



# National Accreditation Board for Testing and Calibration Laboratories

(A Constituent Board of Quality Council of India)



## SCOPE OF ACCREDITATION

Laboratory Name SHRIRAM INSTITUTE FOR INDUSTRIAL RESEARCH, 14 & 15 SADAR MANGALA INDUSTRIAL AREA, BENGALURU, KARNATAKA, INDIA

Accreditation Standard ISO/IEC 17025:2005

Certificate Number CC-2083 Page No. : 1 / 17

Validity 13/01/2019 to 12/01/2021 Last Amended on 21/01/2019

'In view of the transition deadline for ISO/IEC 17025:2017, the validity of this accreditation certificate will cease on 30.11.2020.'

S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability( $\pm$ )	Remarks
<b>Permanent Facility</b>					
1	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / J TYPE Thermocouple	-100 °C to 700 °C	0.12 °C to 0.20 °C	Using Multifunction calibrator by Direct Method
2	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / K TYPE Thermocouple	-100 °C to 1300 °C	0.70 °C to 0.29 °C	Using Multifunction Calibrator by Direct Method
3	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / N TYPE Thermocouple	200 °C to 1200 °C	0.12 °C to 0.26 °C	Using multifunction Calibrator by Direct Method
4	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / R TYPE Thermocouple	100 °C to 1700 °C	0.44 °C to 0.49 °C	Using multifunction calibrator by Direct Method
5	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / S TYPE Thermocouple	200 °C to 1700 °C	0.44 °C to 0.55 °C	Using Multifunction Calibrator by Direct Method
6	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / T TYPE Thermocouple	-100 m°C to 400 °C	0.16 °C to 0.20°C	Using Multifunction Calibrator by Direct Method



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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability( $\pm$ )	Remarks
7	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator RTD	-100 °C to 700 °C	0.14 °C to 0.26 °C	Using Multifunction Calibrator by Direct Method
8	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source)	Temperature Indicator N Type	200 °C to 1200 °C	0.13 °C to 0.29 °C	Using multi function calibrator by Direct Method
9	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source)	Temperature Indicators K TYPE	-100 °C to 1300 °C	0.70 °C to 0.30 °C	Using Multifunction calibrator by Direct Method
10	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source)	Temperature Indicators RTD	-100 °C °C to 700 °C	0.1 °C to 0.17 °C	Using Multi function calibrator CALYSYS 50 & Direct Method
11	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source,Measure)	Temperature Indicator R Type	100 °C to 1700 °C	0.59 °C to 0.49 °C	Using Multifunction Calibrator by Direct method
12	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source,Measure)	Temperature Indicator S Type	100 °C to 1700 °C	0.46 °C	Using Multifunction Calibrator by Direct Method



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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability( $\pm$ )	Remarks
13	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source,Measure)	Temperature Indicators J TYPE	-100 °C to 700 °C	0.12 °C to 0.20 °C	Using Multifunction calibrator by Direct Method
14	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source,Measure)	Temperature Indicators T TYPE	-100 °C to 400 °C	0.15 °C to 0.19 °C	Using Multi function Calibrator by Direct Method
15	ELECTRO-TECHNICAL- TIME & FREQUENCY (Measure)	Time/Digital Timer ,Analog and Digital Stop watches	5 s to 9900 s	0.13s to 5.8s	Using Time Totalizer by Comparison method
16	MECHANICAL-DENSITY AND VISCOSITY	VISCOSITY/ Ford Cup and Flow Cup	10 cSt to 220 cSt	0.9 %	Using Standard Oil as per IS 3944 and ASTM D1200
17	MECHANICAL-DENSITY AND VISCOSITY	VISCOSITY/ Ford Cup and Flow Cup	220 cSt to 1200 cSt	1.1%	Using Dynamic /Absolute Viscosity of the standard oil is compared with digital output of the viscometer as per ISO 2555 & ISO 1652
18	MECHANICAL-DENSITY AND VISCOSITY	VISCOSITY/Rotational Viscometer	10 cp to 200 cp	0.2 % to 1.0 %	Using Dynamic /Absolute Viscosity of the standard oil is compared with digital output of the viscometer as per ISO 2555 & ISO 1652



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Certificate Number CC-2083 Page No. : 4 / 17

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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability(±)	Remarks
19	MECHANICAL-DENSITY AND VISCOSITY	VISCOSITY/Rotational Viscometer	100 cp to 1000 cp	0.2 % to 0.25 %	Using Dynamic /Absolute Viscosity of the standard oil is compared with digital output of the viscometer as per ISO 2555 & ISO 1652
20	MECHANICAL-DENSITY AND VISCOSITY	VISCOSITY/Rotational Viscometer	1000 cp to 15000 cp	0.25 % to 0.3 %	Using Dynamic /Absolute Viscosity of the standard oil is compared with digital output of the viscometer as per ISO 2555 & ISO 1652
21	MECHANICAL-DENSITY AND VISCOSITY	VISCOSITY/Rotational Viscometer	15000 cp to 72000 cp	0.3 %	Using Dynamic /Absolute Viscosity of the standard oil is compared with digital output of the viscometer as per ISO 2555 & ISO 1652
22	MECHANICAL-PRESSURE INDICATING DEVICES	Negative Pressure ( Pneumatic) /Analog and Digital Pressure Gauges/Transducer /Transmitters	-0.70 bar to 0.0 bar	0.9% of rdg	Using Pneumatic calibrator /comparison method and DKD R 6-2
23	MECHANICAL-PRESSURE INDICATING DEVICES	Pressure ( Pneumatic) /Analog and Digital Pressure Gauges/Transducer /Transmitters	0.0 bar to 20 bar	0.16% of rdg	Using Pneumatic Calibrator by comparison method and DKD R 6-1



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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability(±)	Remarks
24	MECHANICAL-PRESSURE INDICATING DEVICES	Pressure (Hydraulic)/ Analog and Digital Pressure Gauges/ Transducer /Transmitters	1 bar to 60 bar	0.03% of rdg	Using Hydraulic Dead weight Tester by Direct method and DKD R 6-1
25	MECHANICAL-PRESSURE INDICATING DEVICES	Pressure (Hydraulic)/Analog and Digital Pressure gauges /Transducers and Transmitters	60 bar to 700 bar	0.07% of rdg	Using Hydraulic Dead weight Tester by Direct method and DKD R 6-1
26	MECHANICAL-VOLUME	Glass Burette	0.1 ml to 50 ml	0.31 µl	Using Precision balance upto 200 g / Readability 0.01 mg & Distilled water of known density as per ISO 4787 & ISO/TR 20461
27	MECHANICAL-VOLUME	Glass Pipette	0.1 ml to 10 ml	0.28µl	Using Precision balance upto 200 g / Readability 0.01 mg & Distilled water of known density as per ISO 4787 & ISO/TR 20461
28	MECHANICAL-VOLUME	Glass Pipette	10 ml to 50 ml	0.31 µl	Using Precision balance upto 200 g / Readability 0.01 mg & Distilled water of known density as per ISO 4787 & ISO/TR 20461



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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability( $\pm$ )	Remarks
29	MECHANICAL-VOLUME	Volume / Measuring cylinder,Voimetric Flask,Conical Flask/Beaker	100 ml to 500 ml	60 $\mu$ l	Using Precision Balance upto 200 g/ Readability 0.01 mg & Distilled water of known density as per ISO 4787 & ISO/TR 20461
30	MECHANICAL-VOLUME	Volume / Measuring cylinder,Voimetric Flask,Conical Flask/Beaker	5 ml to 100 ml	12 $\mu$ l	Using Precision Balance upto 200 g/ Readability 0.01 mg & Distilled water of known density as per ISO 4787 & ISO/TR 20461
31	MECHANICAL-VOLUME	Volume / Measuring cylinder,Voimetric Flask,Conical Flask/Beaker	500 ml to 1000 ml	150 $\mu$ l	Using Precision balance upto 200 g / Readability 0.01 mg ,Analytical Balance 0 to 1200 g /1 mg readability,Digital Balance 0 to 4200 g/ 10 mg readability & Distilled water of known density as per ISO 4787 & ISO/TR 20461
32	MECHANICAL-VOLUME	Volume/ Micro pipette	10 $\mu$ l to 1000 $\mu$ l	0.28 $\mu$ l	Using Precision Balance upto 200 g/ Readability 0.01 mg & Distilled water of known density as per ISO 4787 & ISO/TR 20461





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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability(±)	Remarks
33	MECHANICAL-VOLUME	Volume/ Micro pipette	1000 µl to 5000 µl	0.28µl	Using Precision Balance upto 200 g /Readability 0.01 mg & Distilled water of known density as per ISO 4787 & ISO/TR 20461
34	MECHANICAL-WEIGHTS	Weights ( F1 class & Coarser )	1000 g	1.3mg	Using E2 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111
35	MECHANICAL-WEIGHTS	Weights ( F1 class & Coarser )	20 mg to 200 mg	0.03mg	Using E1 CLASS & E2 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111
36	MECHANICAL-WEIGHTS	Weights ( F1 class & Coarser )	200 g	1mg	Using E1 CLASS & E2 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111



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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability( $\pm$ )	Remarks
37	MECHANICAL-WEIGHTS	Weights ( F1 class & Coarser )	5 g	0.06mg	Using E1 CLASS & E2 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111
38	MECHANICAL-WEIGHTS	Weights ( F1 class & Coarser )	500 g	1mg	Using E2 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111
39	MECHANICAL-WEIGHTS	Weights ( F1 class & Coarser )	500 mg to 1g	0.04mg	Using E1 CLASS & E2 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111
40	MECHANICAL-WEIGHTS	Weights ( F2 class & Coarser )	1 mg to 10 mg	0.02mg	Using E1 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111





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Certificate Number CC-2083 Page No. : 9 / 17

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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability( $\pm$ )	Remarks
41	MECHANICAL-WEIGHTS	Weights ( F2 class & Coarser )	10 g	0.09mg	Using E1 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111
42	MECHANICAL-WEIGHTS	Weights ( F2 class & Coarser )	100 g	0.51mg	Using E1 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111
43	MECHANICAL-WEIGHTS	Weights ( F2 class & Coarser )	2 g	0.05mg	Using E1 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111
44	MECHANICAL-WEIGHTS	Weights ( F2 class & Coarser )	20 g	0.15mg	Using E1 CLASS & E2 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111



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Certificate Number CC-2083 Page No. : 10 / 17

Validity 13/01/2019 to 12/01/2021 Last Amended on 21/01/2019

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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability(±)	Remarks
45	MECHANICAL-WEIGHTS	Weights ( F2 class & Coarser )	50 g	0.27mg	Using E1 CLASS WEIGHTS and Precision Balance and Analytical Balance/Substitution method and as per ABBA weighing cycle as per OIML R-111
46	THERMAL- SPECIFIC HEAT & HUMIDITY	Humidity (Temperature & Humidity Indicators, Thermo Hygrometers, Data loggers)	15 % RH @25°C to 95 % RH @ 25°C	1.1% RH	Using Temperature & Humidity Indicator & Temperature & Humidity generator by comparison method
47	THERMAL- SPECIFIC HEAT & HUMIDITY	Temperature (Temperature & Humidity Indicators, Thermo hygrometers and Data loggers)	6 °C @ 60% RH to 50 °C @ 60% RH	0.3°C	Digital Temperature & Humidity Indicator and Temperature & humidity generator by comparison method
48	THERMAL-TEMPERATURE	Temperature/PRT, RTD'S /Thermocouples with & without indicators	300 °C to 600 °C	0.5°C	Using PRT with Digital Temperature Indicator ,Dry baths by comparison method
49	THERMAL-TEMPERATURE	Temperature/PRT, RTD'S /Thermocouples with & without indicators	600 °C to 1200 °C	2.1°C	Using S Type Thermocouple with Digital Temperature Indicator and furnace by comparison method
50	THERMAL-TEMPERATURE	Temperature/PRT, RTD'S /Thermocouples with & without indicators/ Glass Thermometers	-80 °C to 50 °C	0.1°C	Using PRT with Digital Temperature Indicator.& liquid baths by comparison method



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Certificate Number CC-2083 Page No. : 11 / 17

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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability(±)	Remarks
51	THERMAL- TEMPERATURE	Temperature/PRT, RTD'S /Thermocouples with & without indicators/Glass Thermometers	50 °C to 300 °C	0.1°C	Using PRT with Digital Temperature Indicator dry & liquid baths by comparison method



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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability(±)	Remarks
<b>Site Facility</b>					
1	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / J TYPE Thermocouple	-100 °C to 700 °C	0.12 °C to 0.20 °C	Using Multifunction calibrator by Direct Method
2	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / K TYPE Thermocouple	-100 °C to 1300 °C	0.70 °C to 0.29 °C	Using Multifunction Calibrator by Direct Method
3	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / N TYPE Thermocouple	200 °C to 1200 °C	0.12 °C to 0.26 °C	Using multifunction Calibrator by Direct Method
4	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / R TYPE Thermocouple	100 °C to 1700 °C	0.44 °C to 0.49 °C	Using multifunction calibrator by Direct Method
5	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / S TYPE Thermocouple	200 °C to 1700 °C	0.44 °C to 0.55 °C	Using Multifunction Calibrator by Direct Method
6	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator / T TYPE Thermocouple	-100 m°C to 400 °C	0.16 °C to 0.20°C	Using Multifunction Calibrator by Direct Method



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7	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Measure)	Temperature Indicator RTD	-100 °C to 700 °C	0.14 °C to 0.26 °C	Using Multifunction Calibrator by Direct Method
8	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source)	Temperature Indicator N Type	200 °C to 1200 °C	0.13 °C to 0.29 °C	Using multi function calibrator by Direct Method
9	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source)	Temperature Indicators K TYPE	-100 °C to 1300 °C	0.70 °C to 0.30 °C	Using Multifunction calibrator by Direct Method
10	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source)	Temperature Indicators RTD	-100 °C °C to 700 °C	0.1 °C to 0.17 °C	Using Multi function calibrator CALYSYS 50 & Direct Method
11	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source,Measure)	Temperature Indicator R Type	100 °C to 1700 °C	0.59 °C to 0.49 °C	Using Multifunction Calibrator by Direct method
12	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source,Measure)	Temperature Indicator S Type	100 °C to 1700 °C	0.46 °C	Using Multifunction Calibrator by Direct Method



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14	ELECTRO-TECHNICAL-TEMPERATURE SIMULATION (Source,Measure)	Temperature Indicators T TYPE	-100 °C to 400 °C	0.15 °C to 0.19 °C	Using Multi function Calibrator by Direct Method
15	ELECTRO-TECHNICAL- TIME & FREQUENCY (Measure)	Time/Digital Timer ,Analog and Digital Stop watches	5 s to 9900 s	0.13s to 5.8s	Using Time Totalizer by Comparison method
16	MECHANICAL-ACCELERATION AND SPEED	SPEED - NON CONTACT( Centrifuges,Lab shifter, Sedimentation shaker &Sieve Shaker)	100 RPM to 25000 RPM	5.8 RPM to 61 RPM	USING Digital Tachometer by comparison method
17	MECHANICAL-PRESSURE INDICATING DEVICES	Negative Pressure ( Pneumatic) /Analog and Digital Pressure Gauges/Transducer /Transmitters	-0.70 bar to 0.0 bar	0.9% of rdg	Using Pneumatic calibrator /comparison method and DKD R 6-2
18	MECHANICAL-PRESSURE INDICATING DEVICES	Pressure ( Pneumatic) /Analog and Digital Pressure Gauges/Transducer /Transmitters	0.0 bar to 20 bar	0.16% of rdg	Using Pneumatic Calibrator by comparison method and DKD R 6-1





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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability(±)	Remarks
19	MECHANICAL-WEIGHING SCALE AND BALANCE	WEIGHING BALANCE <sub>d</sub> =0.001mg	0 g to 20 g	0.005mg	USING E1 CLASS, E2 CLASS AND F1 CLASS Based on OIML R-76 & Lab 14
20	MECHANICAL-WEIGHING SCALE AND BALANCE	WEIGHING BALANCE <sub>Sd</sub> = 0.01 mg	0 g to 200 g	0.05mg	USING E1 CLASS, E2 CLASS AND F1 CLASS Based on OIML R-76 & Lab 14
21	MECHANICAL-WEIGHING SCALE AND BALANCE	WEIGHING BALANCE <sub>Sd</sub> = 0.1 mg	0 g to 200 g	0.13mg	USING E1 CLASS, E2 CLASS AND F1 CLASS Based on OIML R-76 & Lab 14
22	MECHANICAL-WEIGHING SCALE AND BALANCE	WEIGHING BALANCE <sub>Sd</sub> =1 g	0 kg to 20 kg	44mg	USING E2 CLASS, F1 CLASS & M1 CLASS Based on OIML R-76 & Lab 14
23	MECHANICAL-WEIGHING SCALE AND BALANCE	WEIGHING BALANCE <sub>Sd</sub> =1 mg	0 kg to 1 kg	1mg	USING E1 CLASS, E2 CLASS AND F1 CLASS Based on OIML R-76 & Lab 14
24	MECHANICAL-WEIGHING SCALE AND BALANCE	WEIGHING BALANCE <sub>Sd</sub> =10 g	0 kg to 150 kg	3.3g	USING F1 CLASS & M1 CLASS Based on OIML R-76 & Lab 14
25	MECHANICAL-WEIGHING SCALE AND BALANCE	WEIGHING BALANCE <sub>Sd</sub> =10 mg	0 kg to 5 kg	15 mg	USING E1 CLASS, E2 CLASS AND F1 CLASS Based on OIML R-76 & Lab 14
26	MECHANICAL-WEIGHING SCALE AND BALANCE	WEIGHING BALANCE <sub>Sd</sub> =100 mg	0 kg to 5 kg	35mg	USING E1 CLASS, E2 CLASS AND F1 CLASS Based on OIML R-76 & Lab 14



# National Accreditation Board for Testing and Calibration Laboratories

(A Constituent Board of Quality Council of India)



## SCOPE OF ACCREDITATION

Laboratory Name SHRIRAM INSTITUTE FOR INDUSTRIAL RESEARCH, 14 & 15 SADAR MANGALA INDUSTRIAL AREA, BENGALURU, KARNATAKA, INDIA

Accreditation Standard ISO/IEC 17025:2005

Certificate Number CC-2083 Page No. : 16 / 17

Validity 13/01/2019 to 12/01/2021 Last Amended on 21/01/2019

'In view of the transition deadline for ISO/IEC 17025:2017, the validity of this accreditation certificate will cease on 30.11.2020.'

S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability(±)	Remarks
27	THERMAL- SPECIFIC HEAT & HUMIDITY	Humidity (Temperature & Humidity Indicators, Thermo Hygrometers, Data loggers)	15 % RH @25°C to 95 % RH @ 25°C	1.1% RH	Using Temperature & Humidity Indicator & Temperature & Humidity generator by comparison method
28	THERMAL- SPECIFIC HEAT & HUMIDITY	Indicator of HUMIDITY chamber (Humidity chambers -Center of the chamber)	20 % RH @25°C to 95 % RH @25°C	0.8% RH	Using Temperature & Humidity Indicator by comparison method
29	THERMAL- TEMPERATURE	Indicator of Furnace Single Point	100 °C to 1200 °C	1.7°C	Using S Type Thermocouple with Digital Indicator by comparison method
30	THERMAL- TEMPERATURE	Temperature (Oven, Thermal chambers, Deep Freezers, Incubator, Auto clave -Spatial mapping)	-80 °C to 300 °C	0.74°C	Using PT 100 with Paperless recorder by comparison method
31	THERMAL- TEMPERATURE	Thermocouple	100 °C to 300 °C	0.5°C	Using PRT with Digital Indicator & dry well block by comparison method
32	THERMAL- TEMPERATURE	Thermocouple	200 °C to 800 °C	1.3°C	Using S Type Thermocouple with Digital Temperature Indicator & Dry well block (furnace) by comparison method.



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S.No	Discipline / Group	Quantity Measured/ Instrument	Range / Frequency	* Calibration Measurement Capability( $\pm$ )	Remarks
33	THERMAL- TEMPERATURE	Thermocouple	800 °C to 1200 °C	2.2°C	Using S Type Thermocouple with Digital Temperature Indicator & Dry well block (furnace) by comparison method