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| Quantity Measured/<br>Instrument                                    | Range / Frequency  | *Calibration Measurement<br>Capability ( $\pm$ ) | Remarks  |
|---|--------------------|--|--|
| <b>I. DIMENSION</b>   |                    |  |  |
| <b>1. CALIPERS <sup>\$</sup></b>                                    |                    |  |  |
| L.C.: 0.01 mm <sup>Φ</sup>  | 0 to 600 mm        | 9.37 $\mu$ m                                     | Using Slip Gauge Set, Caliper Checker, Master Length bar, Granite Block By Comparison Method |
| L.C.: 0.02 mm <sup>Φ</sup>  | 0 to 1000 mm       | 9.25 $\mu$ m                                     |  |
|   | 0 to 2000 mm       | 14.64 $\mu$ m                                    |  |
| <b>2. HEIGHT GAUGE <sup>\$</sup></b>                                |                    |  |  |
| L.C. 0.0001 mm <sup>Φ</sup>   | 0 to 600 mm        | 3.64 $\mu$ m                                     | Using Granite Surface Plate, Master Length bar & Slip Gauge By Comparison Method             |
| L.C. 0.01 mm <sup>Φ</sup>   | 0 to 1000 mm       | 9.14 $\mu$ m                                     |  |
| L.C. 0.02 mm <sup>Φ</sup>   | 0 to 1500 mm       | 13.89 $\mu$ m                                    |  |
| <b>3. VERNIER DEPTH GAUGE <sup>\$</sup></b>                         |                    |  |  |
| L.C. 0.01mm <sup>Φ</sup>  | 0 to 300 mm        | 8.13 $\mu$ m                                     | Using Depth Micro Checker, Slip Gauge Set, Length Bar Set By Comparison Method               |
|   | 0 to 600 mm        | 8.59 $\mu$ m                                     |  |
|   | 0 to 1000 mm       | 9.27 $\mu$ m                                     |  |
| <b>4. EXTERNAL MICROMETER <sup>\$</sup><br/>(with setting tick)</b> |                    |  |  |
| L.C. 0.001mm <sup>Φ</sup>   | 0 to 300 mm        | 2.33 $\mu$ m                                     | Using Slip Gauge Set & Master Length Bar Set By Comparison Method                            |
| L.C. 0.01 mm  | 300 mm to 600 mm   | 5.94 $\mu$ m                                     |  |
|   | 600 mm to 1000 mm  | 7.25 $\mu$ m                                     |  |
|   | 1000 mm to 1500mm  | 9.24 $\mu$ m                                     |  |
|   | 1500 mm to 2000 mm | 11.39 $\mu$ m                                    |  |
| <b>5. MICROMETER SETTING STICK/ROD <sup>\$</sup></b>                | 600mm to 2000mm    | 10.61 $\mu$ m                                    | Using Master Length bar, Granite Block, Slip Gauge By Comparison Method                      |

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|---|--|--|---|
| <b>6. INSIDE MICROMETERS \$</b><br><b>L.C. 0.01 mm</b>  | 5 mm to 250 mm<br>250 mm to 1500mm<br>1500mm to 3000mm | 6.73 $\mu$ m<br>9.39 $\mu$ m<br>14.10 $\mu$ m    | Using Slip Gauge Accessories, Length bar Set, Slip Gauge & Granite Block By Comparison Method |
| <b>7. DEPTH MICROMETER \$</b><br><b>L.C. 0.001 mm <math>\Phi</math></b>   | 0 to 300mm   | 3.09 $\mu$ m                                     | Using Depth Micro Checker By Comparison Method  |
| <b>8. PLUNGER TYPE DIAL GAUGES \$</b><br><b>L.C. 0.0005 mm</b><br><b>L.C. 0.001 mm <math>\Phi</math></b><br><b>L.C. 0.01 mm</b> | Upto 1mm<br>Upto 25mm<br>Upto 100mm                    | 0.98 $\mu$ m<br>1.10 $\mu$ m<br>6.03 $\mu$ m     | Using ULM By Comparison Method  |
| <b>HALF ROUND DIAL \$</b><br><b>L.C. 0.0005 <math>\mu</math>m/0.001 mm</b>  | Upto $\pm$ 1mm   | 0.98 $\mu$ m                                     |   |
| <b>9. PLUNGER TYPE DIAL GAUGES \$</b><br><b>L.C. 0.0005 mm</b><br><b>L.C. 0.001 mm <math>\Phi</math></b>                        | Upto 1mm<br>Upto 10 mm                                 | 2.50 $\mu$ m<br>2.50 $\mu$ m                     | Using Electronic Dial Calibration Tester By Comparison Method                                 |
| <b>HALF ROUND DIAL \$</b><br><b>L.C. 0.0005 <math>\mu</math>m/0.001 mm</b>  | Upto $\pm$ 1mm   | 2.50 $\mu$ m                                     |   |
| <b>10. LEVER DIAL GAUGES \$</b><br><b>L.C. 0.001 mm <math>\Phi</math></b><br><b>L.C. 0.01 mm</b>                                | Upto 1mm<br>Upto 2mm                                   | 1.0 $\mu$ m<br>5.85 $\mu$ m                      | Using ULM 600 By Comparison Method  |
| <b>11. LEVER DIAL GAUGES \$</b><br><b>L.C. 0.001 mm <math>\Phi</math></b><br><b>L.C. 0.01 mm</b>                                | Upto 1mm<br>Upto 2mm                                   | 2.50 $\mu$ m<br>6.42 $\mu$ m                     | Using Electronic Dial Calibration Tester By Comparison Method                                 |

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|---|--|--|---|
| 12. BORE DIAL GAUGE \$<br>(transmission accuracy<br>check)              | Upto 2 mm  | 1.80 $\mu$ m   | Using Electronic Dial<br>Calibration Tester &<br>Electronic Probe<br>By Comparison Method                 |
| 13. ELECTRONIC PROBE \$<br>with D.R.O.<br>L.C. 0.0001 mm $\Phi$         | Upto 25 mm   | 1.70 $\mu$ m   | Using Granite Comparator &<br>Slip Gauge by Comparison<br>Method  |
| 14. DIAL THICKNESS<br>GAUGE \$<br>L.C. 0.01 mm                          | 0 to 30 mm   | 7.58 $\mu$ m   | Using Slip Gauge<br>Set by Comparison Method  |
| 15. DIAL CALIPER GAUGE \$<br>(Internal/External)<br>L.C. 0.01 mm $\Phi$ | Upto 100 mm  | 7.91 $\mu$ m   | Using Slip Gauge Set,<br>Slip Gauge Accessories by<br>Comparison Method                                   |
| 16. GAUGE BLOCKS / SLIP<br>GAUGES \$                                    | Up to 20 mm<br>>20mm to 50 mm<br>>50 mm to 70 mm<br>>70 mm to 100 mm | 0.12 $\mu$ m<br>0.21 $\mu$ m<br>0.28 $\mu$ m<br>0.33 $\mu$ m | Using Slip Gauge Calibrator<br>& Slip Gauge By<br>Comparison Method                                       |
| 17. LENGTH BAR/ LONG<br>SLIP GAUGE/<br>MICROMETER<br>SETTING STICK \$   | Upto 400 mm<br>400 mm to 600 mm                                      | 2.70 $\mu$ m<br>3.66 $\mu$ m                                 | Using Granite Comparator,<br>Master Length bar, Slip<br>Gauge, & Electronic Probe By<br>Comparison Method |
| 18. TAPE & SCALE<br>CALIBRATOR \$<br>L.C. 0.005 mm                      | Upto 1000 mm   | 7.44 $\mu$ m   | Using Slip Gauge &<br>Length bar By<br>Comparison Method  |

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|----------------------------------|--|--|--|
| 19. MEASURING TAPE \$            | Upto 100 m   | $145 \sqrt{\frac{L}{1000}} \mu\text{m}$<br>L in mm             | Using Tape & Scale Calibrator<br>By Comparison Method                            |
| 20. STEEL SCALE \$               | Upto 1000 mm                                       | 145.0 $\mu\text{m}$  | Using Tape & Scale Calibrator<br>By Comparison Method                            |
| 21. FEELER GAUGE \$              | 0 to 2 mm  | 1.00 $\mu\text{m}$   | Using ULM 600 By<br>Comparison Method  |
| 22. FEELER GAUGE \$              | 0 to 2 mm  | 3.90 $\mu\text{m}$   | Using External<br>Micrometer By<br>Comparison Method                             |
| 23. THREAD PITCH<br>GAUGE\$      | 0.25mm to 7.0mm                                    | 6.43 $\mu\text{m}$   | Using Profile Projector By<br>Comparison Method                                  |
| 24. RADIUS GAUGE \$              | Upto 25 mm   | 6.5 $\mu\text{m}$  | Using Profile Projector By<br>Comparison Method                                  |
| 25. PLAIN PLUG GAUGE \$          | Upto 100 mm<br>100 mm to 200 mm<br>200 mm to 300mm | 1.05 $\mu\text{m}$<br>1.61 $\mu\text{m}$<br>2.00 $\mu\text{m}$ | Using ULM & Length bar By<br>Comparison Method                                   |
| 26. PLAIN PLUG GAUGE \$          | Upto 300 mm  | 2.43 $\mu\text{m}$   | Using Slip Gauge, Length Bar<br>Set & Granite Comparator By<br>Comparison Method |
| 27. PLAIN RING GAUGE \$          | 3mm to 150mm<br>150mm to 300mm                     | 1.91 $\mu\text{m}$<br>2.30 $\mu\text{m}$                       | Using Master Ring Gauge &<br>ULM By<br>Comparison Method                         |
| 28. PLAIN SNAP GAUGE \$          | 3mm to 150mm<br>150mm to 300mm                     | 1.91 $\mu\text{m}$<br>2.30 $\mu\text{m}$                       | Using Master Ring Gauge &<br>ULM By<br>Comparison Method                         |

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|---|--|---|--|
| <b>29. THREAD PLUG GAUGE \$<br/>(Effective &amp; Major Dia)</b>                                 | Upto 100mm<br>100mm to 200mm<br>200mm to 300mm | 1.32 $\mu$ m<br>1.61 $\mu$ m<br>1.95 $\mu$ m                      | Using ULM &<br>Thread Measuring Wires,<br>Length Bar Set By<br>Comparison Method     |
| <b>30. TAPER THREAD PLUG<br/>GAUGE \$<br/>(Effective &amp; Major Dia)</b>                       | Upto 100mm<br>100mm to 200mm<br>200mm to 300mm | 1.32 $\mu$ m<br>1.61 $\mu$ m<br>1.92 $\mu$ m                      | Using ULM &<br>Thread Measuring Wires,<br>Length Bar Set By<br>Comparison Method     |
| <b>31. THREAD RING GAUGE \$<br/>(Effective Dia)</b>   | 3mm to 100mm                                   | 1.83 $\mu$ m  | Using ULM &<br>Master Ring Gauge By<br>Comparison Method                             |
| <b>32. MEASURING PIN/<br/>WIRE GAUGE/<br/>THREAD MEASURING<br/>WIRE \$</b>                      | Upto 20 mm                                     | 1.00 $\mu$ m  | Using ULM By<br>Comparison Method  |
| <b>33. CYLINDRICAL<br/>SETTING MASTER \$<br/>(Diameter measurement &amp;<br/>Concentricity)</b> | Upto 100 mm                                    | 1.00 $\mu$ m  | Using ULM, FCDM M/C &<br>Electronic Probe By<br>Comparison Method                    |
| <b>34. BEVEL PROTRACTOR/<br/>COMBINATION SET \$<br/>L.C. 1 minute <sup>Φ</sup></b>              | 0° to 90°                                      | 0.6 minute  | Using Angle Gauge Set By<br>Comparison Method  |
| <b>35. ENGINEER'S SQUARE \$<br/>Straightness<br/>Parallelism<br/>Squareness</b>                 | Upto 600 mm<br>Upto 600 mm<br>Upto 600 mm      | 2.32 $\mu$ m<br>7.80 $\mu$ m<br>2.40 $\mu$ m                      | Using Granite Square , Slip<br>Gauge Set, Granite Surface<br>Plate, Electronic Probe |
| <b>36. CYLINDRICAL SQUARE/<br/>MASTER CYLINDER \$<br/>(Squareness<br/>Measurement)</b>          | Upto 600 mm                                    | 3.68 $\mu$ m  | Using Granite Column,<br>Slip Gauge Set,<br>Granite Surface Plate                    |

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|--|--|---|---|
| <b>37. GRANITE SQUARE COLUMN \$</b><br>Straightness<br>Squareness<br>Parallelism                 | Upto 1000 mm<br>Upto 1000 mm<br>Upto 1000 mm             | 3.20 $\mu$ m<br>2.60 $\mu$ m<br>3.18 $\mu$ m                | Using Granite Surface Plate, Plunger Dial Gauge, Electronic Level & Electronic Probe By Comparison Method |
| <b>38. GRANITE/ CAST IRON SQUARE \$</b><br>Right Angle<br>Squareness<br>Measurement              | Upto 630 mm  | 5.34 $\mu$ m  | Using Granite Surface Plate, Master Cylinder, Slip Gauge & Plunger Dial Gauge                             |
| <b>39. GRANITE/ CAST IRON SQUARE \$</b><br>Straightness<br>Flatness<br>Squareness<br>Parallelism | Upto 630 mm<br>Upto 630 mm<br>Upto 630 mm<br>Upto 630 mm | 2.0 $\mu$ m<br>1.20 $\mu$ m<br>5.34 $\mu$ m<br>2.73 $\mu$ m | Using Granite Surface Plate, Master Cylinder, Plunger Dial Gauge, Electronic Level & Slip Gauge           |
| <b>40. SINE BAR \$</b><br>Angular Error<br>Parallelism   | Upto 300 mm<br>Upto 300 mm                               | 6.0 sec<br>2.19 $\mu$ m                                     | Using Slip Gauge, Angle Gauge Set & Electronic Probe  |
| <b>41. BENCH CENTER #</b><br>(Co axiality of centers)  | Upto 1000 mm   | 2.50 $\mu$ m  | Using Cylindrical Mandrels & Plunger Dial Gauge By Comparison Method                                      |
| <b>42. SINE CENTRE \$</b><br>Angular Error<br>Co axiality of centers                             | Up to 600 mm<br>Up to 600 mm                             | 4.6 sec<br>3.67 $\mu$ m                                     | Using Slip Gauge, Length bar, Angle Gauge, Electronic Probe & Master Test Mandrel By Comparison Method    |

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|--|---|---|--|
| <b>43. SINE TABLE \$</b><br>Angular error<br>Parallelism   | Upto 200 mm<br>Upto 200 mm                | 5.7 sec<br>2.19 $\mu\text{m}$                                     | Using Slip Gauge,<br>Angle Gauge set &<br>Electronic probe By<br>Comparison Method   |
| <b>44. TEST MANDREL \$</b><br>Parallel<br>Taper  | Upto 1000 mm<br>Upto 500 mm               | 4.50 $\mu\text{m}$<br>6.10 $\mu\text{m}$                          | Using Granite Surface Plate,<br>Slip Gauge, Sine Centre,<br>Bench Centre & Electronic<br>Probe By Comparison Method                  |
| <b>45. ENGINEERS SPIRIT<br/>LEVEL/SQUARE<br/>FRAME TYPE SPIRIT<br/>LEVEL \$</b><br>L.C. 10 $\mu\text{m}/\text{m}^\Phi$ | Upto 300 mm                               | 4.8 $\mu\text{m}/\text{m}$  | Using Electronic Level,<br>Slip Gauge, Granite Square<br>Column, Granite Surface Plate<br>& Electronic Probe By<br>Comparison Method |
| <b>46. ELECTRONIC LEVEL \$</b><br>L.C. 1.0 $\mu\text{m}/\text{m}^\Phi$   | Upto 300 mm                               | 3.2 $\mu\text{m}/\text{m}$  | Using Master Electronic<br>Level By Comparison Method  |
| <b>47. ANGLE PLATE \$</b><br>Flatness<br>Squareness<br>Parallelism   | Upto 600 mm<br>Upto 600 mm<br>Upto 600 mm | 1.20 $\mu\text{m}$<br>3.86 $\mu\text{m}$<br>4.76 $\mu\text{m}$    | Using Electronic Level,<br>Slip Gauge, Granite Square<br>Column, Granite Surface Plate<br>& Electronic Probe By<br>Comparison Method |
| <b>48. V – BLOCK \$</b><br>(Granite/Steel/ Cast Iron)<br>Parallelism<br>Squareness<br>Symetricity                      | Upto 300 mm<br>Upto 300 mm<br>Upto 300 mm | 6.54 $\mu\text{m}$<br>5.52 $\mu\text{m}$<br>6.54 $\mu\text{m}$    | Using Granite Surface Plate,<br>Cylindrical Mandrel &<br>Electronic Probe By<br>Comparison Method                                    |

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| 49. ENGINEER'S<br>PARALLEL <sup>\$</sup><br>(Steel / Granite)                      | Upto 300 mm            | 2.46 $\mu$ m   | Using Granite Surface Plate,<br>Slip Gauge &<br>Electronic Probe By<br>Comparison Method                           |
| 50. STRAIGHT EDGE <sup>\$</sup><br>(Steel / Alluminium)                            |                        |  |  |
| Straightness   | Upto 1200 mm           | 3.18 $\mu$ m   | Using Granite Surface Plate,<br>Slip Gauge, Electronic Probe<br>& Plunger Dial Gauge By<br>Comparison Method       |
| Parallelism  | Upto 1200 mm           | 3.18 $\mu$ m   |  |
| Straightness   | UPto 2500 mm           | 9.94 $\mu$ m   |  |
| Parallelism<br>(Width < 30 mm)   | UPto 2500 mm           | 9.94 $\mu$ m   |  |
| 51. STRAIGHTEDGE <sup>\$</sup><br>(Granite/ Cast Iron)                             |                        |  |  |
| Straightness   | Upto 1200 mm           | 3.8 $\mu$ m  | Using Granite Surface Plate,<br>Electronic Level, Electronic<br>Probe & Plunger Dial Gauge<br>By Comparison Method |
| Parallelism  | Upto 1200 mm           | 3.18 $\mu$ m   |  |
| Straightness   | UPto 2500 mm           | 8.00 $\mu$ m   |  |
| Parallelism<br>(Width > 30 mm)   | UPto 2500 mm           | 9.91 $\mu$ m   |  |
| 52. SURFACE PLATE <sup>\$</sup><br>(Granite/ Cast Iron )<br>(Flatness measurement) | Upto 2400mm x 1100mm   | $0.34 \sqrt{\frac{L+W}{b}} \mu\text{m}$<br>(Where L W b in mm,<br>b = base length) | Using Electronic Level<br>& Spirit Level By<br>Comparison Method   |
| 53. SURFACE PLATE *<br>(Granite / Cast Iron)/*<br>(Flatness Measurement)           | Upto 6000 mm x 6000 mm | $0.56 \sqrt{\frac{L+W}{b}} \mu\text{m}$<br>(Where L & b in mm,<br>b = base length) | Using Electronic Level<br>Flatness Measurement By<br>Comparison Method   |

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| 54. STRAIGHT EDGE *<br>(Granite/ Cast Iron)                       | Upto 6000 mm                                    | $0.56 \sqrt{\frac{L}{b}} \mu\text{m}$<br>(Where L & b in mm,<br>b = base length) | Using Electronic Level<br>Straightness Measurement at<br>site (Temperature Upto 40 °C)<br>By Comparison Method  |
| 55. ELECTRONIC HEIGHT<br>GAUGE *<br>L.C.: 0.0001 mm,0.001 mm      | 0 to 600 mm                                     | 3.70 $\mu\text{m}$   | Using Length Bar, Slip Gauge<br>Set (Temperature within 18 °C<br>to 22 °C ) by Comparison<br>Method as per 2921 |
| 56. PROFILE PROJECTOR #<br>X - Y Travel<br>Magnification<br>Angle | 100 mm<br>Upto 100 x<br>0 to 360°               | 4.4 $\mu\text{m}$<br>0.13 %<br>6.2 min   | Using Glass Scale &<br>Glass Angle Graticule By<br>Comparison Method  |
| <b>II. PRESSURE</b>   |   |  |   |
| 1. Hydraulic Pressure \$<br>(Analog/Digital<br>Pressure Gauges)   | 70 kg/cm <sup>2</sup> to 700 kg/cm <sup>2</sup> | 3.5 kg/cm <sup>2</sup>   | Using Digital Pressure Gauge<br>& Standard DPG by<br>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.

<sup>o</sup> Laboratory can also calibrate instruments/devices of coarser resolution / least count within the accredited range using same reference standard/ master equipment under the scope of accreditation.

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