

Laboratory Choksi Laboratories Limited, 6/3, Manoramaganj, Indore, Madhya Pradesh

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2089

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Validity 03.12.2018 to 02.12.2020

Last Amended on -

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

| Sl.                                         | Quantity Measured / Instrument | Range/Frequency                                                                                                                                                      | *Calibration Measurement Capability ( $\pm$ )                                                           | Remarks                                                              |
|---------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b><u>ELECTRO-TECHNICAL CALIBRATION</u></b> |                                |                                                                                                                                                                      |                                                                                                         |                                                                      |
| I.                                          | SOURCE                         |                                                                                                                                                                      |                                                                                                         |                                                                      |
|                                             |                                | 0.1 mV to 1 mV<br>1 mV to 50 mV<br>50 mV to 300 mV<br>300 mV to 1000 V                                                                                               | 7.66 % to 0.60 %<br>0.60 % to 0.018 %<br>0.018 % to 0.004 %<br>0.004 % to 0.007 %                       | Using Multifunction Calibrator, Fluke 5520A by Direct Method         |
|                                             |                                | 1 mV to 50 mV<br>50 mV to 1 V<br>1 V to 30 V                                                                                                                         | 1.89 % to 0.06 %<br>0.06 % to 0.04 %<br>0.04 % to 0.06 %                                                | Using Multifunction Handy Calibrator, Yokogawa CA71 by Direct Method |
|                                             |                                | 10 $\mu$ A to 100 $\mu$ A<br>100 $\mu$ A to 3 mA<br>3 mA to 3 A<br>3 A to 10 A<br>20 A to 1000 A                                                                     | 0.253 % to 0.048 %<br>0.048 % to 0.016 %<br>0.016 % to 0.097 %<br>0.097 % to 0.08 %<br>1.22 % to 0.08 % | Using Multifunction Calibrator, Fluke 5520A by Direct Method         |
|                                             |                                | 1 mA to 20 mA                                                                                                                                                        | 0.39 % to 0.05 %                                                                                        | Using Multifunction Handy Calibrator, Yokogawa CA71 by Direct Method |
|                                             |                                | 10 $\Omega$ to 100 $\Omega$<br>100 $\Omega$ to 1 M $\Omega$<br>1 M $\Omega$ to 10 M $\Omega$<br>10 M $\Omega$ to 100 M $\Omega$<br>100 M $\Omega$ to 1100 M $\Omega$ | 0.016 % to 0.005 %<br>0.005 %<br>0.005 % to 0.018 %<br>0.018 % to 0.106 %<br>0.106 % to 1.8 %           | Using Multifunction Calibrator, Fluke 5520A by Direct Method         |
|                                             |                                | 3 $\Omega$ to 400 $\Omega$                                                                                                                                           | 0.46 % to 0.01 %                                                                                        | Using Multifunction Handy Calibrator, Yokogawa CA71 by Direct Method |

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Program Manager

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|-----|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| 4.  | AC Voltage #                   | <b>10 kHz to 100 kHz</b><br>300 mV to 3 V<br><b>1 kHz to 10 kHz</b><br>300 mV to 300 V<br>300 V to 1000 V<br><b>50 Hz to 1 kHz</b><br>10 mV to 300 mV<br>300 mV to 300 V<br>300 V to 1000 V | 0.17 %<br><br>0.09 % to 0.02 %<br>0.13 % to 0.04 %<br><br>0.125 % to 0.02 %<br>0.02 % to 0.023 %<br>0.023 % to 0.037 % | Using Multifunction Calibrator, Fluke 5520A by Direct Method         |
|     |                                | <b>1 kHz to 5 kHz</b><br>3 mA to 3 A<br><b>50 Hz to 1 kHz</b><br>30 $\mu$ A to 3 mA<br>3 mA to 3 A<br>3 A to 20 A                                                                           | 0.13 % to 0.22 %<br><br>0.96 % to 0.13 %<br>0.13 % to 0.22 %<br>0.22 % to 0.15 %                                       | Using Multifunction Calibrator, Fluke 5520A by Direct Method         |
|     |                                | <b>50 Hz</b><br>20 A to 1000 A                                                                                                                                                              | 1.21 % to 0.11 %                                                                                                       | Using Multifunction Calibrator, Fluke 5520A with Current Coil        |
|     |                                | 3 Hz to 10 Hz<br>10 Hz to 1 MHz                                                                                                                                                             | 2.52 % to 0.58 %<br>0.58 %                                                                                             | Using Multifunction Calibrator, Fluke 5520A By Direct Method         |
|     |                                | 50 Hz to 1000 Hz<br>1 kHz to 10 kHz                                                                                                                                                         | 0.46 % to 0.12 %<br>0.12 % to 1.15 %                                                                                   | Using Multifunction Handy Calibrator, Yokogawa CA71 by Direct Method |
| 7.  | Capacitance #                  | <b>100 Hz</b><br>10.9 $\mu$ F to 100 mF<br><b>1 kHz</b><br>300 pF to 7 $\mu$ F                                                                                                              | 0.44 % to 1.57 %<br><br>4.44 % to 0.47 %                                                                               | Using Multifunction Calibrator, Fluke 5520A By Direct Method         |

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|-----|------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------|
| 8.  | AC Power #                                                             | 50 Hz @ 0.1PF<br>120/240V, 10 A to 20 A<br>120 W to 480 W   | 2.19 % to 0.62 %                              | Using Multifunction Calibrator, Fluke 5520A With Power Option |
|     |                                                                        | 50 Hz @ 0.2PF<br>120/240V, 5 A to 20 A<br>120 W to 960 W    | 2.13 % to 0.791 %                             |                                                               |
|     |                                                                        | 50 Hz @ 0.8PF<br>120/240V, 2.5 A to 20 A<br>240 W to 3840 W | 2.01 % to 0.522 %                             |                                                               |
|     |                                                                        | 50 Hz @ UPF 120/240V,<br>2 A to 20 A<br>240 W to 4800 W     | 2.6 % to 0.786 %                              |                                                               |
|     |                                                                        | AC Vertical Deflection<br>@ 1 kHz<br>12 mV to 35 V          | 0.78 %                                        |                                                               |
|     |                                                                        | Bandwidth<br>250 MHz                                        | 4.95 %                                        |                                                               |
|     |                                                                        | DC Vertical Deflection<br>1.25 mV to 33 V                   | 2.92 % to 0.184 %                             |                                                               |
|     |                                                                        | Horizontal Deflection –<br>Time Base<br>10 nSec to 1 Sec    | 0.157 % to 0.14 %                             |                                                               |
|     | Temperature Simulation#<br>(Temperature Indicator/Controller/Recorder) |                                                             |                                               | Using Multifunction Calibrator, Fluke 5520A by Direct Method  |
|     | RTD                                                                    | (-) 200 °C to 800 °C                                        | 0.09 °C to 0.28 °C                            |                                                               |
|     | B Type T/C                                                             | 600 °C to 1800 °C                                           | 2.5 °C to 2.7 °C                              |                                                               |
|     | E Type T/C                                                             | (-) 200 °C to 1000 °C                                       | 1.2 °C to 0.8 °C                              |                                                               |
|     | J Type T/C                                                             | (-) 200 °C to 1200 °C                                       | 0.29 °C to 0.34 °C                            |                                                               |
|     | K Type T/C                                                             | (-) 200 °C to 1370 °C                                       | 0.3 °C to 0.5 °C                              |                                                               |
|     | N Type T/C                                                             | (-) 200 °C to 900 °C                                        | 1.4 °C to 1.6 °C                              |                                                               |
|     | S Type T/C                                                             | 0 °C to 1750 °C                                             | 0.82 °C to 0.95 °C                            |                                                               |
|     | T Type T/C                                                             | (-) 200 °C to 400 °C                                        | 1.2 °C to 0.7 °C                              |                                                               |

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| Sl.        | Quantity Measured / Instrument | Range/Frequency                                                                     | *Calibration Measurement Capability ( $\pm$ )                                                          | Remarks                                                              |
|------------|--------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
|            | R Type T/C                     | 0 °C to 1700 °C                                                                     | 2.9 °C to 3.3 °C                                                                                       | Using Multifunction Handy Calibrator, Yokogawa CA71 by Direct Method |
| <b>II.</b> | <b>MEASURE</b>                 |                                                                                     |                                                                                                        |                                                                      |
| <b>1.</b>  | DC Voltage <sup>\$</sup>       | 0.1 mV to 1 mV<br>1 mV to 100 mV<br>100 mV to 100 V<br>100 V to 1000 V              | 0.76 % to 0.10 %<br>0.8 % to 0.01 %<br>0.01 %<br>0.01 %                                                | Using 6½ Digital Precision Fluke Multimeter 8846A by Direct Method   |
| <b>2.</b>  | DC Voltage <sup>#</sup>        | 1 mV to 10 mV<br>10 mV to 100 mV<br>100 mV to 1 V<br>1 V to 100 V                   | 2.41 % to 0.27 %<br>0.27 % to 0.05 %<br>0.05 %<br>0.05 % to 0.08 %                                     | Using Multifunction Handy Calibrator, Yokogawa CA71 by Direct Method |
| <b>3.</b>  | DC Current <sup>\$</sup>       | 10 µA to 100 µA<br>100 µA to 400 mA<br>400 mA to 3 A<br>3 A to 10 A                 | 0.36 % to 0.09 %<br>0.09 % to 0.06 %<br>0.06 % to 0.15 %<br>0.15 % to 0.18 %                           | Using 6½ Digital Precision Fluke Multimeter 8846A by Direct Method   |
| <b>4.</b>  | DC Current <sup>#</sup>        | 1mA to 20 mA                                                                        | 0.5% to 0.05%                                                                                          | Using Multifunction Calibrator by Direct Method                      |
| <b>5.</b>  | DC Resistance <sup>\$</sup>    | 1 Ω to 100 Ω<br>100 Ω to 1 MΩ<br>1 MΩ to 10 MΩ<br>10 MΩ to 100 MΩ<br>100 MΩ to 1 GΩ | 0.40 % to 0.017 %<br>0.017 % to 0.013 %<br>0.013 % to 0.048 %<br>0.048 % to 0.94 %<br>0.94 % to 2.35 % | Using 6 ½ Digital Precision Fluke Multimeter 8846A by Direct Method  |
| <b>6.</b>  | DC Resistance <sup>#</sup>     | 1 Ω to 400 Ω                                                                        | 1.21 % to 0.12 %                                                                                       | Using Multifunction Handy Calibrator, Yokogawa CA71 by Direct Method |

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| Sl. | Quantity Measured / Instrument | Range/Frequency                                                       | *Calibration Measurement Capability ( $\pm$ )            | Remarks                                                                |
|-----|--------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------|
| 7.  | AC Voltage <sup>\$</sup>       | 50 Hz to 1 kHz<br>1 mV to 50 mV<br>50 mV to 100 V<br>100 V to 1000 V  | 1.2 % to 0.12 %<br>0.12 % to 0.1 %<br>0.1 %              | Using 6½ Digital Precision Fluke Multimeter 8846A by Direct Method     |
|     |                                | 1 kHz<br>1 V to 100 V                                                 | 1.16 %                                                   |                                                                        |
|     |                                | 50 Hz<br>0.1 V to 1 V<br>1 V to 100 V                                 | 6.35 % to 1.15 %<br>1.15 % to 1.16 %                     |                                                                        |
| 9.  | AC Current <sup>\$</sup>       | 50 Hz to 1 kHz<br>10 µA to 50 µA<br>50 µA to 1 A<br>1 A to 10 A       | 0.32 % to 0.16 %<br>0.16 % to 0.26 %<br>0.26 % to 0.27 % | Using 6½ Digital Precision Fluke Multimeter 8846A by Direct Method     |
| 10. | Frequency <sup>\$</sup>        | 10 Hz to 1 MHz                                                        | 0.09 % to 0.014 %                                        | Using 6½ Digital Precision Fluke Multimeter 8846A by Direct Method     |
| 11. | Capacitance <sup>\$</sup>      | 1 nF to 10 nF<br>10 nF to 3 mF                                        | 5.28 % to 1.83 %<br>1.83 % to 3.63 %                     | Using 6 ½ Digital Precision Fluke Multimeter 8846A by Direct Method    |
| 12. | Time <sup>#</sup>              | 1 s to 60 s<br>60 s to 30 min.<br>30 min. to 2 hr.<br>2 hr. to 24 hr. | 0.24 s<br>0.24 s<br>0.24 Sec to 0.6 Sec<br>0.6 Sec       | Using Digital Time Interval Meter, Beltronics 501 by Comparison Method |

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|-----|------------------------------------------------------------------------------------|----------------------|-----------------------------------------------|-------------------------------------------------------------------------------|
| 13. | Temperature Simulation <sup>#</sup><br>(Temperature Indicator/Controller/Recorder) |                      |                                               |                                                                               |
|     | RTD                                                                                | (-) 200 °C to 800 °C | 1.3 °C                                        | Using Multifunction<br>Handy Calibrator,<br>Yokogawa CA71<br>by Direct Method |
|     | B Type T/C                                                                         | 600 °C to 1800 °C    | 4.55 °C                                       |                                                                               |
|     | E Type T/C                                                                         | (-)200 °C to 1000 °C | 2.44 °C                                       |                                                                               |
|     | J Type T/C                                                                         | (-)200 °C to 1200 °C | 3.39 °C                                       |                                                                               |
|     | K Type T/C                                                                         | (-)200 °C to 1200 °C | 2.43 °C                                       |                                                                               |
|     | L Type T/C                                                                         | (-)200 °C to 900 °C  | 2.51 °C                                       |                                                                               |
|     | N Type T/C                                                                         | (-)200 °C to 900 °C  | 2.51 °C                                       |                                                                               |
|     | R Type T/C                                                                         | 0 °C to 1700 °C      | 3.55 °C                                       |                                                                               |
|     | S Type T/C                                                                         | 0 °C to 1700 °C      | 3.52 °C                                       |                                                                               |
|     | T Type T/C                                                                         | (-)200 °C to 400 °C  | 2.5 °C                                        |                                                                               |
|     | U Type T/C                                                                         | (-)200 °C to 400 °C  | 2.51 °C                                       |                                                                               |

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|--------------------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------|----------------------------------------------------------------|
| <b><u>MECHANICAL CALIBRATION</u></b> |                                                                                                                     |                                     |                                               |                                                                |
| <b>I.</b>                            | <b>DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)</b>                                                           |                                     |                                               |                                                                |
| <b>1.</b>                            | Bore Gauge <sup>\$</sup><br>L.C. : 0.001 mm                                                                         | 0 mm to 1 mm<br>(Transmission Only) | 0.44 $\mu$ m                                  | Using Octagon LMM 300 T and Electronic Dial Calibration Tester |
| <b>2.</b>                            | Cylindrical Setting Master, O.D. Gauge <sup>\$</sup><br>(Only Diameter)                                             | 3 mm to 150 mm                      | 2.7 $\mu$ m                                   | Using Octagon LMM 300 T                                        |
| <b>3.</b>                            | Depth Micrometer <sup>\$</sup><br>L.C.: 0.01 mm                                                                     | 0 mm to 200 mm                      | 8 $\mu$ m                                     | Using Slip Gauge Set                                           |
| <b>4.</b>                            | Dial Indicator (Lever) <sup>\$</sup><br>L.C.: 0.001 mm                                                              | 0 mm to 0.8 mm                      | 5.8 $\mu$ m                                   | Using Electronic dial calibration tester                       |
| <b>5.</b>                            | Dial Thickness Gauge, Inside / Outside Dial Caliper, Pistol Caliper <sup>\$</sup><br>L.C.: 0.01 mm<br>L.C.: 0.01 mm | 0 mm to 10 mm<br>0 mm to 100 mm     | 8 $\mu$ m<br>8.2 $\mu$ m                      | Using Slip Gauge Set                                           |
| <b>6.</b>                            | Digimatic Depth Gauge <sup>\$</sup><br>L.C.: 0.01 mm                                                                | 0 mm to 200 mm                      | 13.31 $\mu$ m                                 | Using Slip Gauge Set                                           |
| <b>7.</b>                            | Digital / Dial Indicator <sup>\$</sup> (Plunger)<br>L.C.: 0.001 mm<br>L.C.: 0.01 mm                                 | 0 mm to 25 mm<br>0 mm to 50 mm      | 1.1 $\mu$ m<br>6 $\mu$ m                      | Using Electronic Dial Calibration Tester<br>Using ULM          |

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| 8.  | External Micrometer <sup>\$</sup><br>L.C.: 0.001 mm<br>L.C.: 0.01 mm<br>L.C.: 0.01 mm | 0 to 100 mm<br>0 to 100 mm<br>0 to 25 mm                | 2 $\mu$ m<br>7 $\mu$ m<br>2 $\mu$ m           | Using Slip Gauge Set                                                   |
| 9.  | Feeler Gauge, Leaf, Thickness Foils <sup>\$</sup>                                     | 0.01 mm to 2 mm                                         | 3 $\mu$ m                                     | Using Slip Gauge Set and Comparator                                    |
| 10. | Height Gauge <sup>\$</sup><br>L.C.: 0.01 mm<br>L.C.: 0.01 mm<br>L.C.: 0.01 mm         | 0 mm to 300 mm<br>300 mm to 600 mm<br>600 mm to 1000 mm | 21 $\mu$ m<br>21 $\mu$ m<br>25.5 $\mu$ m      | Using Slip Gauge Set<br>Using Caliper Checker<br>Using Caliper Checker |
| 11. | Inside Micrometer <sup>\$</sup><br>L.C.: 0.01 mm<br>L.C.: 0.01 mm                     | 0 mm to 100 mm<br>0 mm to 300 mm                        | 6 $\mu$ m<br>7.8 $\mu$ m                      | Using Octagon LMM 300 T                                                |
| 12. | Measuring Tape, Pie Tape <sup>\$</sup>                                                | 0 mm to 1000 mm                                         | 20 $\mu$ m                                    | Using Octagon MSTC-1000                                                |
| 13. | Scale <sup>\$</sup>                                                                   | 0 mm to 1000 mm                                         | 25.5 $\mu$ m                                  | Using Octagon MSTC-1000                                                |
| 14. | Pin Gauge, Thread Measuring Wire <sup>\$</sup>                                        | 0.1 mm to 25 mm                                         | 0.49 $\mu$ m                                  | Using Octagon LMM 300 T                                                |
| 15. | Plain plug Gauge, Height Master Gauge, Width Gauge <sup>\$</sup>                      | 1 mm to 50 mm<br>50 mm to 150 mm                        | 1.6 $\mu$ m<br>2.7 $\mu$ m                    | Using Octagon LMM 300 T                                                |
| 16. | Plain Ring Gauge <sup>\$</sup>                                                        | 3 mm to 50 mm<br>50 mm to 225 mm                        | 2 $\mu$ m<br>4.5 $\mu$ m                      | Using Octagon LMM 300 T                                                |

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| 17. | Snap Gauge, Gap Gauge <sup>\$</sup>                                                                    | 1 mm to 75 mm<br>75 mm to 250 mm           | 0.4 $\mu$ m<br>4.48 $\mu$ m                   | Using Octagon LMM 300 T                                                |
| 18. | Thread Plug Gauge <sup>\$</sup><br>(Parallel Metric, G Thread & Unified)                               | 3 mm to 25 mm<br>25 mm to 100 mm           | 1.2 $\mu$ m<br>3.6 $\mu$ m                    | Using Octagon LMM 300 T                                                |
| 19. | Thread Plug Gauge <sup>\$</sup><br>(Taper NPT)                                                         | 3 mm to 100 mm                             | 3.6 $\mu$ m                                   | Using Octagon LMM 300 T                                                |
| 20. | Thread Plug Gauge <sup>\$</sup><br>(Parallel Metric, G Thread & Unified)                               | 3 mm to 25 mm<br>25 mm to 100 mm           | 2.02 $\mu$ m<br>2.5 $\mu$ m                   | Using Octagon LMM 300 T                                                |
| 21. | Thread Ring Gauge <sup>\$</sup><br>(Parallel Metric, G Thread & Unified)                               | 4 mm to 25 mm<br>25 mm to 100 mm           | 1.8 $\mu$ m<br>2.5 $\mu$ m                    | Using Octagon LMM 300 T                                                |
| 22. | Thread Ring Gauge <sup>\$</sup><br>(Taper NPT)                                                         | 4 mm to 100 mm                             | 3.2 $\mu$ m                                   | Using Octagon LMM 300 T                                                |
| 23. | Vernier Caliper <sup>\$</sup><br>(Dial, Digital)<br>L.C. : 0.01 mm<br>L.C. : 0.01 mm<br>L.C. : 0.01 mm | 0 to 300 mm<br>0 to 600 mm<br>0 to 1000 mm | 13 $\mu$ m<br>21 $\mu$ m<br>32 $\mu$ m        | Using Slip Gauge Set<br>Using Caliper Checker<br>Using Caliper Checker |
| II. | <b>DIMENSION (PRECISION INSTRUMENTS)</b>                                                               |                                            |                                               |                                                                        |
| 1.  | Dial Calibration Tester <sup>\$</sup><br>L.C.: 0.001 mm                                                | 0 mm to 25 mm                              | 1 $\mu$ m                                     | Using Electronic Dial Calibration Tester with Electronic Probe         |
| 2.  | Protractor <sup>\$</sup><br>L.C.: 1°                                                                   | 0 to 360°                                  | 66 arc second                                 | Using Profile Projector                                                |

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|------|------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------|
| 3.   | Radius Gauge / Radius Template <sup>\$</sup>                                       | 0 mm to 25 mm                       | 100 $\mu$ m                                   | Using Profile Projector                                                              |
| 4.   | Sieves <sup>\$</sup>                                                               | 10 $\mu$ m to 5 mm                  | 3.55 $\mu$ m                                  | Using Profile Projector                                                              |
| 5.   | Taper Scale <sup>\$</sup><br>L.C.: 0.1 mm                                          | 0.4 mm to 200 mm                    | 50 $\mu$ m                                    | Using Profile Projector                                                              |
| 6.   | Thread Pitch Gauge <sup>\$</sup>                                                   | 0.25 mm to 25 mm                    | 20 $\mu$ m                                    | Using Profile Projector                                                              |
| 7.   | Weld Gauge <sup>\$</sup><br>(Scale Depth<br>L.C.: 1 mm)                            | 1 mm to 50 mm                       | 15 $\mu$ m                                    | Using Profile Projector                                                              |
| 8.   | Wire Gauge <sup>\$</sup><br>(Linear)                                               | 0.025 mm to 10 mm                   | 20 $\mu$ m                                    | Using Profile Projector                                                              |
| 9.   | Master Rod/Length<br>Bar/Extension Rod <sup>\$</sup>                               | 25 mm to 75 mm<br>75 mm to 300 mm   | 4.5 $\mu$ m<br>4.5 $\mu$ m                    | Using Octagon<br>LMM 300 T                                                           |
| III. | <b>UTM, TENSION, CREEP AND TORSION TESTING MACHINE</b>                             |                                     |                                               |                                                                                      |
| 1.   | Static Uniaxial<br>Testing Machines<br>(UTM, CTM, TTM)<br>Compression <sup>*</sup> | 200 kN to 1000 kN<br>10 kN to 50 kN | 0.54%<br>0.7%                                 | Using Force Proving<br>Instruments of Class 1<br>(Proving Rings)<br>As per IS 1828-1 |
| 2.   | Static Uniaxial<br>Testing Machines<br>(UTM, CTM, TTM)<br>Tension <sup>*</sup>     | 250 N to 50 kN                      | 0.64%                                         | Using Force Proving<br>Instruments of Class 1<br>(Proving Rings) as per<br>IS 1828-1 |

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| Sl. | Quantity Measured / Instrument                                                                                                                | Range/Frequency                         | *Calibration Measurement Capability ( $\pm$ ) | Remarks                                                     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------|
| IV. | <b>TORQUE MEASURING DEVICES</b>                                                                                                               |                                         |                                               |                                                             |
| 1.  | Torque Wrench, Torque Screw Driver, Torque Dial Gauge, Torque Tester <sup>\$</sup>                                                            | 50 Nm to 200 Nm<br>2 Nm to 10 Nm        | 0.72 %<br>1.2 %                               | Using Torque Wrench Calibration System and Load Cell        |
| V.  | <b>PRESSURE INDICATING DEVICES</b>                                                                                                            |                                         |                                               |                                                             |
| 1.  | Pneumatic Low Pressure (Magnehelic Gauge / Low pressure Gauge, Calibrators) <sup>#</sup>                                                      | 0 to 20 mbar                            | 0.06 mbar                                     | Using Digital Low Pressure Calibrator and Low Pressure Pump |
| 2.  | Pneumatic Pressure (Pressure Gauge, Pressure Indicator, Pressure calibrator, Indicator of Pressure Switch, Pressure Transmitter) <sup>#</sup> | (-) 0.9 bar to 0 bar<br>0 bar to 30 bar | 0.013 bar<br>0.06 bar                         | Using Digital Pressure Gauge and Pneumatic Pressure Pump    |
| 3.  | Hydraulic Pressure (Pressure Gauge, Pressure Indicator, Pressure calibrator, Indicator of Pressure Switch, Pressure Transmitter) <sup>#</sup> | 0 to 60 bar<br>60 bar to 600 bar        | 0.81 bar<br>1.01 bar                          | Using Digital Pressure Gauge and Hydraulic Pressure Pump    |

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| Sl.  | Quantity Measured / Instrument                                                                                                                | Range/Frequency                                                                                                    | *Calibration Measurement Capability ( $\pm$ )                                                                                                                        | Remarks                                                                                                                                |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 4.   | Hydraulic Pressure (Pressure Gauge, Pressure Indicator, Pressure calibrator, Indicator of Pressure Switch, Pressure Transmitter) <sup>s</sup> | 0 bar to 60 bar<br>60 bar to 600 bar                                                                               | 0.1 bar<br>0.93 bar                                                                                                                                                  | Using Hydraulic Dead Weight Pressure Tester as Per DKD R-6-1                                                                           |
| VI.  | <b>ACCELERATION AND SPEED</b>                                                                                                                 |                                                                                                                    |                                                                                                                                                                      |                                                                                                                                        |
| 1.   | Contact /Non Contact-Tachometer <sup>s</sup>                                                                                                  | 250 rpm to 25000 rpm                                                                                               | 1.44 % to 0.15 %                                                                                                                                                     | Using Digital Tachometer Calibrator                                                                                                    |
| 2.   | Non Contact-Centrifuge, RPM Source <sup>*</sup>                                                                                               | 30 rpm to 25000 rpm                                                                                                | 3 % to 0.15 %                                                                                                                                                        | Using Digital Tachometer                                                                                                               |
| VII. | <b>WEIGHTS</b>                                                                                                                                |                                                                                                                    |                                                                                                                                                                      |                                                                                                                                        |
| 1.   |                                                                                                                                               | 1 mg<br>2 mg<br>5 mg<br>10 mg<br>20 mg<br>50 mg<br>100 mg<br>200 mg<br>500 mg<br>1 g<br>2 g<br>5 g<br>10 g<br>20 g | 0.003 mg<br>0.003 mg<br>0.003 mg<br>0.003 mg<br>0.003 mg<br>0.003 mg<br>0.003 mg<br>0.003 mg<br>0.005 mg<br>0.005 mg<br>0.008 mg<br>0.008 mg<br>0.008 mg<br>0.026 mg | Using Standard Weight of Accuracy Class E1 and Digital Balance of L.C.: 0.000001g By Substitution Method ABBA Cycle based on OIML-R111 |

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| Sl.          | Quantity Measured / Instrument    | Range/Frequency           | *Calibration Measurement Capability ( $\pm$ ) | Remarks                                                                                                                                  |
|--------------|-----------------------------------|---------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
|              |                                   | 50 g<br>100 g<br>200 g    | 0.03 mg<br>0.07 mg<br>0.07 mg                 | Using Standard Weight of accuracy class E1 and digital Balance of L.C.: 0.00001g<br>By substitution method ABBA Cycle based on OIML-R111 |
|              |                                   | 500 g<br>1000 g<br>2000 g | 0.01 g<br>0.01 g<br>0.01 g                    | Using Standard Weights of F1 Accuracy Class and Digital Balance of L.C.: 0.01 g                                                          |
|              |                                   | 5000 g                    | 0.2 g                                         | Using Standard Weights of F1 Accuracy Class and Digital Balance of L.C.: 0.1 g                                                           |
|              |                                   | 10000 g<br>20000 g        | 0.5 g<br>0.9 g                                | Using Standard Weights of F1 Accuracy Class and Digital Balance of L.C.: 0.5 g                                                           |
| <b>VIII.</b> | <b>WEIGHING SCALE AND BALANCE</b> |                           |                                               |                                                                                                                                          |
|              | Weighing Balance*                 |                           |                                               |                                                                                                                                          |
|              | d=0.01mg                          | 0 to 200 g                | 0.14 mg                                       | Using Standard Weights of E1 and E2 accuracy class based on OIML R-76                                                                    |
|              | d=10mg                            | 0 to 3000 g               | 0.03 g                                        | Using Standard Weights of E2 and F1 accuracy class based on OIML R-76                                                                    |

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| Sl. | Quantity Measured / Instrument | Range/Frequency            | *Calibration Measurement Capability ( $\pm$ ) | Remarks                                                                           |
|-----|--------------------------------|----------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------|
|     | d=100mg                        | 0 to 7 kg                  | 0.37 g                                        | Using Standard Weights of E2 and F1 accuracy class based on OIML R-76             |
|     | d=0.5g                         | 0 to 30 kg                 | 1 g                                           | Using Standard Weights of E2 and F1 accuracy class based on OIML R-76             |
|     | d=50g                          | 0 to 50 kg                 | 106 g                                         | Using Standard Weights of E2 and F1 accuracy class based on OIML R-76             |
| 2.  | Micro Balance*<br>d=0.001mg    | 0 to 20 g                  | 0.025 mg                                      | Using Standard Weights of E1 and E2 accuracy class based on OIML R-76             |
| IX. | <b>VOLUME</b>                  |                            |                                               |                                                                                   |
|     |                                | 1 $\mu$ l to 10 $\mu$ l    | 0.05 $\mu$ l                                  | Using Standard Weights of E2 accuracy class and Electronic Balance L.C.: 0.001 mg |
|     |                                | 10 $\mu$ l to 1000 $\mu$ l | 0.42 $\mu$ l                                  | Using Standard Weights of E2 accuracy class and Electronic Balance L.C.: 0.01 mg  |

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| Sl. | Quantity Measured / Instrument                                                              | Range/Frequency                                                                                 | *Calibration Measurement Capability ( $\pm$ )       | Remarks                                                                                                                       |
|-----|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 2.  | Glass Apparatus (Pipette, Burette, Volumetric Flask, Density Bottle, Measuring Cylinder) \$ | 1 ml to 10 ml<br>10 ml to 100 ml<br>100 ml to 200 ml<br>200 ml to 1000 ml<br>1000 ml to 2000 ml | 0.16 ml<br>0.1 ml<br>0.68 ml<br>0.351 ml<br>0.46 ml | Using Standard Weights of E2 & F1 Accuracy Class and Electronic Balances of L.C.: 0.01 mg, L.C.: 0.01 g by Gravimetric Method |

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| Sl.                               | Quantity Measured / Instrument                                                                   | Range/Frequency                         | *Calibration Measurement Capability ( $\pm$ ) | Remarks                                                                                   |
|-----------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------|
| <b><u>THERMAL CALIBRATION</u></b> |                                                                                                  |                                         |                                               |                                                                                           |
| <b>I.</b>                         | <b>TEMPERATURE</b>                                                                               |                                         |                                               |                                                                                           |
| <b>1.</b>                         | Glass Thermometer, Temperature Gauge, Dial Thermometer <sup>\$</sup>                             | (-) 20 °C to 50 °C<br>50 °C to 250 °C   | 0.14 °C<br>0.14 °C                            | Using SPRT with Readout and Liquid Baths by Comparison Method                             |
| <b>2.</b>                         | RTD/Thermocouple, Temperature Sensor with and without Indicators, Temperature Gauge <sup>#</sup> | (-) 25 °C to 400 °C<br>400 °C to 650 °C | 0.13 °C<br>0.14 °C                            | Using SPRT with Readout and Dry Well Calibrators by comparison method                     |
|                                   |                                                                                                  | 200 °C to 600 °C                        | 1.13 °C                                       | Using S-Type Thermocouple with Readout, Dry Well Calibrator by Comparison Method          |
|                                   |                                                                                                  | 600 °C to 800 °C<br>800 °C to 1200 °C   | 2.0 °C<br>2.4 °C                              | Using S-Type Thermocouple with Readout, Dry Block Furnace by Comparison Method            |
| <b>4.</b>                         | RTD/Thermocouple, Temperature Sensor with and without Indicators, Temperature Gauge <sup>*</sup> | 400 °C to 1200 °C                       | 2.49 °C                                       | Using R – Type Thermocouple with Radix Calibrator, Dry Block Furnace By Comparison Method |

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| Sl. | Quantity Measured / Instrument                                                                                                                                         | Range/Frequency        | *Calibration Measurement Capability ( $\pm$ ) | Remarks                                                                                   |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------|
| 5.  | Temperature Indicator with Sensor of Freezer, Oven, Incubator (for Non-Medical Applications), Furnace, Liquid Bath, Dry Well Block, Chambers*                          | (-) 80 °C to (-) 40 °C | 0.9 °C                                        | Using Digital Temp. Indicator with PT-100 RTD, Dry Well Calibrator by comparison method   |
|     |                                                                                                                                                                        | (-) 40 °C to 200 °C    | 0.79 °C                                       | Using Digital Temp. Indicator with PT-100 RTD, Dry Well Calibrator by comparison method   |
|     |                                                                                                                                                                        | 400 °C to 1200 °C      | 2.7 °C                                        | Using R – Type Thermocouple with Radix calibrator, Dry block furnace by comparison method |
| 6.  | Deep Freezers, Refrigerators, Incubators (for Non-Medical Applications), Temperature Bath, Temperature Calibrators, Chambers, Oven, Furnace, Cold Room (Multipoints) * | (-) 25 °C to 100 °C    | 2.2 °C                                        | Using Standard RTDs, Thermocouples and Multi channel data loggers by comparison method    |
|     |                                                                                                                                                                        | 100 °C to 250 °C       | 2.2 °C                                        | Using Standard RTDs, Thermocouples and Multi Channel Data Loggers by Comparison Method    |

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| Sl. | Quantity Measured / Instrument     | Range/Frequency                    | *Calibration Measurement Capability ( $\pm$ ) | Remarks                                                           |
|-----|------------------------------------|------------------------------------|-----------------------------------------------|-------------------------------------------------------------------|
|     |                                    | 250 °C to 1200 °C                  | 5.6 °C                                        | Using Standard RTDs, Thermocouples and Multi Channel Data Loggers |
| II. | SPECIFIC HEAT & HUMIDITY           |                                    |                                               |                                                                   |
|     |                                    | 30 %RH to 95 %RH @ 25 °C           | 1.28 % RH                                     |                                                                   |
|     |                                    | 15 °C to 40 °C @ 50 %RH            | 0.42 °C                                       |                                                                   |
|     |                                    | 30 %RH to 90 %RH @ 25 °C           | 1.16 % RH                                     |                                                                   |
|     |                                    | 15 °C to 45 °C @ 50 %RH            | 0.5 °C                                        |                                                                   |
| 3.  | Humidity Chambers (Multi Points) * | 30 %RH to 90 %RH<br>15 °C to 40 °C | 4 %RH<br>0.9 °C                               | Using Temperature/ Humidity Data Loggers by Comparison Method     |

\* Measurement Capability is expressed as an uncertainty ( $\pm$ ) at a confidence probability of 95%

§ Only in Permanent Laboratory

\* Only for Site Calibration

# The laboratory is also capable for site calibration however, the uncertainty at site depends on the prevailing actual environmental conditions and master equipment used.

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