



#### CERTIFICATE OF ACCREDITATION

#### APPLE METROLOGY CENTRE PRIVATE LIMITED

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

# "General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

NO. 9/10, PATTUR MAIN ROAD, CHINNAPANICHERY MANGADU, KANCHIPURAM, TAMIL NADU, INDIA

in the field of

#### **CALIBRATION**

Certificate Number: CC-4434

**Issue Date:** 

07/06/2025

Valid Until:

06/06/2029

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL. (To see the scope of accreditation of thislaboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Entity: APPLE METROLOGY CENTRE PRIVATE LIMITED

Signed for and on behalf of NABL

Anita Rani **Director** 

N. Venkateswaran **Chief Executive Officer** 





#### **SCOPE OF ACCREDITATION**

**Laboratory Name:** 

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Validity

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S.No	Discipline / Group	Measurand or Reference Material/Type of instrument or material to be calibrated or measured / Quantity Measured /Instrument	Calibration or Measurement Method or procedure	Measurement range and additional parameters where applicable(Range and Frequency)	* Calibration and Measurement Capability(CMC)(±)
	-	20	Permanent Facility		
1	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Automotive Transient Pulses 1,2a,2b,3a,3b,4,5 : Pulse Width/Duration	Using Digital Oscilloscope, Differential Probe, passive voltage probe and load resistors by Direct Method as per ISO 7637-2, SAE J-1113-11	50 ns to 10 s	0.23 %
2	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Automotive Transient Pulses 1,2a,2b,3a,3b,4,5 : Rise Time/Fall Time	Using Digital Oscilloscope, Differential Probe, passive voltage probe and load resistors by Direct Method as per ISO 7637-2, SAE J-1113-11	1 ns to 100 ms	2.32 %
3	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Automotive Transient Pulses 1,2a,2b,3a,3b,4,5 : Amplitude	Using Digital Oscilloscope & Differential Probe by Direct Method as per ISO 7637-2, SAE J-1113-11	-600 V to 400 V	2.92 %
4	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Capacitive coupling clamp - Pulse Duration	Using Digital Osciiloscope & Load Resistor as per ISO 7637-3 by Direct Method	150 ns	0.08 %





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5	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Capacitive coupling clamp - Rise Time	Using Digital Osciiloscope & Load Resistor as per ISO 7637-3 by Direct Method	5 ns	1.63 %
6	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Capacitive coupling clamp - Voltage Amplitude	Using Digital Osciiloscope & Load Resistor as per ISO 7637-3 by Direct Method	-400 V to 400 V	3 %
7	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) a)Voltage Amplitude	Using Digital Storage Oscilloscope, High Voltage Differential Probe as per IEC 61000-4-5 by Direct Method	±0.25 kV to ±7.0 kV	3.84 %
8	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) b)Voltage front time	Using Digital Storage Oscilloscope, High Voltage Differential Probe as per IEC 61000-4-5 by Direct Method	1.2 μs	0.09 μs
9	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) c)Voltage Duration	Using Digital Storage Oscilloscope, High Voltage Differential Probe as per IEC 61000-4-5 by Direct Method	50 μs	0.03 μs





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10	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) d)current amplitude	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	±20.83 A to ±3.5 kA	1.96 %
11	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) e)current front time	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	2.5 μs to 8 μs	1.64 %
12	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) f) current Duration	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	20 μs to 25 μs	0.08 %
13	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Coupling Factor/Coupling loss /Decoupling of common mode Disturbannce /Insertion loss /RF Attenuation/Isolation /Voltage Division Factor (EM Clamp,SWR Bridge,Directional Coupler) 9 kHz to 4.5 kHz	Using Vector network analyzer by direct method	0 dB to 80 dB	0.69 dB





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14	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator (Voltage Amplitude) (Voltage Decay) Decay in Peak 10 to be 50% of peak 1 value	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	±0.25 kV to ±4.0 kV	2.81 % to 3.9 %
15	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator - Slow and Fast(Repetition Rate)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	40 Hz, 400 Hz,5 kHz	0.06 % to 0.13 %
16	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator- Slow and Fast (Current Amplitude)	Using Current Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	±1.25 A to ±12.5 A	1.88 % to 1.95 %
17	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator- Slow and Fast (Oscillation Frequency)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	100 kHz, 1 MHz , 3 MHz, 1 30 MHZ to	1.21 % to 0.38 %
18	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator- Slow and Fast (Rise Time)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	5 ns to 75 ns	3.31 % to 0.23 %





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19	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system ( Generator output) Burst Period	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	300 ms	0.19 ms
20	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system ( Generator output) e) Burst Duration (2.5 kHz/5 kHz/100 kHz/1000 kHz)	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	0.75 ms to 15 ms	0.05 ms
21	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system ( Generator output, Capacitive Clamp) d)Repetition frequency (inverse)	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	2.5,5,100,1000 kHz	0.15 %
22	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system (Generator, CDN output, Capacitive Clamp) a) Pulse Amplitude	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	±125 V to ±5.5 kV	3 %
23	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system (Generator, CDN output, Capacitive Clamp) Pulse Rise time	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	5 ns to 5.5 ns	0.17 ns





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24	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system (Generator, CDN output, Capacitive Clamp) Pulse width	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	45 ns to 50 ns	0.17 ns
25	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator a)First peak current (± 2.0 kV TO ±30 kV)	Using Digital Storage Oscilloscope , ESD Target as per IEC 61000-4-2, SAE J1113-13, ISO 10605	±6.38 A to ±146.25 A	6.64 %
26	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator b)Rise time	Using Digital Storage Oscilloscope , ESD Target as per IEC 61000-4-2, SAE J1113-13, ISO 10605	0.6 ns to 1 ns	11.44 %
27	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator c) Current @ 30 ns/65ns/180ns/400n s (± 2.0 kV TO ±30 kV)	Using Digital Storage Oscilloscope , ESD Target as per IEC 61000-4-2, SAE J1113-13, ISO 10605	±0.385 A to ±78 A	6.27 %
28	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator d) Current @ 60 ns/130ns/360ns/800 ns (± 2.0 kV TO ±30 kV)	Using Digital Storage Oscilloscope , ESD Target as per IEC 61000-4-2, SAE J1113-13, ISO 10605	±0.15 A to ±39 A	6.23 %





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29	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator- Generator DC output voltage	Using High voltage probe, Dual display Multimeter as per IEC 61000- 4-2 , SAE J1113-13 ISO 10605	±1 kV to ±30 kV	3.95 %
30	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Impedance 9 kHz to 400 MHz	Using Vector network analyzer by direct method	1 ohm to 300 ohm	4 %
31	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Longitudinal conversion loss (Impedance stabilization Network) 9 kHz to 30 MHz	Using Vector network analyzer by direct method AS Per CISPR 22,CISPR 32	0 dB to 60 dB	0.69 dB
32	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Phase Angle (9 kHz to 400 MHz)	Using Vector network analyzer by direct method CISPR 16-1-2	-90 ° to 90 °	1.1 °
33	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Phase Shifting (Surge/ Ringwave/ Dips Generator)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-5, IEC 61000-4-12, IEC 61000-4-11 by Direct Method	0 ° to 360 °	0.08 ° to 0.23 °





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34	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Return loss/ VSWR/Reflection co- efficient (Transient limiter,Directional coupler,Attenuator,C able,Pre amplifier,Terminator ) 9 kHz to 4.5 GHz	Using Vector network analyzer by direct method	1 dB to 46 dB	0.69 dB
35	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator a. Voltage Amplitude (Voltage Decay) Pk2 40% to 110% of Pk1, Pk3 40 to 80% of Pk2, Pk4 40% to 80% of Pk3	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-12 by Direct Method	±0.25 kV to ±7.0 kV	4 %
36	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator - current amplitude	Using Digital Storage Oscilloscope , Current probe as per IEC 61000-4-12 by Direct Method	±8.33 A to ±583.33 A	1.96 %
37	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator - Voltage Rise time	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-12 by Direct Method	0.5 μs	0.008 μs
38	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator -Current rise time	Using Digital Storage Oscilloscope , Current probe as per IEC 61000-4-12 by Direct Method	1 μs	0.008 μs





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39	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator c)Oscillation frequency(period)	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-12 by Direct Method	100 kHz (10μs)	1.20 %
40	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge Generator - Current Amplitude	Using Current Probe & Digital Osciiloscope as per IEC 61000-4-5 by Direct Method	±6.25 A to ±466.66 A	1.90 %
41	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system - current front time	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	5 μs	0.02 μs
42	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system - current pulse width	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	320 μs	0.2 μs
43	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system - Voltage Amplitude	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-5 by Direct Method	±0.25 kV to ±7.0 kV	5.68 %





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44	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system - Voltage front time	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-5 by Direct Method	10 μs	0.015 μs
45	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system Voltage pulse width	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-5 by Direct Method	700 μs	0.42 μs
46	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Voltage Dips & Interruption Generator Dips/Interruption time	Using Digital Storage Oscilloscope, High voltage Differential probe as per IEC 61000-4-11 & IEC 61000-4-29 by Direct Method	10 ms to 5 s	0.83 %
47	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Voltage Dips & Interruption Generator Output voltage at no load	Using Digital Storage Oscilloscope, High voltage Differential probe as per IEC 61000-4-11 & IEC 61000-4-29 by Direct Method	0 % to 100 %	1.33 %





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48	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Voltage Dips & Interruption Generator Rise/Fall Time(with Load)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-11 & IEC 61000-4-29 by Direct Method	1 μs to 50 μs	6.5 %
49	MECHANICAL- PRESSURE INDICATING DEVICES	Absolute Pressure(Pneumatic) : Absolute pressure gauges / Barometers / Manometers / Absolute pressure calibrators, Pressure Switches, Pressure Transducers / Transmitters	Using Absolute Pressure calibrator with Digital Multimeter & Pneumatic Hand Pump by Comparison Method as per DKD-R 6-1	0.2 bar(a) to 7 bar(a)	0.0015 bar(a)
50	MECHANICAL- PRESSURE INDICATING DEVICES	Low Pressure (Pneumatic): Magnehelic gauges / Low Pressure gauges/Low pressure Transmitters and Switches	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	0 mbar to 200 mbar	0.064 mbar





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51	MECHANICAL- PRESSURE INDICATING DEVICES	Negative Pressure: Magnehelic gauges/ Low Pressure gauges/Low pressure Transmitters and switches	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	(-)200 mbar to 0 mbar	0.064 mbar
52	MECHANICAL- PRESSURE INDICATING DEVICES	Negative pressure: Vacuum Gauges, Vacuum Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	(-)0.95 bar to 0 bar	0.0003 bar
53	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure (Hydraulic): Pressure gauges, Pressure Calibrators, Pressure Switches , Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Hydraulic Comparator by Comparison Method DKD R-6-1	0 bar to 200 bar	0.038 bar
54	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure (Hydraulic): Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Hydraulic Comparator by Comparison Method DKD R-6-1	0 bar to 350 bar	0.1 bar





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55	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure (Hydraulic): Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Hydraulic Comparator by Comparison Method DKD R-6-1	0 bar to 70 bar	0.011 bar
56	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure (Hydraulic): Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Hydraulic Comparator by Comparison Method DKD R-6-1	0 bar to 700 bar	0.11 bar
57	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure(Pneumatic) : Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	0 bar to 10 bar	0.0026 bar
58	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure(Pneumatic) : Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	0 bar to 2 bar	0.0005 bar





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59	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure(Pneumatic) : Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	0 bar to 40 bar	0.0096 bar
60	THERMAL- SPECIFIC HEAT & HUMIDITY	Dew Point Temperature Indicator with Sensor, Transmitter (20 %rh to 95 % rh)	Using Humidity Chamber, Dew Point Temperature Sensor with Indicator and Multifunction Calibrator by Comparison Method	(-)10 °C to 50 °C	1.0 °C
61	THERMAL- SPECIFIC HEAT & HUMIDITY	Humidity Chamber (Multipositions) @ (25 °C to 50 °C)	Using Temperature & Humidity Data Loggers ( minimum 3 Nos) by Comparison Method	10 % rh to 95 % rh	2.0 % rh
62	THERMAL- SPECIFIC HEAT & HUMIDITY	Humidity Chamber (Multipostions) @ (50% RH)	Using Temperature & Humidity Data Loggers(minimum 3 Nos ) by Comparison Method	10 °C to 60 °C	0.5 °C
63	THERMAL- SPECIFIC HEAT & HUMIDITY	Thermo Hygrometer, Humidity Transmitter, Humidity Indicator with Sensor @ (10 °C to 60 °C)	Using Humidity Chamber with Digital Temperature & Humidity Indicator with Sensor by Comparison Method	10 %rh to 95 %rh	1.6 %rh





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64	THERMAL- SPECIFIC HEAT & HUMIDITY	Thermo Hygrometer, Humidity Transmitter, Humidity Indicator with Sensor @ (50 % rh)	Using Humidity Chamber with Digital Temperature & Humidity Indicator with Sensor and PRT with Indicator by Comparison Method	6 °C to 60 °C	0.29 °C
65	THERMAL- TEMPERATURE	Black Body Source, IR Calibrator	Using Non Contact IR Thermometer (Emissivity: 0.95) by Comparison Method	(-)30 °C to 100 °C	1.2 °C
66	THERMAL- TEMPERATURE	Black Body Source, IR Calibrator	Using Non Contact IR Thermometer (Emissivity: 0.95) by Comparison Method	100 °C to 500 °C	1.8 °C
67	THERMAL- TEMPERATURE	Infrared, Non- Contact Thermometer, Pyrometer, Thermal Imager (Temp. only)	Using Non-Contact IR Thermometer (Emissivity: 0.95) and Black Body Source By Comparison Method	(-)20 °C to 50 °C	1.57 °C
68	THERMAL- TEMPERATURE	Infrared, Non- Contact Thermometer, Pyrometer, Thermal Imager (Temp. only)	Using Non-Contact IR Thermometer (Emissivity: 0.95) and Black Body Source By Comparison Method	50 °C to 500 °C	2.11 °C





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69	THERMAL- TEMPERATURE	RTD with /without indicator, Thermocouple with/without indicator, Temperature Gauges,Temperatur e Transmitter with/without indicator	Using Standard PRT with Indicator and Dry Temperature Bath and 6.5 digit DMM By Comparison Method	(-)30 °C to 100 °C	0.11 °C
70	THERMAL- TEMPERATURE	RTD with /without indicator, Thermocouple with/without indicator, Temperature Gauges,Temperatur e Transmitter with/without indicator	Using Standard PRT with Indicator and Dry Temperature Bath and 6.5 digit DMM By Comparison Method	100 °C to 650 °C	0.13 °C
71	THERMAL- TEMPERATURE	Thermocouple with/without indicator, Temperature Transmitter with/without indicator	Using Standard 'S' Type Thermocouple with Indicator and Dry Temperature Bath and DMM By Comparison Method	650 °C to 1200 °C	1.92 °C





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		30	Site Facility		
1	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Automotive Transient Pulses 1,2a,2b,3a,3b,4,5 : Pulse Width/Duration	Using Digital Oscilloscope, Differential Probe, passive voltage probe and load resistors by Direct Method as per ISO 7637-2, SAE J-1113-11	50 ns to 10 s	0.23 %
2	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Automotive Transient Pulses 1,2a,2b,3a,3b,4,5 : Rise Time/Fall Time	Using Digital Oscilloscope, Differential Probe, passive voltage probe and load resistors by Direct Method as per ISO 7637-2, SAE J-1113-11	1 ns to 100 ms	2.32 %
3	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Automotive Transient Pulses 1,2a,2b,3a,3b,4,5 : Amplitude	Using Digital Oscilloscope & Differential Probe by Direct Method as per ISO 7637-2, SAE J-1113-11	-600 V to 400 V	2.92 %
4	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Capacitive coupling clamp - Pulse Duration	Using Digital Osciiloscope & Load Resistor as per ISO 7637-3 by Direct Method	150 ns	0.08 %





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5	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Capacitive coupling clamp - Rise Time	Using Digital Osciiloscope & Load Resistor as per ISO 7637-3 by Direct Method	5 ns	1.63 %
6	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Capacitive coupling clamp - Voltage Amplitude	Using Digital Osciiloscope & Load Resistor as per ISO 7637-3 by Direct Method	-400 V to 400 V	3 %
7	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) a)Voltage Amplitude	Using Digital Storage Oscilloscope, High Voltage Differential Probe as per IEC 61000-4-5 by Direct Method	±0.25 kV to ±7.0 kV	3.84 %
8	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) b)Voltage front time	Using Digital Storage Oscilloscope, High Voltage Differential Probe as per IEC 61000-4-5 by Direct Method	1.2 μs	0.09 μs
9	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) c)Voltage Duration	Using Digital Storage Oscilloscope, High Voltage Differential Probe as per IEC 61000-4-5 by Direct Method	50 μs	0.03 μs





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10	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) d)current amplitude	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	±20.83 A to ±3.5 kA	1.96 %
11	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) e)current front time	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	2.5 μs to 8 μs	1.64 %
12	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Combination wave surge test system (Generator, CDN output) f) current Duration	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	20 μs to 25 μs	0.08 %
13	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Coupling Factor/Coupling loss /Decoupling of common mode Disturbannce /Insertion loss /RF Attenuation/Isolation /Voltage Division Factor (EM Clamp,SWR Bridge,Directional Coupler) 9 kHz to 4.5 kHz	Using Vector network analyzer by direct method	0 dB to 80 dB	0.69 dB





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14	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator (Voltage Amplitude) (Voltage Decay) Decay in Peak 10 to be 50% of peak 1 value	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	±0.25 kV to ±4.0 kV	2.81 % to 3.9 %
15	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator - Slow and Fast(Repetition Rate)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	40 Hz, 400 Hz,5 kHz	0.06 % to 0.13 %
16	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator- Slow and Fast (Current Amplitude)	Using Current Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	±1.25 A to ±12.5 A	1.88 % to 1.95 %
17	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator- Slow and Fast (Oscillation Frequency)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	100 kHz, 1 MHz , 3 MHz, 1 30 MHZ to	1.21 % to 0.38 %
18	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Damped Oscillatory wave Generator- Slow and Fast (Rise Time)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-18 by Direct Method	5 ns to 75 ns	3.31 % to 0.23 %





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19	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system ( Generator output) Burst Period	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	300 ms	0.19 ms
20	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system ( Generator output) e) Burst Duration (2.5 kHz/5 kHz/100 kHz/1000 kHz)	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	0.75 ms to 15 ms	0.05 ms
21	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system ( Generator output, Capacitive Clamp) d)Repetition frequency (inverse)	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	2.5,5,100,1000 kHz	0.15 %
22	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system (Generator, CDN output, Capacitive Clamp) a) Pulse Amplitude	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	±125 V to ±5.5 kV	3 %
23	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system (Generator, CDN output, Capacitive Clamp) Pulse Rise time	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	5 ns to 5.5 ns	0.17 ns





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24	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrical fast transient test system (Generator, CDN output, Capacitive Clamp) Pulse width	Using Digital Storage Oscilloscope with Load Resistor 50 ohm & 1000 ohm as per IEC 61000-4-4 by Direct Method	45 ns to 50 ns	0.17 ns
25	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator a)First peak current (± 2.0 kV TO ±30 kV)	Using Digital Storage Oscilloscope , ESD Target as per IEC 61000-4-2, SAE J1113-13, ISO 10605	±6.38 A to ±146.25 A	6.64 %
26	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator b)Rise time	Using Digital Storage Oscilloscope , ESD Target as per IEC 61000-4-2, SAE J1113-13, ISO 10605	0.6 ns to 1 ns	11.44 %
27	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator c) Current @ 30 ns/65ns/180ns/400n s (± 2.0 kV TO ±30 kV)	Using Digital Storage Oscilloscope , ESD Target as per IEC 61000-4-2, SAE J1113-13, ISO 10605	±0.385 A to ±78 A	6.27 %
28	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator d) Current @ 60 ns/130ns/360ns/800 ns (± 2.0 kV TO ±30 kV)	Using Digital Storage Oscilloscope , ESD Target as per IEC 61000-4-2, SAE J1113-13, ISO 10605	±0.15 A to ±39 A	6.23 %





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29	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Electrostatic Discharge Generator- Generator DC output voltage	Using High voltage probe, Dual display Multimeter as per IEC 61000- 4-2 , SAE J1113-13 ISO 10605	±1 kV to ±30 kV	3.95 %
30	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Impedance 9 kHz to 400 MHz	Using Vector network analyzer by direct method	1 ohm to 300 ohm	4 %
31	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Longitudinal conversion loss (Impedance stabilization Network) 9 kHz to 30 MHz	Using Vector network analyzer by direct method AS Per CISPR 22,CISPR 32	0 dB to 60 dB	0.69 dB
32	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Phase Angle (9 kHz to 400 MHz)	Using Vector network analyzer by direct method CISPR 16-1-2	-90 ° to 90 °	1.1 °
33	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Phase Shifting (Surge/ Ringwave/ Dips Generator)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-5, IEC 61000-4-12, IEC 61000-4-11 by Direct Method	0 ° to 360 °	0.08 ° to 0.23 °





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34	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Return loss/ VSWR/Reflection co- efficient (Transient limiter,Directional coupler,Attenuator,C able,Pre amplifier,Terminator ) 9 kHz to 4.5 GHz	Using Vector network analyzer by direct method	1 dB to 46 dB	0.69 dB
35	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator a. Voltage Amplitude (Voltage Decay) Pk2 40% to 110% of Pk1, Pk3 40 to 80% of Pk2, Pk4 40% to 80% of Pk3	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-12 by Direct Method	±0.25 kV to ±7.0 kV	4 %
36	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator - current amplitude	Using Digital Storage Oscilloscope , Current probe as per IEC 61000-4-12 by Direct Method	±8.33 A to ±583.33 A	1.96 %
37	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator - Voltage Rise time	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-12 by Direct Method	0.5 μs	0.008 μs
38	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator -Current rise time	Using Digital Storage Oscilloscope , Current probe as per IEC 61000-4-12 by Direct Method	1 μs	0.008 μs





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39	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Ring Wave Generator c)Oscillation frequency(period)	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-12 by Direct Method	100 kHz (10μs)	1.20 %
40	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge Generator - Current Amplitude	Using Current Probe & Digital Osciiloscope as per IEC 61000-4-5 by Direct Method	±6.25 A to ±466.66 A	1.90 %
41	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system - current front time	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	5 μs	0.02 μs
42	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system - current pulse width	Using Digital Storage Oscilloscope, Current probe as per IEC 61000-4-5 by Direct Method	320 μs	0.2 μs
43	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system - Voltage Amplitude	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-5 by Direct Method	±0.25 kV to ±7.0 kV	5.68 %





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44	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system - Voltage front time	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-5 by Direct Method	10 μs	0.015 μs
45	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Telecom surge test system Voltage pulse width	Using Digital Storage Oscilloscope , High voltage Differential probe as per IEC 61000-4-5 by Direct Method	700 μs	0.42 μs
46	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Voltage Dips & Interruption Generator Dips/Interruption time	Using Digital Storage Oscilloscope, High voltage Differential probe as per IEC 61000-4-11 & IEC 61000-4-29 by Direct Method	10 ms to 5 s	0.83 %
47	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Voltage Dips & Interruption Generator Output voltage at no load	Using Digital Storage Oscilloscope, High voltage Differential probe as per IEC 61000-4-11 & IEC 61000-4-29 by Direct Method	0 % to 100 %	1.33 %





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48	ELECTRO- TECHNICAL- EMI/ EMC (Measure)	Voltage Dips & Interruption Generator Rise/Fall Time(with Load)	Using Voltage Differential Probe & Digital Osciiloscope as per IEC 61000-4-11 & IEC 61000-4-29 by Direct Method	1 μs to 50 μs	6.5 %
49	MECHANICAL- PRESSURE INDICATING DEVICES	Absolute Pressure(Pneumatic) : Absolute pressure gauges / Barometers / Manometers / Absolute pressure calibrators, Pressure Switches, Pressure Transducers / Transmitters	Using Absolute Pressure calibrator with Digital Multimeter & Pneumatic Hand Pump by Comparison Method as per DKD-R 6-1	0.2 bar(a) to 7 bar(a)	0.0015 bar(a)
50	MECHANICAL- PRESSURE INDICATING DEVICES	Low Pressure (Pneumatic): Magnehelic gauges / Low Pressure gauges/Low pressure Transmitters and Switches	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	0 mbar to 200 mbar	0.064 mbar





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51	MECHANICAL- PRESSURE INDICATING DEVICES	Negative Pressure: Magnehelic gauges/ Low Pressure gauges/Low pressure Transmitters and switches	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	(-)200 mbar to 0 mbar	0.064 mbar
52	MECHANICAL- PRESSURE INDICATING DEVICES	Negative pressure: Vacuum Gauges, Vacuum Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	(-)0.95 bar to 0 bar	0.0003 bar
53	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure (Hydraulic): Pressure gauges, Pressure Calibrators, Pressure Switches , Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Hydraulic Comparator by Comparison Method DKD R-6-1	0 bar to 200 bar	0.038 bar
54	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure (Hydraulic): Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Hydraulic Comparator by Comparison Method DKD R-6-1	0 bar to 350 bar	0.1 bar





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55	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure (Hydraulic): Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Hydraulic Comparator by Comparison Method DKD R-6-1	0 bar to 70 bar	0.011 bar
56	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure (Hydraulic): Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Hydraulic Comparator by Comparison Method DKD R-6-1	0 bar to 700 bar	0.11 bar
57	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure(Pneumatic) : Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	0 bar to 10 bar	0.0026 bar
58	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure(Pneumatic) : Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	0 bar to 2 bar	0.0005 bar





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59	MECHANICAL- PRESSURE INDICATING DEVICES	Pressure(Pneumatic) : Pressure gauges, Pressure Calibrators, Pressure Switches, Pressure Transmitters	Using Digital Pressure Gauge, Digital Multimeter & Pneumatic Hand Pump by Comparison Method DKD R-6-1	0 bar to 40 bar	0.0096 bar
60	THERMAL- SPECIFIC HEAT & HUMIDITY	Humidity Chamber (Multipositions) @ (10 °C to 95 °C)	Using RTD's and Multichannel Recorder by Wet & Dry Bulb Method	10 %rh to 95 %rh	3.5 %rh
61	THERMAL- SPECIFIC HEAT & HUMIDITY	Humidity Chamber (Multipositions) @ (25 °C to 50 °C)	Using Temperature & Humidity Data Loggers ( minimum 3 Nos) by Comparison Method	10 % rh to 95 % rh	2.0 % rh
62	THERMAL- SPECIFIC HEAT & HUMIDITY	Humidity Chamber (Multipostions) @ (10 %rh to 95 %rh)	Using RTD's and Multichannel Recorder by Wet & Dry Bulb Method	10 °C to 95 °C	0.52 °C
63	THERMAL- SPECIFIC HEAT & HUMIDITY	Humidity Chamber (Multipostions) @ (50% RH)	Using Temperature & Humidity Data Loggers(minimum 3 Nos ) by Comparison Method	10 °C to 60 °C	0.5 °C





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64	THERMAL- SPECIFIC HEAT & HUMIDITY	Thermo Hygrometer, Humidity Transmitter, Humidity Indicator with Sensor @ (10 °C to 60 °C)	Using Humidity Chamber with Digital Temperature & Humidity Indicator with Sensor by Comparison Method	10 %rh to 95 %rh	1.6 %rh
65	THERMAL- SPECIFIC HEAT & HUMIDITY	Thermo Hygrometer, Humidity Transmitter, Humidity Indicator with Sensor @ (50 % rh)	Using Humidity Chamber with Digital Temperature & Humidity Indicator with Sensor and PRT with Indicator by Comparison Method	6 °C to 60 °C	0.29 °C
66	THERMAL- TEMPERATURE	Black Body Source, IR Calibrator	Using Non Contact IR Thermometer (Emissivity: 0.95) by Comparison Method	(-)30 °C to 100 °C	1.2 °C
67	THERMAL- TEMPERATURE	Black Body Source, IR Calibrator	Using Non Contact IR Thermometer (Emissivity: 0.95) by Comparison Method	100 °C to 500 °C	1.8 °C
68	THERMAL- TEMPERATURE	Deep Freezers, Refrigerators, Chambers (Multi- Position)	Using Standard RTD's with Data Logger By Comparison Method	(-)80 °C to 25 °C	0.78 °C
69	THERMAL- TEMPERATURE	Incubators, Autoclaves(Non- Medical purpose), Chambers, Oven (Multi-Position)	Using Standard RTD's with Data Logger (minimum three No's)By Comparison Method	25 °C to 300 °C	0.75 °C





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70	THERMAL- TEMPERATURE	Indicator with Sensor of Temperature Bath, Temperature Calibrator, Oven, Furnace (Single Position)	Using Standard PRT with Indicator By Comparison Method	200 °C to 500 °C	0.14 °C
71	THERMAL- TEMPERATURE	Indicator with Sensor of Deep Freezers, Refrigerators,Tempe rature Bath, Temperature Calibrator, Temperature Chambers (Single Position)	Using Standard PRT with Indicator By Comparison Method	(-)80 °C to 25 °C	0.152 °C
72	THERMAL- TEMPERATURE	Indicator with Sensor of Incubators, Autoclaves(Non- Medical purpose), Temperature Bath, Temperature Calibrator, Temperature Chambers, Oven (Single Position)	Using Standard PRT with Indicator By Comparison Method	25 °C to 200 °C	0.13 °C





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73	THERMAL- TEMPERATURE	Indicator with Sensor of Temperature Bath, Temperature Calibrator, Furnace (Single Position)	Using Standard 'S' type thermocouple with Indicator By Comparison Method	500 °C to 1200 °C	2.0 °C
74	THERMAL- TEMPERATURE	Infrared, Non- Contact Thermometer, Pyrometer, Thermal Imager (Temp. only)	Using Non-Contact IR Thermometer (Emissivity: 0.95) and Black Body Source By Comparison Method	(-)20 °C to 50 °C	1.57 °C
75	THERMAL- TEMPERATURE	Infrared, Non- Contact Thermometer, Pyrometer, Thermal Imager (Temp. only)	Using Non-Contact IR Thermometer (Emissivity: 0.95) and Black Body Source By Comparison Method	50 °C to 500 °C	2.11 °C
76	THERMAL- TEMPERATURE	Oven, Furnace (Multi-Position)	Using Standard 'N' Type Thermocouples with Data Logger By Comparison Method	300 °C to 1000 °C	3.2 °C





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77	THERMAL- TEMPERATURE	RTD with /without indicator, Thermocouple with/without indicator, Temperature Gauges,Temperatur e Transmitter with/without indicator	Using Standard PRT with Indicator and Dry Temperature Bath and 6.5 digit DMM By Comparison Method	(-)30 °C to 100 °C	0.11 °C
78	THERMAL- TEMPERATURE	RTD with /without indicator, Thermocouple with/without indicator, Temperature Gauges,Temperatur e Transmitter with/without indicator	Using Standard PRT with Indicator and Dry Temperature Bath and 6.5 digit DMM By Comparison Method	100 °C to 650 °C	0.13 °C
79	THERMAL- TEMPERATURE	Thermocouple with/without indicator, Temperature Transmitter with/without indicator	Using Standard 'S' Type Thermocouple with Indicator and Dry Temperature Bath and DMM By Comparison Method	650 °C to 1200 °C	1.92 °C

<sup>\*</sup> CMCs represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k = 2.