CERTIFICATE OF ACCREDITATION

This is to attest that

TRANSCAL TECHNOLOGIES LLP

NO. 100, 10TH CROSS, BETWEEN SAMPIGE ROAD AND MARGOSA ROAD, MALLESWARAM
BANGALORE, KA, 560003, INDIA

Calibration Laboratory CL-233

has met the requirements of AC204, *IAS Accreditation Criteria for Calibration Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories.* This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date October 24, 2024

Expiration Date September 1, 2026

President

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SCOPE OF ACCREDITATION

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TRANSCAL TECHNOLOGIES LLP

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Accredited to ISO/IEC 17025:2017 *Effective Date October 24, 2024*

CALIBRATION AND MEASUREMENT CAPABILITY (CMC)*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Dimensional			
Height Gauge (Vernier/Dial/ Digital)	0 mm to 600 mm 0 mm to 1000 mm	7.8 µm 8.1 µm	Using Gauge Blocks/Caliper Checker. Based on TSC/CAL/404 (IS 2921)
2D Height Gauge	0 mm to 600 mm	2.2 µm	Using Gauge Blocks & Cylindrical Squareness Block. Based on TSC/CAL/404 (IS 2921)
V-Block / Matched pair V-Block (Parallelism, Symmetricity, Angle of V-Block)	300 mm x 125 mm x 200 mm	Parallelism & symmetry: 4.4 µm Angle: 2”	Using Lever Dial Gauge, CMM & Mandrel, Based on TSC/CAL/418 (IS 2949)
Caliper (Vernier/Dial/ Digital)	0 mm to 600 mm 0 mm to 1000 mm 0 mm to 2000 mm	7.8 µm 10 µm 12 µm	Using Gauge Block Set, Caliper Checker, Based on TSC/CAL/401 (IS 16491)
External Micrometer (Mechanical / Electronic / Digital)	0 mm to 25 mm 0 mm to 150 mm 0 mm to 1000 mm 0 mm to 2000 mm	0.4 µm 0.6 µm 1.7 µm 11 µm	Using Gauge Blocks, Based on TSC/CAL/400 (IS 2967)
Electronic Probe	0 mm to 25mm 0 mm to 50 mm	0.5 µm 0.9 µm	Using Gauge Blocks, By Comparison Method, Based on TSC/CAL/454 (IS 2984)
Wire Gauge	0.19 mm to 7.62 mm	8 µm	Using Video Measuring Machine, By Comparison Method Based on TSC/CAL/448 (IS 460)

** If information in this CMC is presented in non-SI units, the conversion factors stated in NIST Special Publication 811 “Guide for the Use of the International System of Units (SI)” apply.*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Hegman Gauge	up to 1 mm	2.3 µm	Using Plunger Dial Gauge By Comparison Method Method Based on TSC/CAL/447 (IS 5460)
Wet Film Thickness Gauge	0.025 mm to 5 mm	5.9 µm	Video Measuring Machine, By Comparison Method, Based on TSC/CAL/449 (IS 460)
Depth Micrometer	0 mm to 300 mm 0 mm to 600 mm	6 µm 11 µm	Using Gauge Block Set, By Comparison Method, TSC/CAL/407 (JIS B 7544)
Depth Caliper	0 mm to 300 mm 0 mm to 600 mm	6.4 µm 13 µm	Using Gauge Block Set, By Comparison Method, TSC/CAL/408 (IS 4213)
Micrometer Setting Rod	25 mm to 1000 mm 1000 mm to 1950 mm	4.7 µm 7.9 µm	Using Gauge Block Set, By Comparison Method Based on TSC/CAL/435 (IS 2984)
Angle Graticule	0° to 360°	1.8’	Using Video Measuring Machine, Comparison method, based on TSC/CAL/455 (IS 4239)
Laser Distance Meter	0 mm to 2000 mm	350 µm	Using Slip Gauge, Comparison Method Based on TSC/CAL/459 (IS 2967)
Inclinometer	0° to 90°	0.028°	Using Angle Gauge Blocks, Comparison Method based on TSC/CAL/453 (IS 4239)
Bench Center (Co-axiality)	0 mm to 500 mm	3.4 µm	Using Straight & Taper Mandrels, Dial Gauge, Comparison Method TSC/CAL/445 (IS 5980)
Bench Center (Parallelism)	0 mm to 500mm	4.5 µm	Using Straight &Taper Mandrels, Dial Gauge, Comparison Method TSC/CAL/445(IS 5980)
Angle Plate	450 mm x 300 mm x 200 mm	11 µm	Using CMM, Comparison Method, TSC/CAL/452 (IS 2554, IS 6973)
Flakiness Gauge	0 mm to 100 mm	5.9 µm	Using Video Measuring Machine & 2D Height Gauge, Comparison Method Based on TSC/CAL/451(IS:2386)

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Elongation Gauge	0 mm to 100 mm	5.9 µm	Using 2D Height Gauge, Comparison Method, Based on TSC/CAL/460 (BS: 812-105.2)
Dial Gauge (Plunger /Digital/ Dial Thickness Gauge)	0 mm to 100 mm	0.7 µm	Using Length Measuring Machine, Comparison Method, TSC/CAL/402 (IS 2092)
Dial Gauge (Lever Type)	0 mm to 2 mm	0.5 µm	Using Length Measuring Machine, Comparison Method, TSC/CAL/402 (IS 11498)
Dial Gauge	0 mm to 100mm	0.4 µm	Using Gauge Block set, Comparison Method, TSC/CAL/402
Dial Comparator Stand	100 mm	0.1 µm	Using Optical Flat, Comparison Method, TSC/CAL/402
Bore Dial Gauge for Transmission Accuracy check	0 mm to 2 mm	0.4 µm	Using Length Measuring Machine, Comparison Method, TSC/CAL/402 (LIS B 7515)
Surface Plate	5 m x 3 m	1.3 √((L+W)/100) L = Length in mm W = Width in mm	Using Electronic Level, Comparison Method, TSC/CAL/410 IS 7327, IS 2285)
Plain Plug Gauge	0 mm to 100 mm 100 mm to 400 mm	1 µm 1.6 µm	Using Length Measuring Machine, Master Disc, FCDM, Electronic Probe with DRO, Comparison Method, TSC/CAL/409 (IS 3455)
Feeler Gauge	Up to 1 mm	1.4 µm	Using Digital Micrometer, Comparison Method, TSC/CAL/405 (IS 3179)
Cylindrical Measuring Pin	0.1 mm to 26 mm	1 µm	Using Length Measuring Machine, Master Disc, FCDM, Electronic Probe with DRO, Comparison Method, TSC/CAL/403 (IS 1103)

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Thread Plug Gauge (Major Diameter & Effective Diameter)	1 mm to 3 mm 3 mm to 100 mm 100 mm to 400 mm	1.2 µm 1.2 µm 1.7 µm	Using Length Measuring Machine, Master Disc, FCDM, Comparison Method, TSC/CAL/409 (IS 2334)
Snap Gauge	3 mm to 500 mm	2.7 µm	Using Gauge Block Set, Comparison Method, TSC/CAL/406 (IS 3477)
Bevel Protractor / Combination Set	0° to 360°	0.048°	Using Angle Block Set, Video Measuring Machine, Comparison Method, TSC/CAL/412 (IS 4239)
Thread Ring Gauge (For Effective Diameter & Minor Diameter only)	3 mm to 325 mm	2.8 µm	Using Length Measuring Machine, Master Ring, Comparison Method, TSC/CAL/415 (IS 2334, IS 4218)
Spirit Level (Type 1, 2 & 3)	Sensitivity up to 0.01 mm/m	0.003 mm/m	Using Electronic probe with DRO / Electronic Level, Comparison Method, TSC/CAL/413 (IS 5706 & IS 1632)
Plain Ring Gauge	3 mm to 325 mm	1.9 µm	Using Length Measuring Machine, Master Ring, Comparison Method, TSC/CAL/416 (IS 3455)
Measuring Scales	Up to 3000 mm	114 √(L) µm Where L is length in meters	Using Length Measuring Machine, Comparison Method, TSC/CAL/427 (IS 1481)
Measuring Tape	Up to 50 m	114 √(L) µm Where L is length in meters	Using Length Measuring Machine, Video Measuring Machine, Comparison Method, TSC/CAL/428 (IS 1269)
PI Tape	Circumference range up to 15000 mm	(42 + 0.5L) µ diameter (where L is in meters)	Using Tape Measuring Machine and Video Measuring Machine. Comparison Method, Based on TSC/CAL/481 (IS 1269)
Thread Pitch Gauge Pitch Angle	 0.25 mm to 6.35 mm 55° and 60°	 0.9 µm 1.2’	Using Video Measuring Machine, Comparison Method, Based on TSC/CAL/424 (IS 4211)

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Radius Gauge	0.4 mm to 50 mm	5.6 µm	Using Video Measuring Machine, Comparison Method, Based on TSC/CAL/425 (IS 5273)
Internal / Stick Micrometer (2 Point)	50 mm to 5000 mm	(6 + 0.4L) µm where L is length in meters	Using slip gauge set and Long Gauge Block Set, Comparison Method, Based on TSC/CAL/417(IS 2966)
Engineering Square (Squareness)	Up to 400 mm	6.2 µm	Using Granite Square & Slip Gauge, Comparison Method, Based on TSC/CAL/420 (IS 2103)
Test Sieves	0.03 mm to 5 mm 5 mm to 125 mm	1 µm 4.8 µm	Using Video Measuring System, Comparison Method Based on TSC/CAL/429 (IS 460)
Comparator Stand (Flatness of worktable)	300 mm x 300 mm	2.4 µm	Using Lever Dial Gauge, Comparison Method, Based on TSC/CAL/421(IS 7599)
Straight Edge/Parallels	Up to 2000 mm	2.8 µm	Using Slip Gauge, Lever dial Gauge / CMM, Comparison Method, Based on TSC/CAL/431 (IS 2220)
Inside/ Outside Dial Caliper	0 mm to 150 mm	0.7 µm	Using Gauge Block Set, by Comparison Method. Based on TSC/CAL/423 (IS 2092)
Pistol Caliper	0 mm to 100 mm	60 µm	Using Gauge Block Set, By Comparison Method. Based on TSC/CAL/422 (IS 2092)
Thickness Plate/Foils	Up to 2.5 mm	1.6 µm	Using Digital Micrometer, By Comparison Method. Based on TSC/CAL/405 (IS 1103)
Limit Gauge /Test probes (Length, Radius / Diameter, Angle)	0 mm to 400 mm 360°	4.6 µm 2.4’	Using Video Measuring Machine, By Comparison Method. Based on TSC/CAL/434 (IS:460 & IS 4211)

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Coating Thickness Gauge	0 µm to 2000 µm	1.8 µm	Using Standard Thickness Foils, By Comparison Method, Based on TSC/CAL/414,413 (IS 1103)
Taper Thread Plug Gauge (Effective Diameter)	Up to 150 mm diameter	1.4 µm	Using Length Measuring Machine, Master Disc, FCDM; Vision system, Comparison Method, Based on TSC/CAL/419 (IS 8999)
3-Point Micrometer	2.5 mm to 100 mm	2.3 µm	Using set of Setting Ring Gauges, By Comparison Method. Based on TSC/CAL/433 (IS 2967)
Taper Scale	1 mm to 15 mm	4.8 µm	Using Video Measuring Machine, By Comparison Method. Based on TSC/CAL/441 (IS 460)
Ultrasonic Thickness Gauge	0 mm to 300 mm	38 µm	Using Gauge Block Set, By Comparison Method. Based on TSC/CAL/440 (IS 2967)
Length Bars	50 mm to 500 mm	2.9 µm	Using Length Measuring Machine, Comparison Method, Based on TSC-CAL-465 (IS 2984)
Micrometer Head	0 mm to 50 mm	0.8 µm	Using Length Measuring Machine, Comparison Method, Based on TSC/CAL/443 (IS 2966)
Fillet Gauge/ Form Gauge	0 mm to 150 mm 0° to 90°	5.8 µm 0.09°	Using Video Measuring Machine, By Comparison Method. Based on TSC/CAL/444 (IS 460 & IS:4211)
Taper Plain Plug Gauge	Taper Half Angle Up to 100 mm	0.6” 0.9 µm	Using Length Measuring Machine, CMM, By Comparison Method. TSC/CAL/436 (IS 9475, IS 2251)

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Taper Thread Ring Gauge	Up to 100 mm	0.9 µm	Using Length Measuring Machine, By Comparison Method, Based on TSC/CAL/437 (IS 8999, ASME B1.20.5)
Taper Plain Ring Gauge	Taper Half Angle Up to 100 mm	5.5” 0.9 µm	Using Length Measuring machine, CMM, By Comparison Method, Based on TSC/CAL/438 (IS 9475, IS 2251)
Sine Bar/ Sine Centre / Sine Table	0° to 45°	2.8”	Using Gauge Blocks, Angle Blocks, Lever Dial Gauge, By Comparison Method, Based on TSC/CAL/439 (IS 5359)
Profile Projector / Video Measuring machine /Microscope	Magnification - 10 X to 50 X	0.06 %	Using Gauge Blocks/Glass Scale, By Comparison Method Based on TSC/CAL/411(JIS B7184)
	Angle measurement - 0° to 360°	4.1”	Using Angle Gauge Blocks/Glass Scale, By Comparison Method, Based on TSC/CAL/411 (JIS B7184)
	Linear measurement - 400 mm	2.9 µm	Using Gauge Blocks/Glass Scale, Comparison Method, Based on TSC/CAL/411(JIS B7184)
Floating Carriage Diameter Measuring Machine	0 mm to 100 mm	1.5 µm	Using Mandrels. Master Cylinders, Electronic probe with DRO, slip Gauge set. Comparison Method, Based on TSC/CAL/456 (MOY/SCMI/9)
Thread Measuring Wire	0.170 mm to 6.350 mm	0.5 µm	Using Electronic Probe with DRO/LMM, Comparison Method, Based on TSC/CAL/457
Cylindrical Master (Diameter & Concentricity)	3 mm to 100 mm	1.1 µm (diameter) 1.3 µm (concentricity)	Electronic Probe with DRO, Lever Dial Gauge, Comparison Method, Based on TSC/CAL/458 (IS 6311)

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Slip Gauges (Gauge Blocks) / Micrometer Check set	0.5 mm to 25 mm 25 mm to 50 mm 50 mm to 75 mm 75 mm to 100 mm	0.11 µm 0.12 µm 0.15 µm 0.18 µm	k Grade Slip Gauges, Gauge Block tapes, Comparison Method, Based on TSC/CAL/461 (IS 2984, ISO 3650)
Dial Calibration Tester	0 mm to 25 mm	0.7 µm	Using Electronic Probe with DRO, Slip Gauge set, by Comparison Method, Based on TSC/CAL/450
Surface Roughness Master specimen	Ra up to 2.985 µm Rz up to 9.745 µm	8 % 8 %	Using Surface Roughness Tester, Comparison Method, Based on TSC/CAL/432 (IS 3073, IS 10707)
Surface Roughness Tester	0.4 µm to 3.0 µm	7 %	Using Roughness master with 3 Ra Value, By Direct Method, Based on TSC/CAL/463
Caliper Checker/ Step Gauge	20 mm to 600 mm	2.7 µm	Electronic Comparator and gauge block (k grade) Using CMM, By Direct Method, Based on TSC/CAL/464
Length Measuring Machine	0 mm to 100 mm	0.5 µm	Using Gauge Block Set (0 Grade), Comparison Method, Based on TSC/CAL/467
Tape & Scale Calibrator	0 mm to 1000 mm	3.7 µm	Using Gauge Block Set and Long Gauge Block (0 Grade), Comparison Method Based on TSC/CAL/466
Long Gauge Blocks	100 mm to 300 mm 300 mm to 500 mm	1.6 µm 1.8 µm	Electronic Comparator and gauge blocks (k Grade), Comparison Method, Based on TSC/CAL/465 (IS 2984)
Glass Scale	0 mm to 300 mm	1.7 µm	Using Video Measuring Machine, Comparison Method, Based on TSC/CAL/426
Glass Scale (Angle)	0° to 360°	0.022°	Using Video Measuring Machine, Comparison Method, Based on TSC/CAL/426

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Granite square	Up to 600 mm x 600 mm x 100 mm Flatness Squareness	 4.6 µm 4.6 µm	Using CMM, Comparison Method, Based On TSC/CAL/472 (IS 2103)
Taper / Straight/ Conical/ Cylindrical Mandrel	Major/Cylindrical diameter 0 mm to 600 mm Taper angle Gauge plane Ø Roundness Straightness Run out	 2” 4.6 µm 4.6 µm 4.6 µm 4.6 µm	Using CMM, Bench Centre, Comparison Method, Based On TSC/CAL/477 (IS 2063, ISO 230-1)
Squareness Master/ Squareness Mandrel	0mm to700 mm Diameter Straightness Perpendicularity Cylindricity	 3 µm 3 µm 3 µm 3 µm	Using CMM,Bench Centre,ComparisonMethod,Based On TSC/CAL/469
Limit Gauge	Up to 800 mm	5.1 µm	Using CMM,Height Master VMS
Jigs, Fixtures, PCD gauges, lever arm, master Block	Up to 500 X 800 mm Linear Measurement Angle	 3.6 µm 1.6”	Using CMM, By Direct Method, Based on TSC/CAL/473
Coordinate Measuring Machine	Up to 600 mm x 600 mm x 500 mm X,Y,Z total measuring error (MPEE) Probing Error	 3.3 µm 1.2 µm	Using Gauge block set grade '0', Step Gauge Block Grade ‘0’, Comparison Method, Based on TSC/CAL/470 (IS 15635, ISO 10360)
Optical Flat and Parallels	Diameter up to 100 mm Thickness up to 25 mm Flatness Parallelism Size	 0.08 µm 0.32 µm 0.37 µm	Using Master flat with Monochromatic light, source, Gauge blocks grade '0' & Electronic Comparator, Comparison Method, Based on TSC/CAL/478,479 (IS 5440)
Angle gauges	0° to 90°	6”	Using Sine bar, Gauge blocks grade'0' and Electronic Comparator, by comparison Method, TSC/CAL/468
Contour Tracer Machine	± 25 mm Linear Measurement Angle Radius	 1.8 µm 36” 1.3 µm	Using Gauge blocks grade '0', Angle gauge& Cylindrical Master, by comparison Method, Based on TSC/CAL/471

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Gauge Block Accessories	up to 600 mm Flatness Parallelism Size	 0.23 µm 0.28 µm 1.8 µm	Using Optical flat, Gauge blocks, electronic comparator, by comparison Method, Based on TSC/CAL/474 (IS 4440)
Sphere/Spherical Ball Diameter	Up to 100 mm	0.7 µm	Using LMM, By Direct Method, Based on TSC/CAL/475
Electronic Level	± 2 mm/m	1.7 µm/m	Electronic probe with DRO with tilting fixture Based on TSC/CAL/413 (JIS B 7510)
Spline gauge (for Major, Minor & Over pins, Diameters only)	10 mm to 100 mm	2.8 µm	Using VMS/FCDM, By Direct Method, Based on TSC/CAL/476 (IS 2327/ISO 14)
Electronic Comparator (Lever Type)	up to 2 mm	1.7 µm	Using LMM, By Comparison Method. Based on TSC/CAL/421
Angle Measuring Device of a Torque Wrench	n x 360° (where n is number of turns)	2°	Using CMM/VMS by Comparison Method
Optical Angle Measuring Device including transducer and encoder	n x 360° (where n is number of turns)	1° x n (where n is number of turns)	Using CMM/VMS by Comparison Method
Mechanical			
Sound Level Meter (at 1 kHz)	94 dB and 114 dB	0.34 dB	Using Sound Level Calibrator, By Comparison Method, Based on TSC/CAL/612
Sound Level Calibrator (at 1kHz)	94 dB and114 dB	0.26 dB	Using Sound Level Calibrator and Reference Microphone and Oscilloscope by Substitution Method Based on TSC/CAL/612A
Vibration Machine (Vibration Measurement)	5 Hz to 10 kHz	3.8 %	Using Accelerometer and Digital Oscilloscope, By Comparison Method, Based on TSC/CAL/613A

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Accelerometer	5 Hz to 5000 Hz 5001 Hz to 10000 Hz	4.1 % 4.1 %	Using Portable Vibration Calibrator, Based on TSC/CAL/613B (ISO 16063 – 21)
Portable Vibration Calibrator	5 Hz to 10000 Hz	5.9%	Using Accelerometer and Digital Oscilloscope, Based on TSC/CAL/613C (ISO 16063-21)
Vibration Meter	Acceleration: 1 m/s^2 to 200 m/s^2 (10 Hz to 1000 Hz) Velocity: 1 mm/s to 200 mm/s (10 Hz to 1000 Hz) Displacement: 0.01 mm to 4 mm (10 Hz to 100 Hz)	 4.1 % 4.1 % 4.1 %	Using Portable Vibration Calibrator, Based on TSC/CAL/613 (ISO 16063-21)
Volumetric Glassware (One Mark Pipette, Graduated Pipette, Graduated Burette, Volumetric Flask, Measuring Jar, Pycnometer)	0.1 mL to 1 mL 1 mL to10 mL 11 mL to 100 mL 101 mL to 1000 mL 1001 mL to 5000 mL 5001 mL to 20000 mL	0.00007 mL 0.00046 mL 0.0045 mL 0.045 mL 0.226 mL 0.7 mL	Calibration based on Gravimetric method using weighing balance of d = 0.1 mg, 1 mg, 10,100 mg and Distilled Water, Based on TSC/CAL/609 (ISO 4787)
Micro Pipette/ Syringes / Dilutors/ Burettes / Positive Displacement Pipettes / Dispensers	0.5 µL to 10 µL 10 µL to 100 µL 100 µL to 1000 µL 1000 µL to 10000 µL 10 mL to 100 mL	0.05 µL 0.06 µL 0.13 µL 0.53 µL 7.5 µL	Calibration based on Gravimetric method using weighing balance of d = 0.001 mg, 0.01 mg and Distilled Water, Based on TSC/CAL/610 (as per ISO 8655)
Pressure Measurement Devices (Digital / Analogue Pressure Gauges, Differential Pressure Gauge, Transducers, Transmitters, Switches)	1 mbar to 10 mbar 10 mbar to 100 mbar 100 mbar to 2 bar 2 bar to 40 bar 40 bar to 700 bar 700 bar to 1000 bar	0.2 % 0.052 % 0.042 % 0.026 % 0.023 % 0.021 %	Digital Pressure Gauge using Pneumatic/ Hydraulic Comparator Pump based on, TSC/CAL/601(DKD – R 6 – 1)
	1 bar to 35 bar 35 bar to 1200 bar	0.015 % 0.016 %	Using Hydraulic (Oil operated) Dead Weight Tester, based on TSC/CAL/601(DKD–R 6-1)

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Dead Weight Tester (Hydraulic)	6 bar to 60 bar 60 bar to 1200 bar	0.01 % 0.0093 %	Using Dead Weight Tester, by Cross Float method / Effective Area and Pressure method, Based on TSC/CAL/601B (Euramet cg-3 & OIML R 110)
Pirani gauges/ Penning Gauges	0.001 µbar to 0.001 mbar 0.001 mbar to 1000 mbar	7.8 % 5.4 %	Using Standard Pirani Gauge / Penning Gauge, Based on TSC/CAL/602A (ISO 19685)
Vacuum Measurement Devices (Digital/Analogue Vacuum Gauges, Transducers/ Transmitters)	-0.03 bar to -0.9 bar	0.33 mbar	Digital Pressure Gauge using Pneumatic Vacuum Comparator Pump, based on TSC/CAL/602 (DKD – R6 – 1)
Absolute Pressure Gauges	30 mbar to 1000 mbar (abs)	1 mbar	Standard absolute Gauge using desiccator and vacuum pump, Based on TSC/CAL/603,621 (OIML R97)
Altimeter Chamber	30 mbar to 1000 mbar	3 mbar	Using Barometer, By Comparison Method, Based on TSC/CAL/621
Calibration of E1 Class Weights and coarser	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg	0.001 mg 0.001 mg 0.001 mg 0.001 mg 0.001 mg 0.001 mg 0.0013 mg 0.0014 mg 0.0016 mg	Using E1 class Standard weights and Mass comparator of d = 0.1 µg, by subdivision through ABBA cycles, Based on TSC/CAL/605A (OIML R – 111)
	1 g 2 g 5 g 10 g 20 g	0.002 mg 0.003 mg 0.004 mg 0.005 mg 0.005 mg	Using Mass Comparator of d = 0.001 mg, by Substitution Method, Based on TSC/CAL/605 (per OIML R 111)
	50 g 100 g 200 g 500 g 1 kg	0.01 mg 0.02 mg 0.03 mg 0.06 mg 0.12 mg	Using Mass Comparator of d = 0.01 mg, by Substitution Method, Based on TSC/CAL/605 (per OIML R 111)

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Calibration of E2 Class Weights and coarser	2 kg 5 kg 10 kg 20 kg	1 mg 2 mg 3 mg 7 mg	Using Mass Comparator of d = 1 mg, by Substitution Methods through ABBA Cycles Based on TSC/CAL/605 (per OIML R 111)
	50 kg	100 mg	Using Mass Comparator of d = 100 mg, by Substitution Methods through ABBA Cycles. Based onTSC/CAL/605 (per OIML R 111)
Calibration of Class 1 Weighing Balances and coarser	1 mg to 2 g 1 mg to 5 g 1 mg to 20 g 1 mg to 50 g 1 mg to 200 g 1 mg to 500 g 1 mg to 1 kg 500 mg to 5 kg 500 mg to 20 kg	0.002 mg 0.004 mg 0.005 mg 0.02 mg 0.03 mg 0.06 mg 0.12 mg 1 mg 7 mg	E1 Class Standard Weights 1 mg to 20 kg, Based on TSC/CAL/606 (OIML R – 76)
Calibration of Class 2 Weighing Balances and coarser	500 mg to 50 kg 500 mg to150 kg 1 kg to 300 kg 1 kg to 1000 kg 2 kg to 3000 kg	100 mg 1 g 10 g 100 g 500 g	F1 and M1 class Standard weights Up to 3000 kg, Based on TSC/CAL/606 (OIML R – 76)
Spring Balance	100 g to 1500 g 1500 g to 100 kg	0.28 % 0.1 %	Using F1 class weights, By Comparison Method Based on TSC/CAL/607
Torque Wrench, Torque Driver Type I - Class B, C, D, E Type II - Class A, B, D, E	0.01 N·m to 0.1 N·m 0.1 N·m to 1 N·m 1 N m to 10 N m 10 N·m to 20 N·m 20 N·m to 200 N·m 200 N·m to 2000 N·m	0.81 % 0.65 % 0.21 % 0.19 % 0.19 % 0.17 %	Torque sensors of various capacities using Torque Calibration Rig, based on TSC/CAL/604 (ISO 6789)
Torque Measuring Devices	0.01 N·m to 0.1 N·m 0.1 N·m to 1 N·m 1 N·m to 10 N·m 10 N·m to 500 N·m	0.1 % 0.03 % 0.03 % 0.03 %	Using Dead Weight Torque Calibration System based on TSC/CAL/620 (BS 7882)
Load Cells / Force Proving Instruments	0.1 N to 100 N 100 N to 10 kN	0.07 % 0.05 %	Using Newton weights, based on TSC/CAL/619 (ISO 376)

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Universal Testing Machine (UTM)	Compression: 10 N to1000 kN	0.52 %	Using Force Proving Instruments. Based on TSC/CAL/614 (as per IS 1828-Part 1 & ISO 7500)
	Tension: 10 N to100 kN	0.37 %	
Displacement Measuring System and Devices used in Material Testing Machine	0 mm to 5 mm 0 mm to 75 mm 0 mm to 500 mm 0 mm to 1000 mm	0.003 mm 0.030 mm 0.095 mm 0.16 mm	Using Gauge Blocks Based on TSC/CAL/614 (ASTM E2309)
Extensometer used in Material Testing Machine	0 mm to 3 mm 0 mm to 10 mm 0 mm to 12.5 mm 0 mm to 25 mm	0.003 mm 0.008 mm 0.009 mm 0.011 mm	Using Digital Micrometer Based on TSC/CAL/614 (ISO 9513 and ASTM E83)
Speed of Material Testing Machine	Up to 800 mm/min	0.08 %	Using Stopwatch, Based on TSC/CAL/614 (ASTM E2658)
Push Pull Gauge / Gram Gauge / Test Fingernail Probe/Tension Gauge	1 N to 2000 N	0.21 %	Newtonian Weights and Frame Fixture, Based on TSC/CAL/608 (VDI/VDE 2624 – Part 2.1)
Specific Gravity Hydrometer/ Density / Baume / Brix Hydrometer / Lactometer / Alcoholmeter	SG = 0.6 to 2.0	0.00014	Calibration of Hydrometers by Cuckows method, Based on TSC/CAL/615
Viscosity (Viscosity Cups, Zahn Cups)	33.57 cSt 64.66 cSt 237.5 cSt	0.39 %	Calibration using liquids of known kinematic viscosity, Based on TSC/CAL/618 (IS 3944, ASTM D4212)
Liquid Flow Meter	1 m^3/h to 350 m^3/h	1.3 %	Using Clamp-On Ultra Sonic Flow Meter by Comparison Method, Based on TSC/CAL/623
Flow Meters (Air)	0.1 L/min to 5 L/min 5 L/min to 250 L/min 250 L/min to 790 L/min	5.8 % 1.3 % 1.3 %	Using Mass Flow Meter by Comparison Method, Based on TSC/CAL/624
Air Velocity (Anemometers, biosafety cabinets, thermionics instruments)	0.3 m/s to 30 m/s	1.7 %	Using Digital Anemometer by comparison method or direct method, Based on TSC/CAL/625

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Liquid Flow Measuring Devices	0.00003 L/min to 500 L/min	0.33 %	Using Weighing System by Gravimetric Method Based on TSC/CAL/623
Rubber Hardness Tester	Shore A, B, E, O Shore C, D, DO Shore M, OO, OOO, OOO-S	0.1 Shore 0.1 Shore 0.1 Shore	Using Load Cell with Indicator, Electronic Balance, Based on TSC/CAL/617 (ASTM D2240)
Rockwell Hardness Testing Machines/ Portable Hardness Tester	HRA HRBW HRC	0.69 HRA 0.69 HRBW 0.69 HRC	Using Standard Hardness Blocks by Indirect Method Based on TSC/CAL/617A (IS 1586 (Part II) / ISO 6508-2)
Brinell Hardness Testing Machines/ Portable Hardness Tester	HBW 2.5 / 187.5 HBW 5 / 750 HBW 10 / 3000	2.1 % 2.1 % 2.1 %	Using Standard Hardness Blocks by Indirect Method, Based on TSC/CAL/617C (IS 1500 (Part II) / ISO 6506-2)
Vickers Hardness Testing Machines/ Portable Hardness Tester	HV 10 HV 20 HV 30 HV 50	2 % 2 % 2 % 2 %	Using Standard Hardness Blocks, by Indirect Method Based on TSC/CAL/617B (IS 1501 (Part II) / ISO 6507-2)
Impact Hammer	0.15 J to 4 J	0.16 J	Using Izod Impact Testing Machine by direct method, Based on TSC/CAL/630
Thermal			
Humidity Meters (Dial / Digital) @ 23 °C	Discrete Values 0.5 %RH 5 %RH 95 %RH	 0.33 %RH 0.33 %RH 0.85 %RH	Using Humidity standard solution by direct method. Based on TSC/CAL/511
Dial /Digital Humidity Meters	10 %RH to 95 %RH (at 10 °C to 60 °C)	1.2 %RH	Using Temperature & Humidity Meter with Humidity Chamber by Comparison Method, Based on TSC/CAL/511
Humidity Transmitters (for temperature scale)	0 °C to 60 °C	0.18 °C	Using Class 'A' RTD Sensor /PRT sensor with Digital Indicator, by comparison. Based on TSC/CAL/511

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
RTD, Thermocouples, Indicator with sensor	-196 °C	0.08 °C	Using LN_2 and cryo bath by comparison method, Based on TSC/CAL/503,502
	-100 °C to -45 °C -45 °C to 140 °C 140 °C to 650 °C	0.09 °C 0.02 °C 0.08 °C	Using Dry Temperature Bath, SPRT with Digital Indicator by comparison Method, Based on TSC/CAL/503,502
	650 °C to 1000 °C 1000 °C to 1200 °C	0.43 °C 1.5 °C	Using Dry Temperature Bath, S- Type Thermo couple with Digital Indicator, by Comparison Method, Based on TSC/CAL/503,502
Glass Thermometer	-80 °C to 250 °C	0.18 °C	Using Liquid Bath, SPRT with Digital Indicator by Comparison Method, Based on TSC/CAL/504
Oil Bath, Low & High Temperature Bath, Dry Bath, Incubators &Autoclave, Thermal Chambers / Ovens, Water Bath, Furnace	-100 °C to 140 °C 140 °C to 650 °C	0.072 °C 0.08 °C	Using SPRT with Digital Indicator by Direct Method, Based on TSC/CAL/509,508
	650 °C to 1200 °C	1.5 °C	Using S-Type Thermocouple with Digital Indicator by Direct Method, Based on TSC/CAL/509, 508
Humidity Chambers, Climatic Chambers, Dry cabinet, De-humidifier	10 %RH to 95 %RH (at 10 °C to 60 °C)	0.98 %RH	Using Temperature & Humidity Meter, by Direct Method, Based on TSC/CAL/505
	5 %RH to 10 %RH @ Ambient temperature	1.4 %RH	
Humidity Chambers @ (60 °C to 85 °C)	30 %RH to 95 %RH	2.2 %RH	Using Temperature sensors & Humidity Meter by wet & dry method: Using Multi Sensor, 9 Sensors, Based on TSC/CAL/505
IR Thermometer	-20 °C to 0 °C 0 °C to 50 °C 50 °C to 650 °C 650 °C to 1200 °C	0.45 °C 1.0 °C 1.0 °C 1.7 °C	By Comparison Method, Based on TSC/CAL/510

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Dew Point Meter (10% RH to 50%RH)	-20 °C to 40 °C	1.0 °C	Using Digital Temperature/Humidity/Dew Point Meter, Multifunction Calibrator and Humidity Chamber by comparison method, Based on TSC/CAL/511
Electrical – DC/LF			
AC Voltage Generate[3]	50 µV to 2 mV (50 Hz to 1 kHz) 2 mV to 20 mV (10 Hz to 40 Hz) (40 Hz to 20 kHz) (20 kHz to 50 kHz) (50 kHz to 100 kHz) (100 kHz to 300 kHz) (300 kHz to 500 kHz) (500 kHz to 1 MHz) 20 mV to 200 mV (10 Hz to 40 Hz) (40 Hz to 20 kHz) (20 kHz to 50 kHz) (50 kHz to 300 kHz) (300 kHz to 1 MHz) 200 mV to 2 V (10 Hz to 40 Hz) (40 Hz to 20 kHz) (20 kHz to 50 kHz) (50 kHz to 300 kHz) (300 kHz to 1 MHz) 2 V to 20 V (10 Hz to 40 Hz) (40 Hz to 20 kHz) (20 kHz to 50 kHz) (50 kHz to 300 kHz) (300 kHz to 1 MHz) 20 V to 30 V (300 kHz to 500 kHz) 20 V to 220 V (10 Hz to 40 Hz) (40 Hz to 20 kHz)	1 % 700 µV/V + 5 µV 190 µV/V + 5 µV 460 µV/V + 5.6 µV 850 µV/V + 7 µV 0.12 %+ 16 µV 0.17 % + 25 µV 0.45 % + 5 µV 320 µV/V + 8 µV 140 µV/V + 9 µV 380 µV/V + 9 µV 0.13 % + 30 µV 0.41 % + 100 µV 180 µV/V + 35 µV 95 µV/V + 10 µV 150 µV/V + 20 µV 0.04 % + 70 µV 0.3 % + 1 mV 180 µV/V + 350 µV 95 µV/V + 100 µV 150 µV/V + 200 µV 0.04 % + 700 µV 0.3 % + 12 mV 0.9 % + 15 mV 180 µV/V + 3.5 mV 100 µV/V + 1.1 mV	Using Calibrator Fluke 5700A/5522A by Direct Method, Based on TSC/CAL/310

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
AC Voltage Generate[3] (continued)	(20 kHz to 50 kHz) (50 kHz to 100 kHz) 200 V to 1000 V (50 Hz to 1 kHz)	240 µV/V + 3.5 mV 0.06 %+ 10 mV 150 µV/V + 4 mV	Using Calibrator Fluke 5700A/5522A by Direct Method, Based on TSC/CAL/310
AC Current Generate[3]	10 µA to 200 µA (40 Hz to 1 kHz) 200 µA to 2 mA (10 Hz to 40 Hz) (40 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz) 2 mA to 20 mA (10 Hz to 40 Hz) (40 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz) 20 mA to 200 mA (10 Hz to 40 Hz) (40 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz) 200 mA to 2 A (40 Hz to 1 kHz) (1 kHz to 5 kHz) (5 kHz to 10 kHz) 2 A to 10 A (45 Hz to 100 Hz) (100 Hz to 1 kHz) (1 kHz to 5 kHz) 10 A to 20 A (45 Hz to 100 Hz) (100 Hz to 1 kHz) (1 kHz to 5 kHz)	190 µA/A + 16 nA 650 µA/A + 35 nA 190 µA/A + 35 nA 700 µA/A + 0.4 µA 0.16 % + 0.8 µA 650 µA/A + 350 nA 190 µA/A + 350 nA 700 µA/A + 4 µA 0.16 % + 8 µA 650 µA/A + 3.5 µA 190 µA/A + 3.5 µA 700 µA/A + 40 µA 0.16 % + 80 µA 650 µA/A + 35 µA 900 µA/A + 80 µA 0.85 % + 160 µA 0.08 % + 2 mA 0.08 % + 2 mA 3.4 % + 2 mA 0.15 % + 5 mA 0.18 % + 5 mA 3.4 % +5 mA	Using Calibrator Fluke 5700A/5522A by Direct Method, Based on TSC/CAL/310
	20 A to 120 A (50 Hz to 1 kHz)	0.1 %	Using current source Omicron, Direct Method, Based on TSC/CAL/310
	120 A to 1000 A (50 Hz to 400 Hz) 1000 A to 3000 A (50 Hz)	0.4 % 1.2 %	Using current source current coil, Based on TSC/CAL/310

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
AC Power Generate[3] Single Phase, 50 Hz, UPF 120 V to 1000 V 0.01 A to 1000 A	1.2 W to 4.8 kW 4.8 kW to 20 kW 20 kW to 1 MW	0.12 % 0.17 % 0.4 %	Using Calibrator Fluke 5522A with 50 turns current coil, Direct Method, Based on TSC/CAL/324
AC Power Generate[3] Single Phase, 50 Hz, 0.2 PF lead/lag, 120 V to 1000 V 0.1 A to 1000 A	2.4 W to 0.96 kW 0.96 kW to 4 kW 4 kW to 0.2 MW	0.19 % 0.19 % 0.37 %	
AC Power Generate[3] Single Phase, 50 Hz, 0.5 PF lead/lag, 120 V to 1000 V 0.1 A to 1000 A	6 W to 2.4 kW 2.4 kW to 10 kW 10 kW to 0.5 MW	0.04 % 0.17 % 0.4 %	
AC Power Generate[3] Single Phase, 50 Hz, 0.8 PF lead/lag, 120 V to 1000 V, 0.1 A to 1000 A	9.6 W to 3.84 kW 3.84 kW to 16 kW 16 kW to 0.8 MW	0.03 % 0.02 % 0.4 %	
AC Energy Generate[3] Active /Reactive Single & Three Phase, 40 V to 300 V, 0.05 A to 20 A, 40 Hz to 70 Hz	0.5 Wh to 6 kWh (0.25 PF to 1 PF)	0.25 %	Using Three Phase Energy Source Direct Method, Based on TSC/CAL/317
Power Factor, Three phase	0.25 PF Lag to Unity 0.25 PF Lead to Unity	0.009 PF 0.00 9PF	Using Edutech Energy source by direct method, Based on TSC/CAL/317
Power Factor, Single phase (Generate[3])	0.2 PF Lead to unity 0.2 PF Lag to Unity	0.002 PF 0.002 PF	Using Calibrator Fluke 5522A by Direct Method, Based on TSC/CAL/324
Power Factor, Single phase (Measure[4])	0.2 PF Lead to unity 0.2 PF Lag to Unity	0.001 PF 0.001 PF	Using Power Meter WT210, by Direct Method, Based on TSC/CAL/324

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
DC Voltage Generate[3]	1.018 V, 10 V	3 µV/V	Using 732B Reference Standard by Direct Method, Based on TSC/CAL/310
	50 µV to 0.5 mV 0.5 mV to 220 mV 220 mV to 2.2 V 2.2 V to 11 V 11 V to 22 V 22V to 220 V 220 V to 1000 V	0.2 % 7 µV/V + 1 µV 8 µV/V + 1 µV 8 µV/V + 3.5 µV 8 µV/V + 6.5 µV 9 µV/V + 80 µV 11 µV/V + 500 µV	Using Calibrator Fluke 5700A by Direct Method, Based on TSC/CAL/310
DC Current Generate[3]/ Measure[4]	10 nA to 10 µA	0.09 %	Using Reference 732B, Decade Megohm box, DMM by VI method, Based on TSC/CAL/327
DC Current Generate[3]	10 µA to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 10 A 10 A to 20 A	70 µA/A + 8 nA 62 µA/A + 8 nA 72 µA/A + 80 nA 82 µA/A + 0.8 µA 100 µA/A + 25 µA 0.06 % + 500 µA 0.12 % +750 µA	Using Fluke 5700A/5522A, by Direct Method, Based on TSC/CAL/310
	20 A to 1000 A 1000 A to 3000 A	0.4 % 1.2 %	Using Current Source with current coil, Based on TSC/CAL/310
DC Power Generate[3] (1 V to 1000 V, 1 mA to 1000 A)	1 mW to10 W 10 W to 1 kW 1 kW to 1 MW	0.06 % 0.06 % 0.36 %	Using Calibrator Fluke 5522A with 50 turns current coil, Direct Method, Based on TSC/CAL/324
DC Resistance Generate[3] (Discrete Values)	1 Ω 1.9 Ω 10 Ω 19 Ω 100 Ω 190 Ω 1 kΩ 1.9 kΩ 10 kΩ 19 kΩ 100 kΩ 190 kΩ 1 MΩ 1.9 MΩ 10 MΩ 19 MΩ 100 MΩ	110 µΩ/Ω 110 µΩ/Ω 33 µΩ/Ω 32 µΩ/Ω 21 µΩ/Ω 29 µΩ/Ω 19 µΩ/Ω 16 µΩ/Ω 15 µΩ/Ω 15 µΩ/Ω 17 µΩ/Ω 17 µΩ/Ω 26 µΩ/Ω 27 µΩ/Ω 48 µΩ/Ω 56 µΩ/Ω 150 µΩ/Ω	Using Calibrator Fluke 5700 by Direct Method, Based on TSC/CAL/310

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
DC Resistance Generate[3]	10 µΩ, 75 µΩ 0.001 Ω to 0.1 Ω 0.1 Ω to 1 Ω	0.71 % 0.06 % 0.12 %	Using Standard Resistors by Direct Method, Based on TSC/CAL/308,305
	1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 kΩ 1 kΩ to 10 kΩ 10 kΩ to 100 kΩ 100 kΩ to 1 MΩ 1 MΩ to 10 MΩ 10 MΩ to 100 MΩ 100 MΩ to 300 MΩ 300 MΩ to 1 GΩ	35 µΩ/Ω + 1.2 mΩ 35 µΩ/Ω + 1.4 mΩ 35 µΩ/Ω + 2 mΩ 35 µΩ/Ω + 0.02 Ω 35 µΩ/Ω + 0.2 Ω 40 µΩ/Ω + 2 Ω 150 µΩ/Ω + 50 Ω 600 µΩ/Ω + 3 kΩ 0.36 % + 100 kΩ 1.7 % + 500 kΩ	Using Calibrator Fluke 5522 A by Direct Method Based on TSC/CAL/308,305
	1 GΩ to 1 TΩ	2.4 %	Using Decade Meg Ohm Box, Based on TSC/CAL/308,305
Temperature Simulation – Generate[3] (temperature indicator / controller / recorder)	B Type: 600 °C to 1800 °C K Type: -200 °C to 1372 °C E Type: -200 °C to 1000 °C U Type: -200 °C to 400 °C L Type: -200 °C to 900 °C J Type: -200 °C to 1200 °C T Type: -200 °C to 400 °C N Type: -200 °C to 1300 °C R Type: 0 °C to 1750 °C S Type: 0 °C to 1750 °C	0.5 °C 0.06 °C 0.08 °C 0.07 °C 0.08 °C 0.06 °C 0.1 °C 0.07 °C 0.07 °C 0.07 °C	Using 5700A Calibrator DC mV measurement method, based on TSC/CAL/321
	RTD: -200 °C to 800 °C	0.07 °C	Using Resistance Method, Based on TSC/CAL/321
Capacitance Generate[3]	(1 kHz) 220 pF to 1 µF 1 µF to 10 µF (100 Hz) 10 µF to 100 µF 100 µF to 1 mF 1 mF to 10 mF 10 mF to 110 mF	 0.05 % + 10 pF 0.25 % + 15 nF 0.25 % +150 nF 0.45 % + 1 µF 0.45 % + 10 µF 1.3 %	Using Calibrator Fluke 5520A, Decade Capacitance Box by Direct Method, Based on TSC/CAL/308
Harmonics Generate[3] @ 50 Hz	2nd order to 39th order (33 mV to 1000 V and 3.3 mA to 20 A)	1.5 %	FLUKE 5522A Source, Direct Method, Based on TSC/CAL/324

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
AC Voltage Measure[4]	1 mV to 20 mV (10 Hz to 40 Hz) (40 Hz to 20 kHz) (20 kHz to 100 kHz) (100 kHz to 300 kHz) (300 kHz to 1 MHz) 20 mV to 200 mV (10 Hz to 40 Hz) (40 Hz to 20 kHz) (20 kHz to 100 kHz) (100 kHz to 300 kHz) (300 kHz to 1 MHz) 200 mV to 2 V (10 Hz to 40 Hz) (40 Hz to 20 kHz) (20 kHz to 100 kHz) (100 kHz to 300 kHz) (300 kHz to 1 MHz) 2 V to 20 V (10 Hz to 40 Hz) (40 Hz to 20 kHz) (20 kHz to 100 kHz) (100 kHz to 300 kHz) 2 V to 10 V (300 kHz to 1 MHz) 20 V to 200 V (10 Hz to 40 Hz) (40 Hz to 20 kHz) (20 kHz to 100 kHz) 200 V to 1000 V (40 Hz to 20 kHz) 200 V to 1000 V (20 kHz to 100 kHz)	 0.002 % 0.0095 % + 1.4 µV 0.009 % + 3 µV 0.014 % + 5 µV 0.18 % + 10 µV 0.02 % 0.009 % + 1.2 µV 0.012 % + 5 µV 0.022 % + 10 µV 0.14 % + 5 µV 0.009 5 % + 15 µV 0.0046 % + 10 µV 0.0057 % + 30 µV 0.012 % + 30 µV 0.1 % +100 µV 0.0095 % + 10 µV 0.0045 % + 12 µV 0.0078 % + 3 µV 0.015 % + 0.5 mV 0.1 % + 10 mV 0.01 % 0.0045 % + 15 µV 0.0091 % + 20 µV 0.013 %+3 mV 0.009 % + 300 mV	Using AC Reference Standard, by Direct Method Based on TSC/CAL/323
	1 kV to 5 kV (50 Hz) 5 kV to 28 kV (50 Hz) 28 kV to 100 kV	0.23 % 2 % 2.3 %	Using High Voltage Divider with DMM's, Sources and HV Probe with DMM, by Direct Method/Comparison Method Based on TSC/CAL/312,313,328

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
	(50 Hz)		
AC Current Measure[4]	20 µA to 100 µA (10 Hz to 50 Hz) (50 Hz to 1 kHz) 100 µA to100 mA (10 Hz to 50 Hz) (50 Hz to 1 kHz) 10 mA to 100 mA (1 kHz to 10 kHz) 100 mA to 2 A (10 Hz to 50 Hz) (50 Hz to 1 kHz) (1 kHz to 10 kHz) 2 A to 20 A (50 Hz to 10 kHz) (50 Hz to 1 kHz) 2 A to 10 A (1 kHz to 10 kHz) 10 A to 20 A (1 kHz to 5 kHz)	 0.029 % 0.02 % + 30 nA 0.05 %+ 20 nA 0.05 %+ 20 nA 0.001 % 0.02 % + 20 µA 0.02 % + 10 µA 0.022 % + 5 µA 0.01 % 0.01 % 0.04 % + 0.4 mA 0.04 % + 0.4 mA	Using 8½ DMM 8508A Fluke, Direct Method, TSC/CAL/323 Using AC Reference Standard with Shunt
	1 A to 30 A (50 Hz to 5 kHz)	0.5 %	Using Shunt with DMM by V-I Method Based on TSC/CAL/323
	30 A to 1000 A (50 Hz) 1000 A to 3000 A (50 Hz)	0.6 % 2.5 %	Using Shunt with DMM by direct method Current coil & Clamp Meter Based on TSC/CAL/323
AC Power Measure[4] 1 Phase, 50 Hz @ UPF 30 V to 1000 V, 1 mA to 30 A	30 mW to 12 kW 12 kW to 30 kW	0.2 % 0.036 %	Using Digital Power Meter WT 210 & WT 5000 by Direct Method, Based on TSC/CAL/324
AC Power Measure[4] 1 Phase, 50 Hz, 0.8 PF Lead/Lag 30 V to 1000 V, 0.01 A to 30 A	0.24 W to 9.6 kW 9.6 kW to 24 kW	0.07 % 0.037 %	Using Digital Power Meter WT 210 & WT 5000 by Direct Method Based on TSC/CAL/324

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
AC Power Measure[4] 1 Phase, 50 Hz, 0.5 PF Lead/Lag, 30 V to 1000 V, 0.01 A to 30 A	0.15 W to 6 kW 6 kW to 15 kW	0.08 % 0.04 %	Using Digital Power Meter WT 210 & WT 5000 by Direct Method Based on TSC/CAL/324
AC Power Measure[4] 1 Phase, 50 Hz, 0.1 PF Lead/Lag, 30 V to 1000 V, 0.01 A to 30 A	0.03 W to 1.2 kW 1.2 kW to 3 kW	0.36 % 0.12 %	Using Digital Power Meter WT 210 & WT 5000 by Direct Method Based on TSC/CAL/324
AC Reactive Power Measure 1 Phase 50 Hz, 0.2 PF Lead/Lag to UPF, 30 V to 320 V, 10 mA to 30 A	60 mVar to 9.6 kVar	0.21 %	Using Digital Power Meter WT 5000 by Comparison Method, Based on TSC/CAL/324
High Frequency Power Measure[4] (400 kHz)	100 mW to 400 W	4 %	Using Differential probe in combination with Oscilloscope by comparison method Based on TSC/CAL/803
DC Voltage Measure[4]	50 µV to 0.5 mV	0.8 %	Direct / Comparison Method using 8½ DMM HP 3458A/Fluke 8508A Based on TSC/CAL/323
	0.5 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1000 V	7.2 µV/V + 0.1 µV 4.6 µV/V + 0.4 µV 4.6 µV/V + 4 µV 6.7 µV/V + 0.04 mV 6.8 µV/V + 0.5 mV	
	1 kV to 5 kV	0.20 %	Using HV Divider with DMM by Direct Comparison MethodBased on TSC/CAL/312,313
	5 kV to 40 kV 40 kV to 100 kV	2 % 1.7 %	Using Source & HV Probe with DMM by Direct Comparison Method,Based on TSC/CAL/312,313,328
DC Current Measure[4]	1 nA to 10 nA 10 nA to 100 nA	0.9 % + 0.004 nA 0.07 %	Using DMM by Comparison method
	100 nA to 10 µA 10 µA to 200 µA 200 µA to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 20 A 20 A to 75 A	0.08 % 0.01 % 14 µA/A + 0.4 µA 0.035 % 0.02 % + 16 µA 0.05 % 0.08 %	Using 8½ DMM HP 3458A FLUKE8508A, by Direct /Comparison MethodBased on TSC/CAL/323

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
	75 A to 100 A 100 A to 1000 A	0.60 % 0.6 %	
DC Power Measure[4] (1 V to 1000 V, 1 mA to 30 A)	1 mW to 10 W 10 W to 30 kW	0.16 % 0.11 %	Using Digital Power Meter WT 210 by Direct Method Based on TSC/CAL/323
Pulse EnergyMeasure[4] (1 ms to 10 ms pulse length)	0.1 J to 360 J	2.8 %	Using oscilloscope DP07254, Differential Probe, DP-100 and P6015 for measurements. Defibrillator used as source Based on TSC/CAL/712
Capacitance Measure[4]	(1 kHz) 1 pF to 1 µF 1 µF to 100 µF 100 µF to 100 mF	 0.06 % 0.13 % 0.11 %	Using LCR Meter by Direct / Comparison Method Based on TSC/CAL/323,306
Inductance Measure[4]	(1 kHz) 100 µH to 1 mH 1 mH to 10 H	 0.09 % 0.07 %	Using LCR Meter by Direct / Comparison Method Based on TSC/CAL/323,306
AC Resistance Measure[4]	(1 kHz) 1 Ω to 10 kΩ	 0.06 %	Using LCR Meter TSC/CAL/308
	(1 kHz to 100 kHz) 100 Ω to 1 kΩ	0.16 %	Using LCR Meter & calibrator Based on TSC/CAL/308
DC Resistance Measure[4]	10 µΩ to 1 mΩ 1 mΩ to 100 mΩ 100 mΩ to 1 Ω	0.31 % 0.005 % 0.035 % + 4 µΩ	Using micro-ohmmeter and Fluke 8508A DMM, standard resistors and shunts by VI method. Based on TSC/CAL/323,306,307
	1 Ω to 2 Ω 2 Ω to 20 Ω 20 Ω to 200 Ω 200 Ω to 2 kΩ 2 kΩ to 20 kΩ 20 kΩ to 200 kΩ 200 kΩ to 2 MΩ 2 MΩ to 20 MΩ 20 MΩ to 200 MΩ 200 MΩ to 2 GΩ 2 GΩ to 20 GΩ	12 µΩ/Ω + 4 µΩ 7 µΩ/Ω + 30 µΩ 9 µΩ/Ω + 50 µΩ 9 µΩ/Ω + 0.5 mΩ 7.5 µΩ/Ω+ 22 mΩ 9 µΩ/Ω + 100 mΩ 6.5 µΩ/Ω + 7 Ω 7 µΩ/Ω + 160 Ω 4 µΩ/Ω + 7 kΩ 30 µΩ/Ω + 0.28 MΩ 0.05 % + 20 MΩ	Using DMM 81/2 8508A by Direct Comparison method Based on TSC/CAL/323,306,307
	20 GΩ to 1 TΩ	1 %	Using Fluke Calibrator, HV divider & 8½ DMM by VI Method/Comparison Based on TSC/CAL/326

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Temperature Simulation - Measure[4]	B Type: 600 °C to 1800 °C K Type: -200 °C to 1372 °C E Type: -200 °C to 1000 °C U Type: -200 °C to 400 °C L Type: -200 °C to 900 °C J Type: -200 °C to 1200 °C T Type: -200 °C to 400 °C N Type: -200 °C to 1300 °C R Type: 0 °C to 1750 °C S Type: 0 °C to 1750 °C	0.5 °C 0.05 °C 0.08 °C 0.07 °C 0.08 °C 0.06 °C 0.1 °C 0.07 °C 0.07 °C 0.07 °C	Using 8½-digit DMM 3458A/8508A DC mV measurement method Based on TSC/CAL/323
	RTD: -200 °C to 800 °C	0.02 °C	
Oscilloscope – DC Signal	1 mV to 130 V	0.04 %	Using Fluke Calibrator 5520A/5522A with 1.1 GHz option by Direct Method Based on TSC/CAL/316
Oscilloscope - Band Width @ 50 kHz Reference	50 kHz to 1 GHz	2.5 %	
Oscilloscope - Scope Amplitude, Square Wave Signal (10 Hz to 10 kHz)	1 mV to 55 Vp-p	0.31 %	
Oscilloscope, Time Marker	1 ns to 1000 s	0.00000007 %	Using Rubidium standard, Fluke Calibrator 5520A/5522A with 1.1 GHz option by Direct Method Based on TSC/CAL/316
Current Transformer – Phase Error 1 % to 120 % of rated current 1 A/5 A secondary	5 A to 2500 A	1.4 min	Using Precision Current Transformer @ Automatic test set by Comparison method:
Current Transformer – Ratio error 5 A to 2000 A Primary 1 A/5 A Secondary	5 A to 2500 A	0.038 %	Using Precision Current Transformer @ Automatic test set by Comparison method
Potential Transformer – Phase error (80 % to 120 %) with 110 V/63.5 V Secondary	440 V– 660 V –1100 V– 2200 V –3300 V 6.6 kV & 11 kV 22 kV & 33 kV 440 V/–660 V–1100 V –2200 V– 3300 V /√3 6.6 kV/√3 & 11 kV/√3 22 kV/√3 & 33 kV/√3	2.0 min	Using Precision Potential Transformer @ Automatic test set by Comparison method:

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Potential Transformer – Ratio error (80 % to 120 %) with 110 V/63.5 V Secondary	440 V–660 V–1100 V – 2200 V – 3300 V 6.6 kV & 11 kV 22 kV & 33 kV 440 V/–660 V–1100 V –2200 V– 3300 V /√3 6.6 kV/√3 & 11 kV/√3 22 kV/√3 & 33 kV/√3	0.07 %	Using Precision Potential Transformer @ Automatic test set by Comparison method
Counters	5 count to 1000000 count	0.013 %	Using MFC, Function Generator, Disciplined Frequency Standard by Direct Method
RF/Microwave and Electromagnetics			
3 dB Bandwidth Generate[3] (Filter, Power Meter, Power Sensor)	Up to 40 GHz	1 %	Using RF Reference Source - 9640ALPNX, Signal Generator and Power Meter by Direct Method, Based onTSC/CAL/316
RF Power Measure[4]/ Generate[3]	(1 kHz to 18 GHz) -60 dBm to -100 dBm -60 dBm to 15 dBm	 0.51 dB 0.25 dB	Using RF Reference source 9640A LPNX, Signal Generator, Attenuator, Multimeter, Power Meter, Spectrum Analyzer Method, Based on TSC/CAL/704
	(18 GHz to 40 GHz) 15 dBm to -60 dBm	12 %	Using Signal Generator SMB 100A & USB Power Sensor U2054XA, TSC/CAL/704
	(18 GHz to 29.99 GHz) 15 dBm to -100 dBm	12 %	Using Signal Generator SMB 100A & Spectrum analyzer FSV30, Based on TSC/CAL/704
RF Attenuation/Insertion Loss/Transmission Loss Measure[4]/ Generate[3]	(1 kHz) 1 dB to 60 dB (1 kHz to 18 GHz) 1 dB to 60 dB (18 GHz to 40 GHz) 1 dB to 60 dB	 0.34 dB 0.35 dB 7.0 %	Using RF Reference Source 9640A, Signal Generator- Multimeter& Power Meter Method, Based on TSC/CAL/707

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
RF Attenuation/Insertion Loss/Transmission Loss Measure[4]/ Generate[3] (continued)	(10 MHz to 18 GHz) 60 dB to 110 dB (18 GHz to 29.99 GHz) 1 dB to 110 dB	0.56 dB 9.7 %	Using Signal Generator, attenuator & Spectrum Analyzer Method, Based on TSC/CAL/707
Spectral Purity (THD) Measure[4]	0.17 % to 3.19 % (No. of harmonics n = 2 to n = 10,10 Hz to 2.9 GHz)	0.2 %	Using Spectrum Analyzer FSV-30 Up to 30 GHz by Direct Method, Based on TSC/CAL/701
Reflection Coefficient Measure[4]/ Generate[3]- 10 MHz to 18 GHz (Maury Microwave Mismatch Test Set/Network Analyzer)	rho = 0.024 to 0.33	0.032	Using Network Analyzer (R&S ZVB20) by direct method, with Cal kit Z270. Maury Microwave Mismatch Test Set used for verification of Network Analyzer performance as check/transfer standard. Based on TSC/CAL/705
Amplitude Modulation (AM) Measure[4] CW: 100 kHz to 3.9 GHz Modulation Rate: 50 Hz to 10 kHz AM Depth	1 % to 98 %	2.1 %	Using Rhode & Schwarz Signal generator, reference source, Spectrum Analyzer FSV 30, Modulation analyzer HP 8901B as transfer by Relative Sideband Amplitude Method and Comparison method Based on TSC/CAL/708A
Frequency Modulation (FM) Measure[4]/ Generate[3] CW: 100 kHz to 25 GHz Modulation Rate: 50 Hz to 267 kHz FM Deviation	50 Hz to 4 MHz	1.3 %	Using Rhode & Schwarz Signal generator, reference source, Spectrum Analyzer FSV 30, by Bessel Function Method Based on TSC/CAL/708B
Time/Frequency			
Frequency Generate[3]	1 mHz to 1 Hz 1 Hz to 1 GHz 1 GHz to 40 GHz	0.000008 % 0.000006 % 0.000009 %	Using Rubidium Frequency Standard, Signal Generator, RF Reference Source by Direct Method, Based on TSC/CAL/332,706

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Frequency Measure[4]	1 mHz to 1 Hz 1 Hz to 1 GHz 1 GHz to 40 GHz	0.000008 % 0.000006 % 0.000009 %	Using Rubidium Frequency Standard locked to other Equipment, Frequency Counter, Spectrum Analyzer - by Direct Method. Based on TSC/CAL/701,709,320
Time Interval	100 ms to 86400 s	12 µs/s + 10 µs	Using Timer/counter and oscilloscope by Direct method Based on TSC/CAL/318
Rotational Speed - Non-Contact	1 rpm to 100 rpm	0.58 %	Using Function generator Based on TSC/CAL/611
	6 rpm to 100 rpm 100 rpm to 1000 rpm 1001 rpm to 5000 rpm 5001 rpm to 20000 rpm 20001 rpm to 90000 rpm	0.61 % 0.35 % 0.10 % 0.05 % 0.021 %	Using Digital Tachometer, Based on TSC/CAL/611(SANAS TR 45)
Rotational Speed - Contact	6 rpm to 10 rpm 10 rpm to 100 rpm 101 rpm to 4000 rpm 4001 rpm to 8000 rpm	5.0 % 0.36 % 0.18 % 0.07 %	Using Digital Tachometer, Based on TSC/CAL/611(SANAS TR 45)
Rotational Speed - Centrifuge	6 rpm to 10 rpm 11 rpm to 1000 rpm 1001 rpm to 5000 rpm 5001 rpm to 20000 rpm	0.4 % 0.23 % 0.12 % 0.09 %	Using Digital Tachometer as per SANAS TR 45, Based on TSC/CAL-611A
Chemical			
pH Meter	4 pH, 7 pH, 10 pH	0.08 pH	Using pH buffer solutions, By Direct Method. Based on TSC/CAL/626
Conductivity Meter	0.147 mS/cm 1.41 mS/cm 12.8 mS/cm	1.4 % 1.4 % 1.6 %	Using Conductivity Solutions, By Direct Method, Based on TSC/CAL/627
Optical Radiation			
OT Lights (Light Intensity Measurement)/ Color matching cabinets	1000 lx to 200000 lx	6.0 %	Using Illuminance Meter by Direct Method. Based on TSC/CAL/622A
Biomedical			
Vital Sign Simulator / Patient Monitor Simulator /	13 kΩ to 15 kΩ (36 °C to 38 °C)	0.01 %	Using 8.5 DMM by Direct Method. Based on TSC/CAL/808

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Multiparameter Simulator (Cardiac Output)			
Vital Sign Simulator / Patient Monitor Simulator / Multiparameter Simulator (NIBP-Pressure)	1 mmHg to 400 mmHg	0.46 %	Using Pressure Calibrator by Comparison Method, Based on TSC/CAL/808
Vital Sign Simulator / Patient Monitor Simulator / Multiparameter Simulator/Defibrillator analyzer (ECG-AMPLITUDE)	50 µV to 5.5 mV	0.93 %	Using Amplifier & Frequency Counter (Oscilloscope) by Direct Method, Based on TSC/CAL/808
Vital Sign Simulator / Patient Monitor Simulator / Multiparameter Simulator (Leak Check)	10 mmHg to 200 mmHg	1.2 %	Using Pressure Calibrator by Comparison Method, Based on TSC/CAL/808
Vital Sign Simulator / Patient Monitor Simulator / Multiparameter Simulator (Respiration Rate)	1 Brpm to 120 Brpm	0.06 %	Measurement of frequency of resistance variation by conversion of resistance in to voltage by constant current excitation. The frequency of signal is measured by oscilloscope /count Based on TSC/CAL/808
Vital Sign Simulator / Patient Monitor Simulator / Multiparameter Simulator (Temperature)	1 Ω to 100 kΩ (0 °C to 42 °C)	0.05 %	Using Power Supply & 8.5 DMM by Comparison Method Based on TSC/CAL/808
Vital Sign Simulator / Patient Monitor Simulator / Multiparameter Simulator/Electrical Safety Analyzer/Defibrillator Analyzer	0.1 Hz to 6 Hz (6 BPM to 360 BPM)	0.05 %	Using Amplifier & Frequency Counter (Oscilloscope) by Direct Method, Based on TSC/CAL/808

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
(ECG Frequency/ Rate)			
Vital Sign Simulator / Patient Monitor Simulator/ Multiparameter Simulator / Fetal Heart Simulator (Fetal Heart Rate / Maternal Heart rate)	0.1 Hz to 6Hz (6 BPM to 360 BPM)	0.05 %	Using Amplifier & Frequency Counter (Oscilloscope) by Direct Method. Based on TSC/CAL/808
Vital Sign Simulator / Patient Monitor Simulators / Multiparameter Simulator (IBP)	-500 µV to 200 mV (-10 mm Hg to 400 mm Hg)	0.6 %	Bridge excitation and imbalance voltage detection with 8.5 DMM. Based on TSC/CAL/808
Electrical Safety Analyzer			
Earth Resistance	0.1 Ω to 2 Ω	0.6 %	Using Resistance Box by Direct Method. Based on TSC/CAL/804
Equipment Current	(0.1 A to 20 A) AC	0.5 %	Using AC Current Load Current Shunt, High Precision DMM by Comparison Method. Based on TSC/CAL/804
Insulation Resistance	0.5 MΩ to 500 MΩ	2.3 %	Using HV Decade Resistance Box by Direct Method. Based on TSC/CAL/804
Leakage Current	4 µA to 10 mA	0.67 %	Using DMM by Comparison Method. Based on TSC/CAL/804
Voltage	(90 V to 264 V) AC	0.1 V	Using AC Power Source & 6.5 DMM by Comparison Method. Based on TSC/CAL/804
Voltage (Point to point)	(0 V to 300 V) AC	0.1 V	Using Calibrator-5700 by Direct Method. Based on TSC/CAL/804
Infusion Device Analyzer			
Flow (Flow rate)	2 mL/h to 1500 mL/h	0.2 %	Using Weighing Balance-200g, Timer by Gravimetric Method. Based on TSC/CAL/812

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Occlusion	0.1 bar to 3 bar	0.14 %	Using Pressure Calibrator by Comparison Method. Based on TSC/CAL/812
Volume	5 mL to 10 mL 11 mL to 100 mL 101 mL to 1000 mL 1001 mL to 5000 mL 5001 mL to 10000 mL	0.024 mL 0.024 mL 0.145 mL 0.145 mL 0.8 mL	Using Weighing Balance-200g, by Gravimetric Method. Based on TSC/CAL/812
Defibrillator Analyzer			
Pacer Variable Load	50 Ω to1500 Ω	0.1 %	Using 6.5 DMM by Direct Method, Based on TSC/CAL/801
Energy-Load 50 ohms	0.1 J to 400 J	1 %	Using Defibrillator Unit & Oscilloscope with differential probe arriving at pulse energy Direct Method, Based on TSC/CAL/801
Time Display Readout Check	0.1 s to 100 s	0.05 %	Using Oscilloscope & Counter by Direct Method. Based on TSC/CAL/801
Pacer Rate Accuracy	5 ppm to 800 ppm	0.05 %	Using Function Generator & Oscilloscope, Based on TSC/CAL/801
Pacer Amplitude	0.5 mA to 200 mA	1.2 %	Using Function Generator & Oscilloscope, Based on TSC/CAL/801
Dialysis Meter			
Conductivity	1.41 mS/cm 12.85 mS/cm	1.5 % 1.5 %	Using Conductivity buffer solutions by direct method, Based on TSC/CAL/809
Vacuum	-700 mmHg to 1 mmHg	0.27 %	Using Pressure calibrator by comparison method. Based on TSC/CAL/809
Time	10 s to 9000 s	0.05 %	Using Timer, By comparison Method. Based on TSC/CAL/809
Pressure	0.1 bar to 2.5 bar	0.13 %	Using Pressure calibrator by comparison method.Based on TSC/CAL/809
Flow	100 mL/min to 2000 mL/min	0.31 %	Using Weighing Balance-200g, by Gravimetric

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
			Method, Based on TSC/CAL/809
Temperature	5 °C to 50 °C	0.03 °C	Using PRT Sensor with Indicator by Comparison Method, Based on TSC/CAL/809
pH	4 pH, 7 pH and 10 pH	0.08 pH	By using buffer solutions, By Direct method, Based on TSC/CAL/809
Electro Surgical Analyzer			
Output Load Resistance	0.1 Ω to 5200 Ω	0.5 %	Using LCR Meter & 6.5 DMM by Direct Method, Based on TSC/CAL/803
Output Current	0.5 mA to 5500 mA	0.05 %	Using current coil with true RMS meter by direct method, Based on TSC/CAL/803
Output Power	1 W to 400 W	5.6 %	Using Oscilloscope & differential probe by Comparison method, Based on TSC/CAL/803
Contact Quality Monitor	0.1 Ω to 475 Ω	0.4 %	Using 6.5 DMM by Direct Method, Based on TSC/CAL/803
Vessel Sealing Measurement	100 mA to 1100 mA	0.05 %	Using current coil with true RMS meter by direct method, Based on TSC/CAL/803
Gas Flow Analyzer			
Barometric Pressure	0.55 bar (abs) to 1.1 bar (abs)	0.26 %	Using Standard Absolute Gauge using desiccator and vacuum pump by Comparison Method, Based on TSC/CAL/810
Flow Rate	0.1 L/min to 300 L/min	1.0 %	Using Mass Flow Controller by Comparison Method, Based on TSC/CAL/810
I:E Ratio	4:1 to 1:1 to 1:4	0.5 %	Using Timer, By Comparison Method, Based on TSC/CAL/810
Pressure	0.001 bar to 10 bar	0.24 %	Using Pressure Gauge by Comparison Method, Based on TSC/CAL/810

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Respiration rate	2 Brpm to 180 Brpm	0.06 Brpm	Using Frequency Counter along with Compressor flow Based on TSC/CAL/810
Vacuum	-0.8 bar to 0.1 bar	0.27 %	Using Pressure calibrator by comparison method, Based on TSC/CAL/810
Tidal Volume	1 mL to 1500 mL	1 %	Using Mass Flow Meter by Comparison Method, Based on TSC/CAL/810
Oxygen Concentration	20 % to 100 %	2 %	Using Oxygen Cylinders by Direct Method, Based on TSC/CAL/810
Temperature	10 °C to 50 °C	0.07 °C	Using RTD Sensor with Indicator by Comparison Method
Humidity	10 %RH to 95 %RH	1.2 %RH	Using Digital Temperature Humidity Meter by Comparison Method
Incubator Analyzer			
Temperature	10 °C to 50 °C	0.07 °C	Using RTD Sensor with Indicator by Comparison Method, Based on TSC/CAL/811
Humidity	30 %RH to 90 %RH	1 %RH	Using Digital Temperature Humidity Meter by Comparison Method, Based on TSC/CAL/811
Sound Level (at 1 kHz)	94 dB	0.3 dB	Using Sound Level Calibrator by Direct Method, Based on TSC/CAL/811
Air Flow @ 35 °C	0.2 m/s to 2.0 m/s	1.3%	Using Mass Flow Controller by Comparison Method, Based on TSC/CAL/811

[1]The uncertainty covered by the Calibration and Measurement Capability (CMC) is expressed as the expanded uncertainty having a coverage probability of approximately 95 %. It is the smallest measurement uncertainty that a laboratory can achieve within its scope of accreditation when performing calibrations of a best existing device. The measurement uncertainty reported on a calibration certificate may be greater than that provided in the CMC due to the behavior of the calibration item and other factors that may contribute to the uncertainty of a specific calibration.

[2]When uncertainty is stated in relative terms (such as percent, a multiplier expressed as a decimal fraction or in scientific notation), it is in relation to instrument reading or instrument output, as appropriate, unless otherwise indicated.

[3]Capability is suitable for the calibration of measuring devices in the stated ranges.

[4]Capability is suitable for the calibration of devices intended to generate the indicated quantity in the stated ranges.

SG = specific gravity
PF = power factor
THD = total harmonic distortion
CW = carrier wave
Brpm = breaths per minute
BPM = beats per minute