

Schedule

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LABORATORY LOCATION/ CENTRAL OFFICE: 	SIRIM Calibration Sdn Bhd, Pulau Pinang Bangunan SIRIM, Lot Pt 483. MK.6 Jalan Permatang Pauh 13500 Permatang Pauh, Pulau Pinang , 13500, PULAU PINANG MALAYSIA
ACCREDITED SINCE :	24 MARCH 2025
FIELD(S) OF CALIBRATION:	HEAT & TEMPERATURE DIMENSIONAL MASS FORCE TORQUE PRESSURE ELECTRICAL

This laboratory has demonstrated its technical competence to operate in accordance with MS ISO/IEC 17025:2017 (ISO/IEC 17025:2017).

This laboratory's fulfillment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001 (see Joint ISO-ILAC-IAF Communiqué dated April 2017).

*** The uncertainty covered by the CMC is expressed as the expanded uncertainty corresponding to a coverage probability of approximately 95 % and have a coverage factor of k=2 unless stated otherwise.**

CENTRAL LOCATION	SIRIM Calibration Sdn Bhd, Pulau Pinang Bangunan SIRIM, Lot Pt 483. MK.6 Jalan Permatang Pauh 13500 Permatang Pauh, Pulau Pinang , 13500, Pulau Pinang
FIELD(S) OF CALIBRATION :	HEAT & TEMPERATURE, DIMENSIONAL, MASS, FORCE, TORQUE, PRESSURE, ELECTRICAL

SCOPE OF CALIBRATION : HEAT & TEMPERATURE

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Liquid-in-glass Thermometer (total Immersion)	30 °C to 70 °C 70 °C to 300 °C	0.1 °C 0.3 °C	Comparison with PT100 in: temperature bath
Temperature Sensor 1) thermocouple, 2) Pt 100	-30 °C to 70 °C 70 °C to 400 °C	0.1 °C 0.3 °C	Comparison with PT100 in: temperature bath
Temperature Indicating Instruments Thermocouple: K Type	100 °C to 1300 °C	0.5 °C	By electrical simulation using calibrator
Temperature Indicating Instruments Thermocouple: J Type	100 °C to 1100 °C	0.4 °C	By electrical simulation using calibrator
Temperature Indicating Instruments Thermocouple: T Type	-100 °C to 400 °C	0.6 °C	By electrical simulation using calibrator
Temperature Indicating Instruments Thermocouple: E Type	-100 °C to 800 °C	0.5 °C	By electrical simulation using calibrator
Temperature Indicating Instruments Thermocouple: Pt100	-100 °C to 800 °C	0.6 °C	By electrical simulation using calibrator
Dry Block Calibrator	0 °C to 400 °C	0.2 °C	Comparison with PT100
Temperature Switch	0 °C to 400 °C	0.9 °C	Comparison with PT100 in Dry Block Calibrator or temperature bath
Mechanical Thermometer	-30 °C to 300 °C	1.3 °C	Comparison with Dry Block Calibrator or temperature bath
Thermohygrograph / Thermohygrometer @ 23°C	25 %rh to 95 %rh 0 °C to 50 °C	3.5 % rh 0.8 °C	Comparison with thermohygrometer humidity chamber

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SCOPE OF CALIBRATION : DIMENSIONAL

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Digital Thickness Gauge	Up to 50 mm	1.3 μ m	Calibrated using gauge block as standard
Depth-micro-checker	Up to 300 mm	11 μ m	Calibrated using gauge block as standard
Height Gauge	Up to 300 mm 300 mm to 600 mm	3.5 μ m 5.2 μ m	Calibrated using gauge block as standard JIS B 7517: 1993
Standard Rod (length Only)	Up to 300 mm 300 mm to 600 mm	2.2 μ m 4.2 μ m	Calibrated using gauge block as standard
Micrometer (external)	Up to 25 mm	1.2 μ m	Calibrated using gauge block and related accessories as standard according ISO 3611: 2010
Caliper (vernier, Dial, Digital)	Up to 300 mm 300 mm to 600 mm 600mm to 1000 mm	9 μ m 13 μ m 20 μ m	Calibrated using caliper checker as standard according to JIS B 7507: 1993
Caliper Checker -external Measurement Only	Up to 300 mm 300 mm to 600 mm	3 μ m 5 μ m	Calibrated using steel gauge block as standard
Feeler Gauge (thickness And Wrap)	Up to 1 mm	1.5 μ m	Calibrated by Sylvac digital probe as reference standard
Dial Gauge	Up to 50 mm	3.0 μ m	Calibrated by Sylvac digital probe as reference standard
Pin Gauge (external Diameter Only)	Up to 40 mm	1.5 μ m	Calibrated using Master Pin Gauge as reference standard
Ruler	0.1 mm to 1000 mm	0.15 mm	Liner Scale
Tape	0 m to 10 m	(0.17L + 0.2) mm L is length in unit meter	Liner Scale

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SCOPE OF CALIBRATION : MASS

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Standard Weights And Weight Block	1 mg	0.005 mg	Comparison against OIML class E2 weight
	2 mg	0.005 mg	
	5 mg	0.005 mg	
	10 mg	0.005 mg	
	20 mg	0.006 mg	
	50 mg	0.006 mg	
	100 mg	0.007 mg	
	200 mg	0.010 mg	
	500 mg	0.010 mg	
	1 g	0.012 mg	
	2 g	0.014 mg	
	5 g	0.016 mg	
	10 g	0.021 mg	
	20 g	0.025 mg	
	50 g	0.06 mg	
	100 g	0.06 mg	
	200 g	2 mg	
	500 g	3 mg	
	1 kg	3 mg	
	2 kg	14 mg	
	5 kg	15 mg	
	10 kg	50 mg	
	20 kg	160 mg	
	50 kg	160 mg	
	60 kg	170 mg	

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SCOPE OF CALIBRATION : FORCE

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Tension Gauge	10 gf to 100 gf 100 gf to 350 gf 35 gf to 1000 gf	0.2 gf 2.5 gf 7.0 gf	Standard weight & deadweight

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SCOPE OF CALIBRATION : TORQUE

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Torque Wrench	0 N.m to 2 N.m 2 N.m to 25 N.m 26 N.m to 400 N.m 401 N.m to 1500 N.m	0.02 N.m 0.10 N.m 0.52 N.m 3.3 N.m	Comparison with torque transducers with reference to BS EN ISO 6789: 2003. Transducers 2 N.m, 25 N.m, 400 N.m and 1500 N.m

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SCOPE OF CALIBRATION : PRESSURE

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Pressure Measuring Device (oil Medium)	10 psi to 100 psi 100 psi to 200 psi 200 psi to 400 psi 400 psi to 600 psi 600 psi to 800 psi 800 psi to 1000 psi 2000 psi to 4000 psi 4000 psi to 8000 psi 8000 psi to 12000 psi 12000 psi to 16000 psi	0.04 psi 0.06 psi 0.10 psi 0.14 psi 0.19 psi 0.60 psi 1.2 psi 3.2 psi 4.5 psi 5.3 psi	Hydraulic Dead Weight Tester
Pressure Measuring Device (air Medium)	Up to 60 psi 60 psi to 320 psi 320 psi to 640 psi 640 psi to 960 psi 960 psi to 1280 psi 1280 psi to 1600 psi	0.03 psi 0.09 psi 0.18 psi 0.27 psi 0.36 psi 0.47 psi	Electronic Pressure Test Gauge and Air Dead Weight Tester
Vacuum	Up to 14 psi	0.02 psi	Electronic Pressure Test Gauge and Air Dead Weight Tester

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SCOPE OF CALIBRATION : ELECTRICAL

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Measuring Instrument 1. Multimeter/ Indicating Meter Dc Voltage	0 to 330 mV 330 mV to 3.3 V 3.3 to 33 V 33 to 330 V 334 to 1000 V	12 μ V 0.1 mV 1 mV 10 mV 80 mV	Multi Calibrator Fluke 5520A
Measuring Instrument 1. Multimeter/ Indicating Meter Resistance	0 to 11 Ω 11 to 33 Ω 33 to 110 Ω 110 to 330 Ω 0.33 to 1.1 k Ω 1.1 to 3.3 k Ω 3.3 to 11 k Ω 11 to 33 k Ω 33 to 110 k Ω 110 to 330 k Ω 0.33 to 1.1 M Ω 1.1 to 3.3 M Ω 3.3 to 11 M Ω 11 to 33 M Ω 33 to 110 M Ω 110 to 330 M Ω	15 m Ω 19 m Ω 28 m Ω 28 m Ω 0.1 Ω 0.1 Ω 2.5 Ω 3.4 Ω 11 Ω 10 Ω 0.1 k Ω 0.4 k Ω 2 k Ω 17 k Ω 69 k Ω 1.2 M Ω	Multi Calibrator Fluke 5520A
	330 M Ω to 1100 M Ω	17 M Ω	Multi Product Calibrator Fluke 5520A
Measuring Instrument 1. Multimeter/ Indicating Meter Dc Current	0 to 3.3 mA 3.3 to 33 mA 33 to 330 mA 330 mA to 1.1 A 1.1 to 3 A 3 to 11 A 11 to 20 A	0.4 μ A 4 μ A 95 μ A 0.3 mA 2 mA 17 mA 0.08 A	Multi Calibrator Fluke 5520A

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Measuring Instrument 1. Multimeter/ Indicating Meter Ac Voltage	1 to 30 mV	0.03 mV	Multi Calibrator Product Fluke 5520A
	10 Hz to 45 Hz	0.01 mV	
	45 Hz to 10 kHz	0.01 mV	
	10 kHz to 20 kHz	0.04 mV	
	20 kHz to 50 kHz	0.12 mV	
	50 kHz to 100 kHz	0.27 mV	
	100 kHz to 500 kHz		
	33 to 330 mV	0.10 mV	
	10 Hz to 45 Hz	0.05 mV	
	45 Hz to 10 kHz	0.06 mV	
	10 kHz to 20 kHz	0.12 mV	
	20 kHz to 50 kHz	0.28 mV	
	50 kHz to 100 kHz	0.70 mV	
	100 kHz to 500 kHz		
	0.33 to 3.3 V	1.0 mV	
	10 Hz to 45 Hz	1.0 mV	
	45 Hz to 10 kHz	2.0 mV	
	10 kHz to 20 kHz	2.0 mV	
	20 kHz to 50 kHz	5.0 mV	
	50 kHz to 100 kHz	10 mV	
	100 kHz to 500 kHz		
	3.3 to 33 V	0.01 V	
	10 Hz to 45 Hz	0.01 V	
	45 Hz to 10 kHz	0.02 V	
	10 kHz to 20 kHz	0.02 V	
	20 kHz to 50 kHz	0.13 V	
	50 kHz to 90 kHz		
	33 to 330 V	0.13 V	
	10 Hz to 45 Hz	0.10 V	
	45 Hz to 10 kHz	0.10 V	
	10 kHz to 18 kHz		
	330 to 1020 V	0.36 V	
	10 Hz to 45 Hz	0.36 V	
	45 Hz to 8 kHz		

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Measuring Instrument 1. Multimeter/ Indicating Meter Ac Current	0.03 mA to 0.33 mA 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 0.33 mA to 3.3 mA 10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 10 kHz 3.3 mA to 33 mA 10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 10 kHz 33 mA to 330 mA 10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 10 kHz 0.33 A to 2.2 A 10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 10 kHz 2.2 A to 11 A 45 Hz to 1 kHz 11 A to 20 A 45 Hz to 1 kHz	1 μ A 1 μ A 1 μ A 1 μ A 3 μ A 6.0 μ A 5.0 μ A 19 μ A 43 μ A 31 μ A 80 μ A 0.5 mA 0.4 mA 0.9 mA 3.0 mA 2.0 mA 5.0 mA 28 mA 0.04 A	Multi Product Calibrator Fluke 5520A
Measuring Instrument 1. Multimeter/ Indicating Meter Frequency	0.01 Hz to 120 Hz 150 Hz to 1200 Hz 12 kHz to 120 kHz	12 mHz 95 mHz 9 Hz	Multi Product Calibrator Fluke 5520A
Measuring Instrument 1. Multimeter/ Indicating Meter Capacitance (test Frequency At 10 Hz To 10 KHz)	0.19 nF to 3.3 nF 3.3 nF to 33 nF 33 nF to 330 nF 0.33 μ F to 3.3 μ F 3.3 μ F to 33 μ F 33 μ F to 110 μ F 110 μ F to 330 μ F	2 pF 0.3 nF 1.2 nF 0.1 μ F 0.2 μ F 0.8 μ F 1.8 μ F	Multi Product Calibrator Fluke 5520A

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Measuring Instrument 2. Impedance Meter Capacitance Fixed	Test Frequency 20 Hz to 1 MHz 1 pF to 10 nF 10 nF to 1 μ F	0.4 pF/F + 0.2 pF 1 pF/F + 5.2 pF	Series HP/Keysight 16380 A/C Series
Measuring Instrument Inductance	Test Frequency 20 Hz to 1 MHz 100 μ H to 1 mH 1 mH to 10 H	0.8 nH/H + 0.02 mH 0.3 μ H/H + 0.19 mH	Standard Inductance/Decade Inductance General Radio 1491-G/1482 series & HP 4284A
Measuring Instrument Resistance	0 to 1 Ohm 1 Ohm to 100 Ohm 100 Ohm to 100 kOhm 100 kOhm to 1 MOhm	0.1 $\mu\Omega/\Omega$ + 2.4 m Ω 8 $\mu\Omega/\Omega$ + 0.04 m Ω 8 m Ω/Ω + 0.7 $\mu\Omega$ 8 Ω/Ω + 0.02 m Ω	Standard Resistance / Decade Resistance Yew 2793 / IET HARS- X / 742A series
Measuring Instrument 3. Low Current Meter Dc Current	0 nA to 100 nA 100 nA to 10 μ A 10 μ A to 10 mA 10 mA to 100 mA	4.6 pA/A + 1.2 pA 0.6 nA/A + 1 nA 1.7 nA/A + 0.03 μ A 1.2 μ A/A + 0.06 mA	Programmable Current Source / Keithley 220
Measuring Instrument 4. High Voltage Type High Voltage Meter High Voltage Probe	DCV: 0 kV to 5 kV 5 kV to 10 kV ACV (50Hz): 0 kV to 5 kV 5 kV to 10 kV	53 V 93 V 39 V 41 V	Withstanding Voltage Tester / Standard High Voltage Meter (TOS 5101 & TDV 20ADS / Vitrex 4700)
Measuring Instrument 5. Frequency Counter Frequency	0.1 Hz to 2 GHz	56 μ Hz	Function Generator HP 3325B / Signal Generator- E4425B
Measuring Instrument 6. Oscilloscope	Volt/Div (1 V to 20 V) Volt/Div (10 mV to 500 mV) Time/Div (5 ns to 500 ns) Time/Div (1 μ s to 500 μ s) Time/Div (1 ms to 500 ms) Time/Div (1 s to 5 s) Bandwidth (3 MHz to 1 GHz) Risetime	90 mV 1.5 mV 0.46 ns 0.46 μ s 0.058 m s/s 5 m s/s 24 kHz/MHz 1 ps/ns	Standard Multi Calibrator Fluke 5820A
Measuring Instrument 7. Oscilloscope Vertical Deflection Dc Signal	0 V to $\pm$ 6.6 V (50 Ω Load) 0 V to $\pm$ 130 V (1M Ω Load)	49 μ V 74 mV	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B

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Measuring Instrument 7. Oscilloscope Vertical Deflection	$\pm 1\text{m Vpp}$ to $\pm 6.6\text{ Vpp}$ (50 Ω Load)	10 μVpp	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 7. Oscilloscope Square Wave Signal	$\pm 1\text{m Vpp}$ to $\pm 130\text{ Vpp}$ (1M Ω Load)	99 mVpp	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 7. Oscilloscope Horizontal Deflection Time Markers (50 Ω Load)	2 ns/div to 20 ms/div 50 ms/div to 5 s/div	1 ps 1 ms	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 7. Oscilloscope Rise Time	$\leq 300\text{ ps}$	5 fs	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 7. Oscilloscope Bandwidth Frequency	50 kHz to 600 MHz 600 MHz to 2100 MHz	0.4 kHz 0.5 kHz	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 7. Oscilloscope Bandwidth Amplitude	50 kHz to 600 MHz 600 MHz to 2100 MHz	16 mVpp 14 mVpp	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 8. Timer/stop Watch Time	1 s to 50 s 50 s to 10 minutes 10 minutes to 1 hour 1 hour to 3 hours	0.13 s 0.51 s 0.73 s 0.98 s	Time Calibrator SST-2 / Stop Watch

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Measuring Instrument 9. Clamp Meter Dc Current 50- Turn Coil	3.2 to 32 A	0.04 A	Multi Calibrator Fluke 5520A & 50-Turn Coil Model Fluke 5500A/Coil
	32to 105 A	0.35 A	
	105to 200 A	1.7 A	
	16 to 160 A	0.12 A	
	160 to 525 A	1.1 A	
	525 to 1000 A	3.7 A	
	3.2 A to 32 A	0.31 A	
	10 Hz to 100 Hz	0.33 A	
	100 Hz to 440 Hz	0.23 A	
	32 A to 200 A	0.25 A	
Measuring Instrument 9. Clamp Meter Ac Current 50- Turn Coil	10 Hz to 100 Hz	0.14 A	Multi Calibrator Fluke 5520A & 50-Turn Coil Model Fluke 5500A/Coil
	100 Hz to 440 Hz	0.47 A	
	16 A to 160 A	2.9 A	
	10 Hz to 100 Hz	13 A	
	100 Hz to 440 Hz		
	160 A to 1000 A		
	10 Hz to 100 Hz		
	100 Hz to 440 Hz		
	3.2 to 32 A	0.04 A	
	32to 105 A	0.35 A	
	105to 200 A	1.7 A	
	16 to 160 A	0.12 A	
	160 to 525 A	1.1 A	
	525 to 1000 A	3.7 A	
	3.2 A to 32 A	0.31 A	
	10 Hz to 100 Hz	0.33 A	
	100 Hz to 440 Hz	0.23 A	
	32 A to 200 A	0.25 A	
	10 Hz to 100 Hz	0.14 A	
	100 Hz to 440 Hz	0.47 A	
	16 A to 160 A	2.9 A	
	10 Hz to 100 Hz	13 A	
	100 Hz to 440 Hz		
	160 A to 1000 A		
	10 Hz to 100 Hz		
	100 Hz to 440 Hz		
	3.2 to 32 A	0.04 A	
	32to 105 A	0.35 A	
	105to 200 A	1.7 A	
	16 to 160 A	0.12 A	
	160 to 525 A	1.1 A	
	525 to 1000 A	3.7 A	
	3.2 A to 32 A	0.31 A	
	10 Hz to 100 Hz	0.33 A	
	100 Hz to 440 Hz	0.23 A	
	32 A to 200 A	0.25 A	
	10 Hz to 100 Hz	0.14 A	
	100 Hz to 440 Hz	0.47 A	
	16 A to 160 A	2.9 A	
	10 Hz to 100 Hz	13 A	
	100 Hz to 440 Hz		
	160 A to 1000 A		
	10 Hz to 100 Hz		
	100 Hz to 440 Hz		
	3.2 to 32 A	0.04 A	
	32to 105 A	0.35 A	
	105to 200 A	1.7 A	
	16 to 160 A	0.12 A	
	160 to 525 A	1.1 A	
	525 to 1000 A	3.7 A	

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Measuring Instrument 10. Power/energy Dc Current	0.1 W to 1 kW 1 kW to 20 kW	0.1 mW 0.1 kW	Multi Calibrator Fluke 5520A
Measuring Instrument 10. Power/energy Ac Current (45 Hz To 65 Hz At Pf=1)	0.1 W to 1 kW 1 kW to 10 kW 10 kW to 20 kW	0.1 mW 5.1 W 0.1 kW	Multi Calibrator Fluke 5520A
Measuring Instrument 11. Tachometer	60 rpm to 600 rpm 600 rpm to 6000 rpm 6000 rpm to 60000 rpm 60000 rpm to 99960 rpm	0.7 rpm 7.1 rpm 71 rpm 120 rpm	In-House Method ESF/0303 (Function Generator HP 3325B)
Measuring Instrument 12. Insulation Testers	(1 k Ω to 10 k Ω) @10 V (10 k Ω to 100 k Ω) @ 50 V (0.1 M Ω to 1 M Ω) @150 V (1 M Ω to 10 M Ω) @ 300 V (10 M Ω to 100 M Ω) @ 500 V (0.1 G Ω to 1 G Ω) @1000 V (1 G Ω to 10 G Ω) @ 5000 V (10 G Ω to 100 G Ω) @ 5000 V (100 G Ω to 500 G Ω) @ 5000 V	8 Ω 19 Ω 0.2 k Ω 8 k Ω 71 k Ω 1.6 M Ω 12 M Ω 0.2 G Ω 2.8 G Ω	IET HRRS-Q-9- 10k-10kV High Resistance Decade Substituter
Sourcing/generating Instrument 1. Calibrator Dc Voltage	(100 μ V to 100 mV) (100mV to 1V) (1V to 10V) (10V to 100 V) (100V to 1000 V)	9 μ V/V + 0.6 μ V 10 μ V/V + 0.7 μ V 6 μ V/V + 0.6 mV 8 μ V/V + 0.5 mV 9 μ V/V + 5 mV	Multimeter/ Direct Measurement HP/Agilent 3458A/Keithley 486/Keithley 580
Sourcing/generating Instrument Resistance	10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω	0.5 m Ω 2 m Ω 0.1 Ω 0.2 Ω 2.0 Ω 0.1 k Ω 0.8 k Ω 60 k Ω	Multimeter/ Direct Measurement HP/Agilent 3458A/Keithley 486/Keithley 580

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Sourcing/generating Instrument Dc Current	100 μ A 1 mA 10 mA 100 mA 1 A	0.02 μ A 0.1 μ A 0.8 μ A 9.2 μ A 0.2 mA	Multimeter/ Direct Measurement HP/Agilent 3458A/Keithley 486/Keithley 580
Sourcing/generating Instrument Ac Voltage	100 mV 1 kHz to 20 kHz 100 kHz 300 kHz 1 MHz 1V 45 Hz to 20 kHz 50 kHz 100 kHz 300 kHz 500 kHz 1 MHz 10 V 45 Hz to 20 kHz 50 kHz 100 kHz 300 kHz 500 kHz 1 MHz 100 V 45 Hz to 20 kHz 50 kHz 100 kHz 1000 V 10 Hz to 45 Hz	0.03 mV 0.38 mV 1.2 mV 1.8 mV 0.4 mV 0.2 mV 3.6 mV 12 mV 12 mV 18 mV 3.7 mV 2.4 mV 36 mV 0.1 V 0.1 V 0.2 V 0.04 V 0.14 V 0.48 V 0.49 V	Masurement using Digital Multimeter Direct Measurement HP/Agilent 3458A
Sourcing/generating Instrument Frequency	Input Signal 1 mV to 700 V 1 Hz 10 MHz	1 mHz 1 kHz	Masurement using Digital Multimeter Direct Measurement HP/Agilent 3458A
Sourcing/generating Instrument 2. Standard Impedance Capacitance	Test Frequency 10 Hz to 1 MHz 1 pF to 1000 pF 1 nF to 1 μ F	1.5 fF/F + 1 fF 1.1 nF/F + 0.1 pF	Masurement using Standard Capacitance/ Decade Capacitance General Radio 1423A/1409 series HP 16380A series & HP 4284A

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Sourcing/generating Instrument Inductance	Test Frequency 10 Hz to 1 MHz 100 μ H to 1 mH 1 mH to 10 H	0.8 nH/H + 0.2 μ H 1.6 μ H/H + 0.08 mH	Measurement using Standard Inductance/Decade Inductance General Radio 1491-G/1482 series & HP 4284A
Sourcing/generating Instrument Resistance Fixed	1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω	0.07 $\mu\Omega$ 0.2 $\mu\Omega$ 2 $\mu\Omega$ 0.01 m Ω 0.1 Ω 1.5 Ω 23 Ω 1 k Ω 58 k Ω	Measurement using DMM 3458A and compare with Standard Resistance (1 Ω to 10M Ω)/ Direct Measurement (100M Ω)
Sourcing/generating Instrument 3. High Voltage Type Generate	DCV: 0 kV to 20 kV 10 kV to 20 kV AC (50Hz): 0 kV to 20 kV 10 kV to 20 kV	0.3 mV/V + 0.001 kV 0.5 mV/V + 0.001 kV 1.4 mV/V + 0.001 kV 1.8 mV/V + 0.001 kV	Measurement using Standard High Voltage Meter Vitrek 4700/High Voltage Probe Vitrek HVP-35
Sourcing/generating Instrument 4. Signal Generator Frequency	0.1 Hz to 5 GHz	(of reading) 20 μ Hz	Measurement using Standard Universal Counter /HP 53132A

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Sourcing/generating Instrument 5. Ac Current	29 μ A to 0.33 mA 10 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 5 kHz 0.33 mA to 3.3 mA 10 Hz to 45 Hz 45 Hz to 1 kHz 100 Hz to 1 kHz 1 kHz to 5 kHz 3.3 mA to 33 mA 10 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 33 mA to 330 mA 10 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 20 kHz 20 kHz to 50 kHz 330 mA to 1A 10 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 20 kHz 20 kHz to 50 kHz	2.0 μ A 0.3 μ A 0.4 μ A 0.3 μ A 6.0 μ A 3.0 μ A 2.0 μ A 3.0 μ A 65 μ A 65 μ A 19 μ A 31 μ A 31 μ A 17 μ A 27 μ A 0.65 mA 0.31 mA 0.19 mA 0.31 mA 0.31 mA 0.17 mA 1.6 mA 0.6 mA 2.0 mA 4.0 mA 4.0 mA 2.7 mA	Measurement using Digital Multimeter Model 3458A
Sourcing/generating Instrument 6. Oscilloscope Calibrator (calibration Generator, Time Mark Generator And Levelled Sine Wave Generator)	Frequency: 0.1 Hz to 5 GHz Amplitude 100 mV to 10 V 40 Hz to 1 kHz 1 kHz to 20 kHz 50 kHz to 100 kHz	(of reading) 20 μ Hz 1 mV 10 mV 36 mV	Measurement using Standard Universal Counter/ Digital Multimeter Digitizing Oscilloscope HP53132/HP3458A/TDS680C
Sourcing/generating Instrument 7. Dc Current Source	1 A to 10 A 11 A to 100 A	32 mA 0.05 A	Measurement using Standard Current Shunt VS2575A and Digital Multimeter HP 3458A

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Sourcing/generating Instrument 8. Ac Current Source	1 A to 10 A (50 Hz to 10 kHz)	72 mA	Measurement using Standard Current Shunt VS2575A and Digital Multimeter HP 3458A

SITE LOCATION (HQ)	1. CATEGORY I
FIELD(S) OF CALIBRATION :	DIMENSIONAL,ELECTRICAL,FORCE,HEAT & TEMPERATURE,MASS,PRESSURE

SCOPE OF CALIBRATION : HEAT & TEMPERATURE

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Temperature Indicating Instruments (by Electrical Simulation) Thermocouple: (with Cold Junction Compensation) resistant Temperature Detector	K Type -100 °C to 1300 °C J Type -100 °C to 1100 °C T Type -100 °C to 400 °C E Type -100 °C to 800 °C R Type 0 °C to 1700 °C S Type 0°C to 1700 °C PT100 -100 °C to 800 °C	0.5 °C 0.4 °C 0.6 °C 0.5°C 1.4 °C 1.4 °C 0.6 °C	By electrical simulation using calibrator & temperature reference to ITS-90
Temperature Controlled Heat Enclosures	-60 °C to 200 °C 200 °C to 400 °C	0.7°C 1.3 °C	Using temperature recorder and Thermocouple Wires with reference to AS 2853-1986
Humidity Chamber @ 23°C	35 %rh to 95 %rh	4.0 %rh	Comparison with Humidity Temperature Recorder & wet and dry bulb thermocouple

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SCOPE OF CALIBRATION : DIMENSIONAL

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Surface Plate Overall Flatness	600 mm x 600 mm Up to 1500 mm x 2000 mm	3 µm 4 µm	Calibrated using Planekator as Standards according to ISO 8512-2:1990
Profile Projector -“linear Scale Only	Up to 80 mm 80 mm to 200 mm	4 µm 6 µm	Calibrated using glass scale as reference standard

SCOPE OF CALIBRATION : MASS

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Analytical Balance	Up to 200 g	0.2 mg	Using standard weight
Balance / Scale (mechanical, Electronic)	200 g to 1 kg Above 1 kg to 10 kg Above 10 kg to 30 kg Above 30 kg to 100 kg Above 100 kg to 500 kg Above 500 kg to 1000 kg	0.7 mg 8.2 mg 0.1 g 10 g 50 g 100 g	Using standard weight

SCOPE OF CALIBRATION : FORCE

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Universal Testing Machine	0 kgf to 500 kgf 500 kgf to 1000 kgf 1000 kgf to 3000 kgf 3000 kgf to 5000 kgf 5000 kgf to 10000 kgf	0.24 kgf 2.5 kgf 14 kgf 15 kgf 16 kgf	BS EN ISO 7500- 1: 2004 Load Cell 500 kgf, 1000 kgf, 3000 kgf, 5000 kgf, 10000 kgf operating in compression mode

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SCOPE OF CALIBRATION : PRESSURE

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Vacuum	Up to 14 ps	0.018 psi	Pressure sensor
Pressure Measuring Device (air Medium)	0 psi to 30 psi 30 psi to 600 psi	0.04 psi 0.8 psi	Pressure sensor
Pressure Measuring Device (oil Medium)	0 to 30 psi 30 psi to 600 psi 600 psi to 6000 psi 6000 psi to 10000 psi	0.04 psi 0.8 psi 8 psi 12 psi	Pressure sensor

SCOPE OF CALIBRATION : ELECTRICAL

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Measuring Instrument 1. Multimeter/ Indicating Meter Dc Voltage	0 to 330 mV 0 to 3.3 V 0 to 33 V 33 to 330 V 334 to 1000 V	15 µV 0.1 mV 1 mV 11 mV 81 mV	Generating using Multi Calibrator Fluke 5520A
Measuring Instrument 1. Multimeter/ Indicating Meter Resistance	0 to 11 - _Ω 11 to 33 - _Ω 33 to 110 - _Ω 110 to 330 - _Ω 0.33 to 1.1 k- _Ω 1.1 to 3.3 k- _Ω 3.3 to 11 k- _Ω 11 to 33 k- _Ω 33 to 110 k- _Ω 110 to 330 k- _Ω 0.33 to 1.1 M- _Ω 1.1 to 3.3 M- _Ω 3.3 to 11 M- _Ω 11 to 33 M- _Ω 33 to 110 M- _Ω 110 to 330 M- _Ω 330 to 1100 M- _Ω	16 m- _Ω 19 m- _Ω 28 m- _Ω 0.2 - _Ω 3.0 - _Ω 2.8 - _Ω 2.7 - _Ω 4.0 - _Ω 24 - _Ω 30 - _Ω 0.1 k- _Ω 0.4 k- _Ω 2 k- _Ω 17 k- _Ω 0.18 M- _Ω 1.2 M- _Ω 2.1 M- _Ω	Generating using Multi Calibrator Fluke 5520A

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Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Measuring Instrument 1. Multimeter/ Indicating Meter Dc Current	0 mA to 300 μ A 300 μ A to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA 330 mA to 1.1 A 1.1 A to 3 A 3 A to 11 A 11 A to 20.5 A	0.1 μ A 0.4 μ A 4.0 μ A 0.1 mA 0.3 mA 2.0 mA 17 mA 26 mA	Generating using Multi Calibrator Fluke 5520A
Measuring Instrument 1. Multimeter/ Indicating Meter Ac Voltage	1 to 30 mV 10 Hz to 45 Hz 45 Hz to 10 kHz 10 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 500 kHz 33 to 330 mV 10 Hz to 45 Hz 45 Hz to 10 kHz 10 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 500 kHz 0.33 to 3.3 V 10 Hz to 45 Hz 45 Hz to 10 kHz 10 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 500 kHz 3.3 to 33 V 10 Hz to 45 Hz 45 Hz to 10 kHz 10 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 90 kHz 33 to 330 V 10 Hz to 45 Hz 45 Hz to 10 kHz 10 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 330 to 1020 V 45 Hz to 10 kHz	29 μ V 6 μ V 8 μ V 35 μ V 0.12 mV 0.28 mV 0.11 mV 0.06 mV 0.06 mV 0.12 mV 0.28 mV 0.70 mV 1.0 mV 1.0 mV 2.0 mV 2.0 mV 5.0 mV 10 mV 10 mV 15 mV 17 mV 19 mV 0.13 V 0.13 V 0.10 V 0.11 V 0.11 V 0.11 V 0.36 mV	Generating using Multi Calibrator Fluke 5520A

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Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Measuring Instrument 1. Multimeter/ Indicating Meter Ac Current	29 μ A to 330 μ A 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 0.33 mA to 3.3 mA 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 3.3 mA to 33 mA 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 33 mA to 330 mA 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 33 mA to 330 mA 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 0.33 A to 1.1 A 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 1.1 A to 3 A 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 3 A to 11 A 45 Hz to 1 kHz 11 A to 20 A 45 Hz to 1 kHz	1 μ A 1 μ A 3 μ A 6 μ A 5 μ A 20 μ A 32 μ A 41 μ A 81 μ A 0.4 mA 1 mA 1 mA 3 mA 2 mA 35 mA 5 mA 24 mA 93 mA 28 mA 44 mA	Generating using Multi Calibrator Fluke 5520A
Measuring Instrument 1. Multimeter/ Indicating Meter Frequency	0.01 Hz to 120 Hz 120 Hz to 1200 Hz 12 kHz to 120 kHz	9 mHz 76 mHz 9 Hz	Generating using Multi Calibrator Fluke 5520A
Measuring Instrument 1. Multimeter/ Indicating Meter Capacitance (test Frequency At 10 Hz To 10 KHz)	0.19 nF to 3.3 nF 3.3 nF to 33 nF 33 nF to 330 nF 0.33 μ F to 3.3 μ F 3.3 μ F to 33 μ F 33 μ F to 110 μ F	2 pF 0.2 nF 1.2 nF 59 nF 0.2 μ F 0.5 μ F	Generating using Multi Calibrator Fluke 5520A
Measuring Instrument 2. Timer/stop Watch Time	1 s to 50 s 50 s to 10 minutes 10 minutes to 1 hour 1 hour to 3 hours	0.12 s 0.51 s 0.74 s 1.0 s	Generating using Time Calibrator

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Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Measuring Instrument 3. Insulation Testers	(1 k Ω to 10 k Ω) @10 V (10 k Ω to 100 k Ω) @ 50 V (0.1 M Ω to 1 M Ω) @150 V (1 M Ω to 10 M Ω) @ 300 V (10 M Ω to 100 M Ω) @ 500 V (0.1 G Ω to 1 G Ω) @1000 V (1 G Ω to 10 G Ω) @ 5000 V (10 G Ω to 100 G Ω) @ 5000 V (100 G Ω to 500 G Ω) @ 5000 V	8 Ω 19 Ω 0.2 k Ω 8 k Ω 71 k Ω 1.6 M Ω 12 M Ω 0.2 G Ω 2.8 G Ω	Generating Using IET HRRS-Q-9-10k10kV High Resistance Decade Substituter
Measuring Instrument 4. Oscilloscope Vertical Deflection Dc Signal	0 V to ± 6.6 V (50 Ω Load) 0 V to ± 130 V (1M Ω Load)	49 μ V 74 mV	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 4. Oscilloscope vertical Deflection	± 1 m Vpp to ± 6.6 Vpp (50 Ω Load)	10 μ Vpp	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 4. Oscilloscope square Wave Signal	± 1 m Vpp to ± 130 Vpp (1M Ω Load)	99 μ Vpp	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 4. Oscilloscope horizontal Deflection Time Markers (50 Ω Load)	2 ns/div to 20 ms/div 50 ms/div to 5 s/div	1 ps 1 ms	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 4. Oscilloscope rise Time	≤ 300 ps	5 fs	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 4. Oscilloscope bandwidth Frequency	50 kHz to 600 MHz 600 MHz to 2100 MHz	0.4 kHz 0.5 kHz	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B
Measuring Instrument 4. Oscilloscope Bandwidth Amplitude	50 kHz to 600 MHz 600 MHz to 2100 MHz	16 mVpp 14 mVpp	Generating using Oscilloscope Calibrator Fluke 5820A & E4425B

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Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques	Remarks
Sourcing/generating Instrument 1. Dc Power Supply dc Voltage	(100µV to 100 mV) (100mV to 1V) (1V to 10V) (10V to 100 V) (100V to 1000 V)	9 µV/V + 0.6 µV 10 µV/V + 0.7 µV 6 µV/V + 0.6 mV 8 µV/V + 0.5 mV 9 µV/V + 5 mV	Measurement using Digital Multimeter HP3458A & Current Shunt VS 2575A
Sourcing/generating Instrument 1. Dc Power Supply dc Current	100 mA to 1 A 10 A to 100 A	0.01 µA 0.05 A	Measurement using Digital Multimeter HP3458A & Current Shunt VS 2575A
Sourcing/generating Instrument 2. High Voltage Type	DCV: 0 kV to 20 kV 10 kV to 20 kV AC (50Hz): 0 kV to 20 kV 10 kV to 20 kV	0.3 mV/V + 0.001 kV 0.5 mV/V + 0.001 kV 1.4 mV/V + 0.001 kV 1.8 mV/V + 0.001 kV	Measurement using Standard High Voltage Meter Vitrek 4700/HV Probe HVP-35

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