by direct method	10 Hz to 1 MHz	0.02 % to 0.06 %
Group-Low Frequency (Source Mode)				
1	Frequency	Using Calibration System, Fluke/9100 by direct method	10 Hz to 10 MHz	0.006 %
Group - Temperature Simulation (All Type T/C) (Measure Mode)				
1	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "J" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 180 to 1200 °C	1.94 °C

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Electro technical Calibration (Laboratory based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
2	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "K" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 140 to 1300 °C	2.2 °C
3	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "R" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	0 to 1700 °C	2.16 °C
4	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "S" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	0 to 1700 °C	1.94 °C
5	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "T" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 200 to 400 °C	1.94 °C

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Electro technical Calibration (Laboratory based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
6	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “RTDpt-100” Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 200 to 790 °C	0.64 °C
7	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “N” Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 200 to 1300 °C	1.2 °C
Group - Temperature Simulation (All Type T/C) (Source Mode)				
1	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “J” Type	Using Calibration System, Fluke/9100 by direct method	(-) 100 to 1200 °C	0.3 °C
2	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “K” Type	Using Calibration System, Fluke/9100 by direct method	(-) 200 to 1300 °C	0.4 °C

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Electro technical Calibration (Laboratory based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
3	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "N" Type	Using Calibration System, Fluke/9100 by direct method	(-) 100 to 1300 °C	0.3 °C
4	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "R" Type	Using Calibration System, Fluke/9100 by direct method	100 to 1700 °C	0.8 °C
5	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "S" Type	Using Calibration System, Fluke/9100 by direct method	200 to 1700 °C	0.9 °C
6	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "T" Type	Using Calibration System, Fluke/9100 by direct method	(-) 200 to 400 °C	0.4 °C

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Electro technical Calibration (Laboratory based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
7	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "RTDpt-100" Type	Using Multifunction Process Calibrator Fluke/725by direct method	(-) 200 to 790 °C	0.4 °C

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Fluid flow Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Group – Fluid Flow				
1	Liquid Flow Meter/ADM Flow Meter/Precision Flow Meter ,Volume Flow Rate	Using Electronic Balance, Stop Watch, Glass Thermometer by Comparison Method	1ml/min to 10 ml/min	1.6 %

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Group-Dimension				
1	Ball (Spherical Shape) S.S./Iron	Using Digital Micrometer by comparison method As per IS: 5273:1969 (Ref. IS)	Upto50 mm	1.9 µm
2	Calipers L.C.:0.01 mm	Using Caliper Checker & Gauge Block Set by comparison method As per IS 16491 (Part-1):2016	Upto 450 mm	8.0 µm
3	Calipers L.C.:0.02 mm	Using Caliper Checker & Gauge Block Set by comparison method As per IS 16491 (Part-1) 2016	Upto 600 mm	13.9 µm
4	Cube Mould	Using Digital Caliper by Comparison Method As Per IS: 10086:2021	50 mm, 70 mm , 150 mm & 250 mm	24.84µm
5	Coating Thickness Gauge L.C.:0.001 mm	Using Standard Foils by comparison method As per ISO:19840:2012 (Ref. IS)	0.01mm to 1000 µm	3.0 µm
6	Dial Gauge (Lever Type)L.C.: 0.001 mm	Using Gauge Block Set & Comparator Stand by comparison method As per IS:11498:1985	0.001 mm to 1 mm	2.0 µm
7	Dial Thickness Gauge L.C.: 0.01 mm	Using Gauge Block Set & Accessories by comparison method As per IS:2092:1983	0.01 mm to 100 mm	6.1 µm

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
8	Feeler Gauge L.C.: 0.01 mm	Using Digital Micrometer by comparison method As per IS: 3179:1990	Upto 1 mm	1.9 µm
9	Flakiness & Elongation Gauge	Using Digital Caliper by Comparison Method As Per IS: 2386 (Part –1) :1963	Thickness Gauge: 6.3 to 63 mm Length Gauge: 10 to 50 mm	20 µm
10	Height Gauge L.C.: 0.01 mm	Using Caliper Checker & Gauge Block Set with Accessories by comparison method As per IS: 2921:2016	Upto 600 mm	8.63 µm
11	Plunger Type Gauge (Analog/Digital) L.C.: 0.001 mm	Using Gauge Block Set & Comparator Stand by comparison method As per IS:2092 :1983	upto 25 mm	1.3 µm
12	Plunger Type Gauge (Analog/Digital) L.C.: 0.01 mm	Using Gauge Block Set & Comparator Stand by comparison method As per IS:2092:1983	upto100 mm	1.7 µm
13	Radius Gauge	Using Profile Projector & Radius Chart by comparison method As per IS: 5273 :1969	Upto25 mm	10.2 µm
14	Snap Gauge	Using Gauge Block Set by comparison method.	5 mm to 100 mm	1.5 µm

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
15	Steel Scale L.C.: 0.5 mm & 1 mm	Using Profile Projector by comparison method As per IS: 1481:1970	Upto 150 mm	0.5 mm
16	Try Square (Perpendicularity & Parallelism)	Using Profile Projector, Master Cylinder & Gauge Block Set by comparison method As per IS: 2103:1980	150 (Blade Length) mm	2.0 in of arc and 1.7 µm
17	Ultrasonic Thickness Gauge L.C.: 0.1 mm	Using standard Gauge Block by comparison method As per IS: 15468:2004	0.1 mm to 150 mm	0.9 66 µm
18	V-Block (Parallelism)	Using Test Mandrel (Master Cylinder), Puppy Dial & Surface Plate by comp. method As per IS: 2949:1992	200 x 150 x 150 mm	3.44 µm
19	V-Block (Squareness)	Using Test Mandrel (Master Cylinder), Puppy Dial & Surface Plate by comp. method As per IS: 2949:1992	200 x 150 x 150 mm	2.41 µm
20	V-Block (Symmetricity)	Using Test Mandrel (Master Cylinder), Puppy Dial & Surface Plate by comp. method As per IS: 2949:1992	200 x 150 x 150 mm	2.45 µm

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Sub Group -Angle gauges, circular scales, indexing tables, polygons, levels, sine bars, autocollimators engineers' squares, cylindrical squares, angle plates, bevel protractors, sine centers, combination set, sine table, spirit level, electronic level, inclinometers				
1.	Bevel Protractor (Least Count: 5’)	Using Angle Gauge Set by comparison method As per IS: 4239:2023	0°-90°-0°	2.9 min of arc
2.	Combination Set/ Combination Square Set (L.C.: 1°)	Using Angle Gauge Set by comparison method As Per IS: 4239:2023	1° to 180°	36.0 min of arc
Sub Group - Plug and ring screw gauges, snap gauges, thread diameter and pitch measuring instrument, profile gauges.				
1	External Micrometer L.C.: 0.001 mm	Using Gauge Block Set by comparison method As per IS: 2967:1983	Upto 150 mm	1.0 µm
2	External Micrometer L.C.: 0.01 mm	Using Gauge Block Set by comparison method As per IS: 2967: 1983	0.01 mm to 150 mm	5.0 µm
3	Internal Micrometer (Two jaw type) L.C.: 0.001 mm	Using Gauge Block Set & Accessories by comparison method As per IS:2966:1964	50 mm to 150 mm	1.9 µm
4	Plain Plug Gauge/ Setting Plug Gauge	Using Gauge Block Set, Dial Gauge & Comparator Stand by comparison method As per IS: 3455:1971	5 mm to 100 mm	1.3 µm

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
5	Stick Micrometer	Using Gauge Block Set & Accessories by comparison method As per IS: 2966:1964	5 mm to 150 mm	10 µm
Sub Group - Gears, Test sieves, M/C tools				
1	Test Sieves	Using Profile Projector & Digital Caliper by comparison method As per IS 460 (Part – 1, 2, 3) : 2020	40 µm to 850 µm	2.7 µm
2	Test Sieves	Using Profile Projector & Digital Caliper by comparison method As per IS 460 (Part – 1, 2, 3) : 2020	850 µm to 4 mm	3.0 µm
3	Test Sieves	Using Profile Projector & Digital Caliper by comparison method As per IS 460 (Part – 1, 2, 3) : 2020	4 mm to 150 mm	17 µm
Group-Mass, Sub Group - Weights/Standards of mass				
1.	Mass/Weights of F1 class and coarser	Using Standard Weights of Accuracy Class E1/E2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	1 mg	0.011mg

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
2.	Mass/Weights of F1 class and coarser	Using Standard Weights of Accuracy Class E1/E2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	2 mg	0.011mg
3.	Mass/Weights of F1 class and coarser	Using Standard Weights of Accuracy Class E1/E2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	5mg	0.011 mg
4.	Mass/Weights of F1 class and coarser	Using Standard Weights of Accuracy Class E1/E2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	10mg	0.011mg
5.	Mass/Weights of F1 class and coarser	Using Standard Weights of Accuracy Class E1/E2 and Weighing Balance of Readability 0.01mg &Substitution Method as	20 mg	0.011 mg

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
		per OIML- R 111-1:2004. ABBA Weighing Cycle		
6.	Mass/Weights of F1 class and coarser	Using Standard Weights of Accuracy Class E1/E2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	50 mg	0.013 mg
7.	Mass/Weights of F1 class and coarser	Using Standard Weights of Accuracy Class E1/E2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	100 mg	0.013 mg
8.	Mass/Weights of F1 class and coarser	Using Standard Weights of Accuracy Class E1/E2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	200 mg	0.013 mg
9.	Mass/Weights of F1 class and coarser	Using Standard Weights of Accuracy Class E1/E2 and Weighing Balance of Readability 0.01mg	500 mg	0.013 mg

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
		&Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle		
10.	Mass/Weights of F_1 class and coarser	Using Standard Weights of Accuracy Class E_1/E_2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	1 g	0.02 mg
11.	Mass/Weights of F_1 class and coarser	Using Standard Weights of Accuracy Class E_1/E_2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	2 g	0.02 mg
12.	Mass/Weights of F_1 class and coarser	Using Standard Weights of Accuracy Class E_1/E_2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	5 g	0.02 mg
13.	Mass/Weights of F_1 class and coarser	Using Standard Weights of Accuracy Class E_1/E_2 and Weighing Balance of	10 g	0.03 mg

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
		Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle		
14.	Mass/Weights of F_1 class and coarser	Using Standard Weights of Accuracy Class E_1/E_2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	20 g	0.031 mg
15.	Mass/Weights of F_1 class and coarser	Using Standard Weights of Accuracy Class E_1/E_2 and Weighing Balance of Readability 0.01mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	50 g	0.046mg
16.	Mass/Weights of F_1 class and coarser	Using Standard Weights of Accuracy Class E_1/E_2 and Weighing Balance of Readability 0.1mg &Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	100 g	0.15 mg
17.	Mass/Weights of F_1 class and coarser	Using Standard Weights of Accuracy Class E_1/E_2	200 g	0.15mg

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		and Weighing Balance of Readability 0.1mg & Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle		
18.	Mass/Weights of F_2 class and coarser	Using Standard Weights of Accuracy Class F_1 and Weighing Balance of Readability 1 mg & Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	500 g	2.5 mg
19.	Mass/Weights of F_2 class and coarser	Using Standard Weights of Accuracy Class F_1 and Weighing Balance of Readability 1 mg & Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	1 kg	0.005 g
20.	Mass/Weights of F_2 class and coarser	Using Standard Weights of Accuracy Class F_1 and Weighing Balance of Readability 10 mg & Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	2 kg	0.011 g

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
21.	Mass/Weights of F_2 class and coarser	Using Standard Weights of Accuracy Class F_1 and Weighing Balance of Readability 100 mg & Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	5 kg	0.102 g
22.	Mass/Weights of F_2 class and coarser	Using Standard Weights of Accuracy Class F_1 and Weighing Balance of Readability 100 mg & Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	10 kg	0.104 g
23.	Mass/Weights of F_2 class and coarser	Using Standard Weights of Accuracy Class F_1 and Weighing Balance of Readability 100 mg & Substitution Method as per OIML- R 111-1:2004. ABBA Weighing Cycle	20 kg	0.154 g
24.	Mass/Weights of M_2 class and coarser	Using Standard Weights of Accuracy Class F_1 and Weighing Balance of Readability 1/5g & Substitution Method as	50 kg	5.3g

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
		per OIML- R 111-1:2004. ABBA Weighing Cycle		
Sub Group - Balance or other weighing devices				
1	Digital Weighing Balance, Micro/ Semi micro/Precision/Ordinary Balance Readability: 0.01 mg (For class I and coarser)	Using Standard Weight of Accuracy Class E_1 and as per OIML R-76 1:2006	1 mg to 50 g	0.05mg
2	Digital Weighing Balance, Micro/ Semi micro/Precision/Ordinary Balance Readability: 0.1 mg (For class I and coarser)	Using Standard Weight of Accuracy Class E_1 and as per OIML R-76 1:2006	>50 g to 200 g	0.10mg
3	Digital Weighing Balance, Precision/Ordinary Balance Readability: 1 mg (For class I and coarser)	Using Standard Weight of Accuracy Class $E_1/E_2/F_1$ and as per OIML R-76-1:2006	>200 g to 1 kg	2.0mg
4	Digital Weighing Balance, Precision/Ordinary	Using Standard Weight of Accuracy Class E_2/F_1 and as per OIML R-76 1:2006	>200 g to 1 kg	11mg

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
	Balance Readability: 10 mg (For class I and coarser)			
5	Digital Weighing Balance, Precision/Ordinary Balance Readability: 10 mg (For class II and coarser)	Using Standard Weight of Accuracy Class $F_1/M_1$and as per OIML R-76-1:2006	>1 kg to 2 kg	20mg
6	Digital Weighing Balance, Precision/Ordinary Balance Readability: 100 mg (For class II and coarser)	Using Standard Weight of Accuracy Class $F_1/M_1$and as per OIML R-76 1:2006	>2 kg to 20 kg	0.20g
7	Digital Weighing Balance, Readability: 1 g (For class III and coarser)	Using Standard Weight of Accuracy Class F_1/M_1 and as per OIML R-76-1:2006	>2kg to 30 kg	0.50g
8	Digital Weighing Balance, Readability: 1 g (For class III and coarser)	Using Standard Weight of Accuracy Class $F_1/M_1$and as per OIML R-76-1:2006	>30 kg to 50 kg	2.5 g
9	Digital Weighing Balance, Readability:5g(For class III and coarser)	Using Standard Weight of Accuracy Class F_1/M_1 and as per OIML R-76-1:2006	>20 kg to 50 kg	7.0g

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
10	Digital Weighing Balance, Readability: 10 g (For class III and coarser)	Using Standard Weight of Accuracy Class F_1 /M_1 and as per OIML R-76-1:2006	>50 kg to 100 kg	13g
Group- Volume				
1	Calibration of Piston Pipette/Micropipette/ Syringe	Using Digital Balance (Readability : 0.01/0.1mg) and Distilled Water of Known Density, As per ISO 8655-6:2022 & ISO/TR 20461:2023	>10 µl to 100 µl	0.19µl
2	Calibration of Piston Pipette/Micropipette/ Syringe	Using Digital Balance (Readability : 0.01/0.1mg) and Distilled Water of Known Density, as per ISO 8655-6:2022 & ISO/TR 20461:2023	>100 µl to 1000 µl	0.23µl
3	Calibration of Piston Pipette/Micropipette/ Syringe	Using Digital Balance (Readability : 0.01/0.1mg) and Distilled Water of Known Density, as per ISO 8655-6:2022& ISO/TR 20461:2023	1 ml to 10 ml	0.013ml
4	Volume (Glassware's) (Graduated & Non Graduated	Using Weight/Digital Balance (Readability : 0.01/0.1mg) and Distilled	0.1 ml to 10 ml	0.001ml

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
	Pipette/Burette/Bulb Pipette/Burette)	Water of Known Density, as per ISO 4787:2021& ISO/TR 20461:2023		
5	Volume (Glassware's) (Graduated & Non-Graduated Pipette/Burette/Bulb Pipette/Burette	Using Weight/Digital Balance (Readability : 0.01/0.1mg) and Distilled Water of Known Density, as per ISO 4787:2021& ISO/TR 20461:2023	>10 ml to 50 ml	0.032ml
6	Volume (Glassware's) (Graduated & Non-Graduated Pipette/Burette/Bulb Pipette/Burette	Using Weight/Digital Balance (Readability : 0.01/0.1mg) and Distilled Water of Known Density, as per ISO 4787:2021& ISO/TR 20461:2023	>50 ml to 100 ml	0.045ml
7	Volume (Glassware's) (Graduated & Non-Graduated Pipette/Burette/Bulb Pipette/Burette	Using Weight/Digital Balance (Readability : 0.1/1mg) and Distilled Water of Known Density, as per ISO 4787:2021& ISO/TR 20461:2023	>100 ml to 200 ml	0.050ml
8	Volume (Glassware's) (Volumetric Flask/Measuring Cylinder/Beaker/Conical Flask/ Pycnometer/Specific	Using Weight/Digital Balance (Readability : 0.01/0.1mg/1mg) and Distilled Water of Known Density, as per ISO	0.1 ml to 10 ml	0.017ml

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
	Gravity Bottle/Density Bottle	4787:2021& ISO/TR 20461:2023		
9	Volume (Glassware's) (Volumetric Flask/Measuring Cylinder/Beaker/Conical Flask/ Pycnometer/Specific Gravity Bottle/Density Bottle	Using Weight/Digital Balance (Readability : 0.01/0.1mg/1mg) and Distilled Water of Known Density, as per ISO 4787:2021& ISO/TR 20461:2023	>10 ml to 100 ml	0.07ml
10	Volume (Glassware's) (Volumetric Flask/Measuring Cylinder/Beaker/Conical Flask/ Pycnometer/Specific Gravity Bottle/Density Bottle	Using Weight/Digital Balance (Readability : 0.1/1mg) and Distilled Water of Known Density, as per ISO 4787:2021& ISO/TR 20461:2023	>100 ml to 500 ml	0.50ml
11	Volume (Glassware's) (Volumetric Flask/Measuring Cylinder/Beaker/Conical Flask/ Pycnometer/Specific Gravity Bottle/Density Bottle	Using Weight/Digital Balance (Readability : 1/10mg) and Distilled Water of Known Density, as per ISO 4787:2021& ISO/TR 20461:2023	>500 ml to 1000 ml	1ml

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
12	Volume (Glassware's) (Volumetric Flask/Measuring Cylinder/Beaker/Conical Flask/ Pycnometer/Specific Gravity Bottle/Density Bottle	Using Weight/Digital Balance (Readability : 10/100mg) and Distilled Water of Known Density, as per ISO 4787:2021& ISO/TR 20461:2023	>1000 ml to 2000 ml	1.4ml
Group-Force, Sub Group - Force measuring devices				
1.	Force Measuring System of CTM/UTM -Compression Mode	Using Class I accuracy Load Cell & Proving Ring As per IS 1828 Part-1:2022	200 kN to 2000 kN	0.72%
2.	Force Measuring System of UTM-Tension/Compression Mode	Using Class I accuracy Load Cell & Proving Ring As per IS 1828 Part-1:2022	2 kN to 200 kN	0.74%
Group-Pressure & Vacuum Sub Group - Differential Pressure				
1.	Pneumatic Pressure Gauge (Magnehelic Gauge)	Using Differential Pressure Manometer with Pneumatic Pump (as per DKD-R-6-1) by comparison method	Upto 300 mmWC (29.4 mbar)	1.92 mmWC (0.19mbar)

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Sub Group - Vacuum				
1	Vacuum-Dial/Digital Pressure Gauge /Indicator and Calibrator	Using Digital Pressure Gauge with Pneumatic Comparator (as per DKD-R-6-1) by comparison method	(-) 0.8 bar to 0 bar	0.01 bar
Sub Group - Pressure Gauges, Dead weight tester, instruments, Barometer				
1	Hydraulic Pressure-Dial/Digital Pressure Gauge and Calibrator, Pressure Transmitters & Pressure Switches	Using Dead Weight Tester (as per DKD-R-6-1) by comparison method	1 bar to 56 bar	0.07 bar
2	Hydraulic Pressure-Dial/Digital Pressure Gauge and Calibrator, Pressure Transmitters & Pressure Switches	Using Dead Weight Tester (as per DKD-R-6-1) by comparison method	>50 bar to 600 bar	0.2 bar
3	Hydraulic Pressure-Dial/Digital Pressure Gauge and Calibrator, Pressure Transmitters & Pressure Switches	Using Digital Pressure Gauge with Hydraulic Comparator (as per DKD-R-6-1) by comparison method	2.5 bar to 600 bar	0.3 bar

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Mechanical Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
4	Pneumatic Pressure-Dial/Digital Pressure Gauge and Calibrator, Pressure Transmitters & Pressure Switches	Using Digital Pressure Gauge with Pneumatic Comparator (as per DKD-R-6-1) by comparison method	0 bar to 20 bar	0.039 bar
Group-Acoustics, Sub Group – Noise				
1	Sound Level Meter @ 1 kHz	Using Sound Level Calibrator by comparison method As per IS: 15575 (Part-1):2016	94 dB to 114 dB	1.31 dB
Group - Speed & Acceleration				
1	Tachometer (Non-Contact Type)	Using Digital Tachometer & RPM Calibrator (Contact & Non-Contact) by comparison method	100 rpm to 30000 rpm	1.2 % to 0.15 %
2	Tachometer (Contact Type)	Using Digital Tachometer & RPM Calibrator (Contact & Non-Contact) by comparison method	100 rpm to 3000 rpm	1.2 % to 0.2 %

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Thermal Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Group - Temperature				
1	Liquid in Glass Thermometer, Dial Thermometer	Using RTD/PRT/SPRT/ with Digital Readout Thermometer & Liquid Bath by Comparison method	(-) 80 to 0 °C	0.58 °C
2	Liquid in Glass Thermometer, Dial Thermometer	Using RTD/PRT/SPRT/ with Digital Readout Thermometer & Liquid Bath by Comparison Method	0 to 100 °C	0.13 °C
3	Liquid in Glass Thermometer, Dial Thermometer	Using RTD/PRT/SPRT/ with Digital Readout Thermometer & Liquid Bath by Comparison Method	>100 to 250 °C	0.58 °C
4	PRT/SPRT/RTD/Thermocouple with and without Indicator, Digital Thermometer, Temp. Indicator with Sensor, Temp. Transmitter, Temp. Data Logger with Sensor, Temperature Gauge	Using PRT/SPRT/RTD with Digital Readout Thermometer & Liquid Bath/Dry Block Calibrator by Comparison Method	(-) 80 to 300 °C	0.05 °C

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Thermal Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
5	PRT/SPRT/RTD/Thermocouple with and without Indicator, Digital Thermometer, Temp. Indicator with Sensor, Temp. Transmitter, Temp. Data Logger with Sensor, Temperature Gauge	Using PRT/SPRT/RTD with Digital Readout Thermometer & Liquid Bath/Dry Block Calibrator by Comparison Method	>300 to 660 °C	0.05 °C
6	Thermocouple with and without Indicator, Digital Thermometer, Temp. Indicator with Sensor, Temp. Transmitter, Temp. Data Logger with Sensor	Using R/S-type Thermocouple with Digital Readout Thermometer & Dry Block Calibrator /Calibration Furnace by Comparison Method	>660 to 1000 °C	0.9 °C
7	Thermocouple with and without Indicator, Digital Thermometer, Temp. Indicator with Sensor, Temp. Transmitter, Temp. Data Logger with Sensor	Using R/S-type Thermocouple with Digital Readout Thermometer & Dry Block Calibrator /Calibration Furnace by Comparison Method	>1000 to 1200 °C	1.0 °C

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Thermal Calibration (Laboratory Based)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
8	Thermo-Hygrometer /Humidity Meter/ Digital Hygrometer /Data Logger / Humidity Indicator with Sensor	Using RTD With Indicator with Probe, Humidity Chamber By Comparison Method.	5°C to 50 °C @ 50 %RH	0.27 °C
Group - Humidity				
1	Thermo-Hygrometer/Humidity Meter/Digital Hygrometer /Data Logger / Humidity Indicator with Sensor	Using Digital Thermo Hygrometer with Probe, Humidity Chamber by Comparison Method.	20 % RH to 95 % RH @ 25 °C	1.5 %RH
Group - Non-Contact Type (IR/Optical)				
1	Infrared Thermometer/IR Gun/Thermal Imager Camera @ 0.95 Emissivity	Using Infrared Calibrator & Infrared Thermometer blackbody (Emissivity of Source (e = 0.950).) by Comparison Method.	35 to 500 °C	2.23 °C

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Electrotechnical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Group - Direct Current (Measure Mode)				
1	DC Current	Using Digital Multimeter $6^{1/2}$ Fluke/8846A by direct method	10 µA to 10 A	0.4 % to 0.2 %
2	DC Voltage	Using Digital Multimeter 61/2 Fluke/8846A by direct method	1 mV to 100 mV	0.42 % to 0.01 %
			100 mV to 10 V	0.01 % to 0.005 %
			10 V to 1000 V	0.005 % to 0.006 %
3	DC High Voltage	Using HV Probe Fluke/80k-40 & Digital Multimeter by direct method	>1 kV to 27 kV	3 %
4	DC Resistance (2 & 4 Wire)	Using Digital Multimeter 61/2 Fluke/8846A by direct method	1 ohm to 1 M ohm	0.36 % to 0.015 %
			1 M ohm to 100 M ohm	0.015 % to 1.0 %
Group - Direct Current (Source Mode)				
1	DC Current	Using Calibration System, Fluke/9100 by direct method	1 µA to 300 mA	1.5 % to 0.03%
			300 mA to 10 A	0.03 % to 0.08 %
		Using Calibration System, Fluke/9100 with 50 Turn	10 A to 1000 A	0.12 %

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Electrotechnical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
		Current Coil by direct method		
2	DC Voltage	Using Calibration System, Fluke/9100 by direct method	1 mV to 300 V	0.5 % to 0.01 %
			300 V to 1000 V	0.01 % to 0.012 %
3	DC Resistance (2 & 4 Wire)	Using Standard Resistance Box & Decade Resistance Box by direct method	1 m ohm to 1 k ohm	1.04 % to 0.58 %
			1 k ohm to 1 M ohm	0.58 % to 2.82 %
4	DC Resistance (2 Wire)	Using Mega Ohm Box by direct method	1 M ohm to 2 G ohm	2.82 % to 1.16%
5	Insulation Resistance @ 1kV/5 kV	Using HV Mega Ohm Box by direct method	2 M ohm to 2 G ohm	1.6%
Group - Alternative Current (Measure Mode)				
1	AC Current @ 50 Hz	Using Digital Multimeter $6^{1/2}$ Fluke/8846A by direct method	100 µA to 10 A	0.25 %
2	AC Voltage @ 50 Hz	Using Digital Multimeter $6^{1/2}$ Fluke/8846A by direct method	10 mV to 100 mV	0.54% to 0.12 %
			100 mV to 1000 V	0.12 % to 0.2 %
3	AC High Voltage @ 50 Hz	Using HV Probe Fluke/80k-40 & Digital Multimeter by direct method	>1 kV to 27 kV	3.5 %

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Electrotechnical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
4	AC Resistance @ 1 kHz	Using LCR Meter/ Aplab 4912 by direct method	1 ohm to 1 M ohm	0.45%
5	Capacitance @ 1 kHz		1 nF to 10 µF	0.5%
6	Inductance @ 1 kHz		1 mH to 10 H	0.5%
7	AC Power @50 Hz	Using Digital Power Logger by Direct Method	1 kW to 6 kW	0.98 %
8	Power Factor	Using Digital Power Logger by Direct Method	0.500 PF (Lead/Lag) to 1 UPF	0.1 PF
Group - Alternative Current (Source Mode)				
1	AC Current @ 50 Hz//1 kHz	Using Calibration System, Fluke/9100 by direct method	100 µA to 300 mA	0.45 % to 0.12 %
			300 mA to 10 A	0.12 % to 0.27 %
		Using Calibration System, Fluke/9100 with 50 Turn Current Coil by direct method	10 A to 1000 A	0.32 %
2	AC Voltage @ 50 Hz/1 kHz	Using Calibration System, Fluke/9100 by direct method	10 mV to 30 mV	1.2 % to 0.42 %
			30 mV to 300 V	0.42 % to 0.07 %
			300 V to 1000 V	0.07 % to 0.08%

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Electrotechnical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Group - Low frequency (Measure Mode)				
1	Timer/Hour Meter/Stop Watch	Using Digital Time Interval Meter by direct method	1 s to 18000 s	0.15 s to 2.4 s
			18000 s to 36000 s	2.4 s to 4.5 s
			36000 s to 86400 s	4.5 s to 10.2 s
2	Frequency	Using Digital Multimeter 61/2 Fluke/8846A by direct method	10 Hz to 1 MHz	0.02 % to 0.015 %
Group - Low frequency (Source Mode)				
1	Frequency	Using Calibration System, Fluke/9100 by direct method	10 Hz to 10 MHz	0.006 % to 0.003 %
2	Wascator/Front Loading Washer or washing machine (Time)	Using Digital Time Calibrator by direct method ISO 6330:2021	1s to 30 s	0.15 s to 2.4 s
3	Washer/Top Loading Washing Machine (Time)	Using Digital Time Calibrator by direct method	60 s - 1200 s	2.4 s
4	ISO Tumble Dryer (Time)		1 min. - 15 min.	2.4 s
5	Flammability Tester (Time)		0.5 s - 40 s	0.15 s to 2.4 s

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Electrotechnical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
6	Pneumatic Bursting Tester (Time)	Using Digital Time Calibrator by direct method	1 s - 30 s	0.15 s to 2.4 s
7	Hydraulic Bursting Tester (Time)	ASTM D3786/D3786M:2018 ISO 13938-1:2019,ISO 13938-2:2019	15s-2s	0.14s
8	AATCC Dryer (Time)	AATCC 88B:2018, AATCC8C:2018,AATCC124:2018,AATCC130:2018,AATCC:135:2018,AATCC142:2016,AATCC143:2018,AATCC150:2018,AATCC172:2016,AATCC179:2023	10s to 600s	2.4s
Group - Temperature Simulation (All Type T/C) (Measure Mode)				
1	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "J" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 180 to 1200 °C	1.94 °C
2	Temperature Controller/ Indicator/ Recorder/ Process Meter/	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 140 to 1300 °C	2.2 °C

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Electrotechnical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
	Temperature Data Logger "K" Type			
3	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "R" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	0 to 1700 °C	1.94 °C
4	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "S" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	0 to 1700 °C	1.94 °C
5	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "T" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 200 to 400 °C	1.94 °C
6	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger "RTDpt-100" Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 200 to 790 °C	0.64 °C

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Electrotechnical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
7	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “N” Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 200 to 1300 °C	1.2 °C
Group - Temperature Simulation (All Type T/C) (Source Mode)				
1	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “J” Type	Using Calibration System, Fluke/9100 by direct method	(-) 100 to 1200 °C	0.3 °C
2	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “K” Type	Using Calibration System, Fluke/9100 by direct method	(-) 200 to 1300 °C	0.4 °C
3	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “N” Type	Using Calibration System, Fluke/9100 by direct method	(-) 100 to 1300 °C	0.3 °C

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Electrotechnical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
4	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “R” Type	Using Calibration System, Fluke/9100 by direct method	100 to 1700 °C	0.8 °C
5	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “S” Type	Using Calibration System, Fluke/9100 by direct method	200 to 1700 °C	0.9 °C
6	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “T” Type	Using Calibration System, Fluke/9100 by direct method	(-) 200 to 400 °C	0.4 °C
7	Temperature Controller/ Indicator/ Recorder/ Process Meter/ Temperature Data Logger “RTDpt-100” Type	Using Multifunction Process Calibrator Fluke/725 by direct method	(-) 200 to 790 °C	0.4 °C

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Mechanical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Group: Dimension Sub Group - Length standards& Instruments and Gauges for measuring length.				
1	Crock meter /Crocking Tester (Linear Dimension)	Using Digital Caliper, Digital Micrometer& Steel Scale by comparison method as per ISO105 X 12:2016, AATCC 8:2016	5 mm-110 mm (stroke length)	0.02 mm
			5 mm-20 mm (diameter)	0.01 mm
2	Martindale Abrasion and Pilling Tester (Lissajous figure's Dimensions)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ISO 12947-1:1998 ISO 12945-2:2020, ASTM D 4966:2022, ASTM/D4970M:2022	1 mm - 65 mm	0.02 mm
3	Martindale Abrasion and Pilling Tester (Linear Dimension)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ISO 12947-1:1998 ISO 12945-2:2020, ASTM D 4966:2022 ASTM D4970M:2022	0.5 mm to 10 mm	0.01 mm
			11 mm to 130mm	0.02 mm
4	Perspirometer/Perspiration Tester (Linear Dimension (of sample plates)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per AATCC 15:2021, ISO 105 E01:2013, ISO 105 E04:2013	0 mm - 120 mm	0.02 mm
5	Box Pilling Tester (Linear Dimension)	Using Digital Caliper, Digital Micrometer & Steel Scale by	2mm-300mm	0.02 mm

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Mechanical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
		comparison method as per ISO 12945-1:2020		
6	Wascator/Front Loading Washer or washing machine(Linear Dimension)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ISO 6330:2021	50 mm to 250 mm	0.2 mm
7	ISO Tumble Dryer Linear Dimension (Drum)	Using Steel Scale & Measuring Tape as per ISO 6330:2021	500 mm-700 mm	0.2 mm
8	Sample Cutter (Linear Dimensions)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ASTM D 3776M: 2020 /ASTM D2646:2018, ISO 3801:1977, BS 2471:2005, BS EN 12127:1998, ASTM D 4966:2022, ISO 17076-2:2011, ISO 17704:2004, ISO 12945-2:2020, ASTM D 4970M:2022, ISO 20344:2021, ISO 5470-2:2021	30 mm to 150 mm	0.02 mm
9	Flammability Tester (Linear Dimension)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ASTM D 1230:2022 , CFR 16 1610:2023	5mm-50mm	0.02 mm
			100mm - 400mm	0.2 mm

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Mechanical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
10	Pneumatic Bursting Tester (Linear Dimension (Distension)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ISO 13938-1:2019, ISO 13938-2:2019	0 mm to 30 mm	0.02mm
			40 mm to 80 mm	0.02 mm
11	Pneumatic Bursting Tester (Linear Dimension (Diameter)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ISO 13938-1:2019, ISO 13938-2:2019	25 mm to 115 mm	0.02 mm
12	Hydraulic Bursting Tester (Distension)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ISO 13938-1:2019, ISO 13938-2:2019	0 mm to 70 mm	0.02 mm
13	Hydraulic Bursting Tester (Linear Dimension (Diameter)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ISO 13938-1:2019, ISO 13938-2:2019	25 mm to 115 mm	0.02 mm
14	Elmendorf Tear Strength Tester(Linear Dimension)	Using Digital Caliper, Digital Micrometer & Steel Scale by comparison method as per ISO 13937-1:2000, ASTM 1424:2021	2 mm - 110 mm	0.02 mm
15	Los Angeles abrasion machine(Ball Dia)	Using Digital Caliper &Digital Micrometer as per IS 2386 Part-4:1963 ,	40 mm to 50 mm	0.02 mm

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
		ASTM 135:1996, IS 10070:1982, ASTM C33:2023		
Sub Group - Angle gauges, circular scales, indexing tables, polygons, levels, sine bars, autocollimators engineers' squares, cylindrical squares, angle plates, bevel protractors, sine centers, combination set, sine table, spirit level, electronic level, inclinometers				
1	Flammability Tester (Angle)	Using Angle Gauge Set & Profile Projector as per ASTM D 1230:2022, CFR 16 1610:2023	30^{0}- 50^{0}	0.6^{0}
Group: Mass Sub Group: Weights/Standards of mass				
1	Crock meter /Crocking Tester (Mass)	Using Digital Weighing Balance by Comparison Method	100 g -1100 g	0.01 g to 0.1 g
2	Martindale Abrasion and Pilling Tester(Mass)	Using Digital Weighing Balance by Comparison Method	100g to 250g	0.02 g
			251g to 3000g	0.05 g
3	Perspirometer/Perspiration Tester **(**Mass**)**	Using Digital Weighing Balance by Comparison Method	100g-5500g	0.01 g
4	Flammability Tester(Mass)	Using Digital Weighing Balance by Comparison Method	10 g to 50 g	0.02 g
5	Elmendorf Tear StrengthTester(Mass)	Using Digital Weighing Balance by Comparison Method	400 g to 7500 g	0.01 g to 0.1 g

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Mechanical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
6	Los Angeles abrasion machine (A, B, C, D, E, F & G) (Grading mass)	Using Digital Weighing Balance by Comparison Method	2.5 kg to 5 kg	0.1 g
7	Los Angeles abrasion machine (Ball mass)	Using Digital Weighing Balance by Comparison Method	390 g to 455 g	0.01 g
Sub Group - Balance or other weighing devices				
1	Digital Weighing Balance, Micro/ Semi /Precision/ Ordinary Balance Readability: 0.001 mg(For class I and coarser)	Using Standard Weight of Accuracy Class E_1 and as per OIML R-76 1:2006	1 mg to 5 g	0.005 mg
2	Digital Weighing Balance, Micro/ Semi micro/ Precision/Ordinary Balance Readability: 0.01 mg (For class I and coarser)	Using Standard Weight of Accuracy Class E_1 and as per OIML R-76 1:2006	1 mg to 50 g	0.05 mg

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Mechanical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
3	Digital Weighing Balance, Micro/ Semi micro/ Precision/Ordinary Balance Readability: 0.01 mg (For class I and coarser)	Using Standard Weight of Accuracy Class E_1 and as per OIML R-76 1:2006	>50 g to 200 g	0.07 mg
4	Digital Weighing Balance, Micro/ Semi micro/ Precision/Ordinary Balance Readability: 0.1 mg (For class I and coarser)	Using Standard Weight of Accuracy Class E_1 and as per OIML R-76 1:2006	>50 g to 200 g	0.09 mg
5	Digital Weighing Balance, Precision/ Ordinary Balance Readability: 1 mg (For class I and coarser)	Using Standard Weight of Accuracy Class E_1/E_2/F_1 and as per OIML R-76-1:2006	>200 g to 1 kg	2.0 mg
6	Digital Weighing Balance, Precision/ Ordinary Balance Readability: 10 mg (For class I and coarser)	Using Standard Weight of Accuracy Class E_2/F_1 and as per OIML R-76-1:2006	>200 g to 1 kg	11mg

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Mechanical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
7	Digital Weighing Balance, Precision/Ordinary Balance Readability: 10 mg (For class II and coarser)	Using Standard Weight of Accuracy Class F_1/M_1 and as per OIML R-76-1:2006	>1 kg to 2 kg	20 mg
8	Digital Weighing Balance, Precision/ Ordinary Balance Readability: 100 mg (For class II and coarser)	Using Standard Weight of Accuracy Class F_1/M_1 and as per OIML R-76-1:2006	>2 kg to 20 kg	0.20 g
9	Digital Weighing Balance, Readability: 1 g (For class and coarser)	Using Standard Weight of Accuracy Class F_1/M_1 and as per OIML R-76-1:2006	>2kg to 30 kg	0.50 g
10	Digital Weighing Balance, Readability: 1 g (For class III and coarser)	Using Standard Weight of Accuracy Class F_1/M_1 and as per OIML R-76-1:2006	>30 kg to 50 kg	2.5 g
11	Digital Weighing Balance, Readability: 5 g (For class III and coarser)	Using Standard Weight of Accuracy Class F_1/M_1 and as per OIML R-76-1:2006	>20 kg to 50 kg	7.0 g

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
12	Digital Weighing Balance, Readability: 10 g (For class III and coarser)	Using Standard Weight of Accuracy Class F_1 /M_1 and as per OIML R-76-1:2006	>50 kg to 100 kg	13 g
13	Wascator/Front Loading Washer or washing machine (Weighing balance)	Using Standard Weight by Comparison Method	0.1 kg - 10kg	0.1g to 5 g
Group: Volume				
1	Washer/Top Loading Washing Machine (Volume)	Using Weighing Balance (Readability: 0.1g/5g/10g) and Distilled Water of Known Density, by Comparison Method	10 liters- 100 liters	0.01 to 0.1 liter
Group: Pressure & Vacuum Sub Group - Pressure				
1	Pneumatic Bursting Tester (Pressure)	Using Digital Pressure Gauge with Pneumatic Comparator by comparison method as per ASTM D3786/D3786M:2018, ISO 13938-1:2019, ISO 13938-2:2019	100 kPa - 1600 kPa	3.9 kPa
2	Hydraulic Bursting Tester (Pressure)	Using Digital Pressure Gauge with Hydraulic Comparator by comparison method as per ASTM	100 kPa - 7000 kPa	3.9 kPa

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
		D3786/D3786M:2018,ISO 13938-1:2019, ISO 13938-2:2019		
Sub Group - Differential Pressure				
1	Pneumatic Pressure Gauge (Magnehelic Gauge)	Using Differential Pressure Manometer with Pneumatic Pump (as per DKD-R-6-1) by comparison method	Upto 300 mmWC (29.4 mbar)	1.92 mmWC (0.19 mbar)
Sub Group - Vacuum				
1	Vacuum-Dial/Digital Pressure Gauge /Indicator and Calibrator,	Using Digital Pressure Gauge with Pneumatic Comparator (as per DKD-R-6-1) by comparison method	(-) 0.8 bar to 0 bar	0.008 bar
Sub Group - Pressure Gauges, Dead weight tester, instruments, Barometer				
1	Hydraulic Pressure Dial/Digital Pressure Gauge and Calibrator, Pressure Transmitters & Pressure Switches	Using Digital Pressure Gauge with Hydraulic Comparator (as per DKD-R-6-1)) by comparison method	2.5 bar to 600 bar	0.3 bar

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S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
2	Pneumatic Pressure- Dial/Digital Pressure Gauge and Calibrator, Pressure Transmitters & Pressure Switches	Using Digital Pressure Gauge with Pneumatic Comparator (as per DKD-R-6-1)) by comparison method	0 bar to 20 bar	0.039 bar
Group - Speed & Acceleration				
1	RPM indicator of Centrifuge, Viscometer, Dissolution apparatus, Rotatory Evaporator, Insolubility Index Mixer, DT apparatus (Contact Type)	Using Digital Tachometer by comparison method	20 rpm to 5000 rpm	6.8 % to 2 %
2	RPM indicator of Centrifuge, Viscometer, Dissolution apparatus, Rotatory Evaporator, Insolubility Index Mixer, DT apparatus (Non-Contact Type)	Using Digital Tachometer by comparison method	20 rpm to 50000 rpm	6.7 % to 2 %

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Mechanical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
3	Martindale Abrasion and Pilling Tester(Rotational Speed)	Using Digital Tachometer by comparison method as per ISO 12945-2:2020, ASTM D 4966:2022 ASTM D4970/D4970M:2022	10 RPM-60 RPM	2%
4	Box Pilling Tester (Rotational Speed)	Using Digital Tachometer by comparison method as per ISO 12945-1:2020	10 RPM- 70 RPM	2%
5	Wascator/Front Loading washer or washing machine (Rotational Speed)	Using Digital Tachometer As per ISO 6330:2021,	45 RPM-1000RPM	2%
6	Washer/Top Loading Washing Machine (Agitation Speed)	Using Digital Tachometer by comparison method as per AATCC 88 B:2018, AATCC 88 C:2018, AATCC 124:2018, AATCC 130:2018, AATCC 135:2018, AATCC 142:2016, AATCC 143:2018, AATCC 150:2018, AATCC 172:2016, AATCC 179:2023,AATCC LP1:2021	10 RPM - 200 RPM	6.8% to 2%

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Mechanical Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
7	Washer/Top Loading Washing Machine (Spin Speed)	Using Digital Tachometer by comparison method as per AATCC 88 B:2018, AATCC 88 C:2018, AATCC 124:2018, AATCC 130:2018, AATCC 135:2018, AATCC 142:2016, AATCC 143:2018, AATCC 150:2018, AATCC 172:2016, AATCC 179:2023, AATCC LP1:2021	300 RPM - 800 RPM	2%
8	Los Angeles abrasion machine(RPM)	Using Digital Tachometer by comparison method as per IS 2386 Part-4:1963 , ASTM C135:2022, IS 10070:1982, ASTM C33:2023	30 rpm to 33 rpm	6.8% to 2%

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Thermal Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
Group - Temperature				
1	Temperature Indicator of Humidity/Environment /Stability Chamber	Using Digital Thermo-Hygrometer with Probe/RTD with Indicator (Single Sensor) by Comparison Method	5˚C to 50 ˚C @ 50%RH	0.25 ˚C
2	Temperature Indicator of Humidity/Environment /Stability Chamber	RTD With Data Logger/Data Logger (Multi Sensor) by Comparison Method	5˚C to 50 ˚C @ 50%RH	0.50 ˚C
3	Indicator of Liquid Bath, Freezer, Deep Freezer, Chiller, Cooling Chamber ,Refrigerator	Using PRT/SPRT/RTD with Digital Thermometer (Single Sensor) By Comparison Method	(-80) ˚C to 40 ˚C	0.07 ˚C
4	Indicator of Liquid Bath, Freezer, Deep Freezer, Chiller, Cooling Chamber ,Refrigerator	Using 9 RTD with Data Logger (Multi Sensor) by Comparison Method	(-)80 °C to 40 °C	2.71 °C
5	Indicator of Liquid Bath, Cooling Chamber	Using PRT/SPRT/RTD with Digital Thermometer (Single Sensor)By Comparison Method	>40˚C to 300 ˚C	0.07 ˚C

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Thermal Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
6	Indicator of Liquid Bath, Cooling Chamber	Using 9 RTD with Data Logger(Multi Sensor) by Comparison Method	>40˚C to 300 ˚C	2.48°C
7	Indicator of Liquid Bath, Dry Block, Incubator, BOD, Autoclave, Oven, Environment Chamber, Humidity Chamber, Walk-In-Room	Using PRT/SPRT/RTD with Digital Thermometer (Single Sensor) By Comparison Method	0 °C to 300 °C	0.07°C
8	Indicator of Liquid Bath, Incubator, BOD, Autoclave, Oven, Environment Chamber, Humidity Chamber, Walk-In-Room	Using 9 RTD with Data Logger. (Multi-Sensor) By (Comparison Method)	0 °C to 300 °C	3.64°C
9	Indicator of Dry Block, Incubator, BOD, Autoclave, Oven, Environment Chamber, Humidity Chamber	RTD/PRT/SPRT with Digital Thermometer (Single Sensor) By Comparison Method	50 °C to 300 °C	0.07°C
10	Temperature Indicator of Dry	Using PRT/SPRT/RTD with Digital Thermometer	>300 °C to 660 °C	0.2°C

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Thermal Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
	Block, Muffle Furnace, Industrial Furnace, Oven	(Single-Sensor) By (Comparison Method)		
11	Temperature Indicator of Dry Block, Muffle Furnace, Industrial Furnace.	Using R/S-type Thermocouple with Digital Readout Thermometer (Single-Sensor) by Comparison Method	>660 °C to 1200 °C	1.3°C
12	Temperature Indicator of Dry Block, Muffle Furnace, Industrial Furnace, Oven	Using K-type Thermocouple With Data Logger (Multi-Sensor) by Comparison Method	>200 °C to 1100 °C	4.18°C
13	PRT/SPRT/RTD/ Thermocouple with and without Indicator, Temperature Transmitter, Temperature Gauge	Using PRT/SPRT/RTD with Digital Readout Thermometer & Dry Block Calibrator by Comparison Method	(-) 20 °C to 660 °C	0.098°C
14	Thermocouples (with & without Indicator)	Using R/S-type Thermocouple with Digital Readout Thermometer &Dry Block	>660 °C to 1200 °C	1.3°C
15	Washer/Top Loading Washing Machine	Using PRT/SPRT/RTD with Digital Thermometer	10^0 C - 90^0 C	0.15 ^{0} C

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Thermal Calibration (At Site)

S. No.	Parameter	Calibration Method/ Procedure & Equipment used as Reference Standard	Range	Uncertainty in Measurement (±) *
	(Temperature)	(Single Sensor)By Comparison Method		
Group - Humidity				
1	Humidity Indicator of Humidity/ Environment /Stability Chamber	Digital Thermo Hygrometer with Probe (Single Sensor) by Comparison Method	20 %RH to 95%RH @ 25°C	1.5 %RH
2	Humidity Indicator of Humidity/ Environment /Stability Chamber	Data Logger (Multi Sensor) by Comparison Method	20 %RH to 95%RH @25°C	3.08%RH

***Expanded uncertainty expressed in coverage probability of approximately 95 % (coverage factor k=2)**

**** This amended scope is issued, due to change in location of the lab**

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