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| SI.        | Quantity Measured /<br>Instrument | Range/Frequency  | *Calibration Measurement<br>Capability (±)                   | Remarks   |
|------------|-----------------------------------|--|--|---|
|            |                                   | ELECTRO-TECHNIC  | AL CALIBRATION   |   |
| <b>I</b> . | SOURCE                            |  |  |   |
|            | DC Voltage <sup>\$</sup>          | 1.018 V<br>10 V  | 11.39 ppm<br>10.67 ppm                                       | Using Nano Scan Volt<br>Maintenance System,<br>Fluke/7000 by Direct<br>Method |
|            | DC Voltage#                       | 1 mV to 10 mV<br>10 mV to 100 mV<br>100 mV to 1 V<br>1 V to 10 V   | 0.17 %<br>0.0038 %<br>0.0016 %<br>0.0017 %                   | Using Multi-Function<br>Calibrator, Fluke-5520A<br>by Direct Method           |
|            | DC Voltage <sup>\$</sup>          | 10 V to 100 V<br>100 V to 1000 V   | 0.0036 %<br>0.0025 %   | Using Multi-Function<br>Calibrator, Fluke-5520A<br>by Direct Method           |
|            | DC Voltage*                       | 10 V to 1000 V   | 0.0025 %   | Using Multi-Function<br>Calibrator, Fluke-5520A<br>by Direct Method           |
|            |                                   | 50 Hz to 1 kHz<br>1 mV to 10 mV<br>10 mV to 100 mV<br>100 mV to 10 V<br>10 V to 100 V<br>100 V to 1000 V<br>1 kHz to 100 kHz<br>10 mV to 300 V | 0.72 %<br>0.038 %<br>0.024 %<br>0.029 %<br>0.038 %<br>0.15 % | Using Multi-Function<br>Calibrator, Fluke-5520A<br>by Direct Method           |

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| SI. | Quantity Measured /<br>Instrument | Range/Frequency  | *Calibration Measurement<br>Capability (±)   | Remarks   |
|-----|-----------------------------------|--|--|---|
|     |                                   | <b>50 Hz</b><br>6.6/√3 kV to 33 kV<br>1000 V to 33 kV  | 0.13 %<br>0.13 %   | Using Precision<br>Potential Transformer<br>with Standard PT/<br>Automatic Instrument<br>Transformer Test Set<br>(AITTS) Eltel/ AITTS-98<br>by Direct Method &<br>Using H. V Divider with<br>KV Meter along with HV<br>Source by Comparison<br>Method |
|     | AC Voltage*                       | 50Hz<br>1mV to 100mV<br>100mV to 100V<br>100V to 1000V<br>50Hz to 1kHz<br>1mV to 100mV<br>100mV to 100V<br>100V to 1000V               | 0.72 %<br>0.029 %<br>0.038 %<br>0.72 %<br>0.029 %<br>0.038 %                               | Using Multi-Function<br>Calibrator, Fluke-5520A<br>by Direct Method   |
|     | AC Voltage <sup>\$</sup>          | <b>40Hz to 62.5Hz</b><br>1V to 480V  | 7.5ppm to 16ppm  | Using Precision Power<br>Calibration System<br>(PPCS)/ Zera By Direct<br>Method   |
|     | DC Current <sup>\$</sup>          | 1 μA to 10 μA<br>10 μA to 100 μA<br>100 μA to 1 mA<br>1 mA to 100 mA<br>100 mA to 1 A<br>1 A to 10 A<br>10 A to 20 A<br>20 A to 1000 A | 2.33 % to 0.25 %<br>0.02 %<br>0.018 %<br>0.016 %<br>0.028 %<br>0.065 %<br>0.12 %<br>0.46 % |   |

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| SI. | Quantity Measured /<br>Instrument | Range/Frequency  | *Calibration Measurement<br>Capability (±)                                       | Remarks   |
|-----|-----------------------------------|--|--|---|
|     | DC Current*                       | 1 μA to 100 μA<br>100 μA to 1 mA<br>1 mA to 100 mA<br>100 mA to 1 A<br>1 A to 10 A<br>10 A to 20 A<br>20 A to 1000 A | 2.33 % to 0.25 %<br>0.018 %<br>0.016 %<br>0.028 %<br>0.065 %<br>0.12 %<br>0.46 % | Using Multi-Function<br>Calibrator, Fluke-5520A<br>by Direct Method             |
|     |                                   | <b>40 Hz to 70 Hz</b><br>10 mA to 120 A  | 0.053 % to 0.013 %   | Using Power /Energy<br>Comparator COM 3003<br>by Direct Method                  |
|     |                                   | <b>50 Hz to 1 kHz</b><br>30 μA to 1 mA<br>1 mA to 10 mA<br>10 mA to 100 mA<br>100 mA to 1 A<br>1 A to 20 A           | 0.40 % to 0.14 %<br>0.08 %<br>0.08 %<br>0.08 %<br>0.18 %                         | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method             |
|     |                                   | <b>50 Hz</b><br>20 A to 1000 A   | 1.0 %  | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method             |
|     | AC Current*                       | <b>50 Hz to 1 kHz</b><br>30 μA to 1 mA<br>1 mA to 10 mA<br>10 mA to 1 A<br>1 A to 20 A<br>20 A to 1000 A             | 0.40 % to 0.26 %<br>0.26 %<br>0.08 %<br>0.18 %<br>1.0 %                          | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method             |
|     | AC Current <sup>\$</sup>          | <b>40Hz to 62.5Hz</b><br>40mA to 100A  | 14ppm  | Using Precision Power<br>Calibration System<br>(PPCS)/ Zera By Direct<br>Method |

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| SI. | Quantity Measured /<br>Instrument | Range/Frequency  | *Calibration Measurement<br>Capability (±)                              | Remarks   |
|-----|-----------------------------------|--|---|---|
| 5.  | AC Resistance <sup>\$</sup>       | <b>1 kHz</b><br>1 Ω<br>10 Ω<br>100 Ω<br>1 kΩ<br>10 kΩ  | 0.12 %<br>0.0065 %<br>0.011 %<br>0.0066 %<br>0.011 %                    | Using Standard<br>Resistors - 5685A,<br>5685B, 3111, 1682,<br>1659 by Direct Method |
|     | DC Resistance <sup>\$</sup>       | 1Ω to 100 Ω<br>100Ω to 1kΩ<br>1 kΩ to 100kΩ<br>>100kΩ to 1MΩ<br>>1MΩ to 10MΩ<br>>10MΩ to 100MΩ<br>>100MΩ to 1000MΩ | 0.13 %<br>0.005 %<br>0.005 %<br>0.008 %<br>0.008 %<br>0.008 %<br>1.74 % | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method                 |
|     | DC Resistance*                    | 1Ω to 100 Ω<br>100Ω to 1kΩ<br>1 kΩ to 100kΩ<br>100kΩ to 1MΩ<br>1MΩ to 10MΩ<br>10MΩ to 10MΩ                         | 0.13%<br>0.006%<br>0.005%<br>0.008%<br>0.008%<br>0.07%                  | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method                 |
|     |                                   | 100ΜΩ<br>1GΩ<br>10GΩ<br>100GΩ  | 1.17%<br>1.64%<br>1.64%<br>3.47%  | Using Standard Resistor<br>Tinsley/4721 by Direct<br>Method                         |
|     |                                   | 0.01Ω<br>0.1Ω<br>1Ω  | 0.05%<br>0.0099%<br>0.0007%   | Using Standard<br>Resistors 3111, 1682,<br>1659 by Direct Method                    |
|     |                                   | 1Ω<br>10Ω<br>100Ω<br>1kΩ<br>10kΩ   | 0.0007%<br>0.0007%<br>0.0007%<br>0.0007%<br>0.0007%                     | Using Standard<br>Resistors, Tinsley /<br>5685A& B by Direct<br>Method              |

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| SI. | Quantity Measured /<br>Instrument | Range/Frequency  | *Calibration Measurement<br>Capability (±)                                 | Remarks  |
|-----|-----------------------------------|--|--|--|
|     | DC Resistance*                    | 0.1Ω to 10Ω<br>10Ω to 100Ω<br>100Ω to 1kΩ<br>1kΩ to 10kΩ<br>10kΩ to100kΩ<br>100kΩ to 1MΩ | 1.39% to 0.05%<br>0.014%<br>0.012%<br>0.013%<br>0.013% to 0.058%<br>0.058% | Using Standard Decade<br>Resistance Box<br>Tinsley/ZX76, Tinsley/<br>ZX77 by Direct Method                     |
| 7.  | Inductance <sup>\$</sup>          | <b>1 kHz</b><br>100 μH<br>1 mH<br>10 mH<br>100 mH<br>1 H<br>10 H                         | 0.26 %<br>0.12 %<br>0.037 %<br>0.024 %<br>0.041 %<br>0.13 %                | Using Standard Inductor<br>Set, Tinsley / 4190A/B/C<br>Standard Inductor, iET/<br>SL-B-10H by Direct<br>Method |
| 8.  | Capacitance <sup>§</sup>          | <b>1 kHz</b><br>1 nF<br>10 nF<br>100nF<br>1 μF<br>10 μF<br>100 μF<br>1000 μF             | 0.02 %<br>0.02 %<br>0.02 %<br>0.06 %<br>0.07 %<br>0.37 %<br>1.2 %          | Using Standard<br>Capacitor iET/SCA<br>Series by Direct Method   |
|     |                                   | 1 Hz to 15 MHz   | 11 ppm to 25 ppm   | Using Multi-function<br>Calibrator, Fluke-5520A,<br>Function Generator/<br>Agilent-33120A by Direct<br>Method  |
|     |                                   | 1 MHz<br>5 MHz<br>10 MHz   | 0.01 ppm<br>0.01 ppm<br>0.0008 ppm   | Using Rubidium<br>Frequency Standard<br>XL Microwave/ 500 by<br>Direct Method                                  |

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| SI. | Quantity Measured /<br>Instrument               | Range/Frequency   | *Calibration Measurement<br>Capability (±) | Remarks  |
|-----|---|---|--|--|
|     |   | 100 kHz to 3 GHz  | 1.64 ppm                                   | Using Synthesized<br>Signal Generator;<br>AR / SG6000 by Direct<br>Method                |
|     | Frequency*                                      | 1 Hz to 2 MHz   | 15 ppm                                     | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method                      |
| 10. | RF Power Level <sup>\$</sup>                    | <b>250 kHz to 1 GHz</b><br>(-) 50 dBm to 7 dBm  | 1.1dB                                      | Using Synthesized<br>Signal Generator;<br>AR/SG6000 by Direct<br>Method                  |
|     | Oscilloscope <sup>\$</sup><br>Time Base<br>Volt | 1 ns to 5 s<br>Square Wave Signal<br>2mV to 100Vp(1MΩ)<br>DC Signal<br>1mV to 100V(1MΩ) | 50 ppm<br>0.38% to 0.12%<br>0.5% to 0.058% | Using Multi-function<br>Calibrator with Scope<br>Option, Fluke-5520A by<br>Direct Method |
|     | Bandwidth                                       | 50kHz to 1100MHz  | 2.9% to 5.5%                               |  |
|     | Oscilloscope*                                   |   |  | Using Multi-function   |
|     | Time Base                                       | 1ns to 5s   | 50ppm                                      | Calibrator, Fluke-5520A  |
|     | Volt  | Square Wave Signal<br>2mV to 100Vp(1MΩ)   | 0.38% to 0.12%                             |  |
|     |   | DC Signal<br>1mV to 100V(1MΩ)   | 0.5% to 0.058%                             |  |
|     | Bandwidth                                       | 50kHz to 1100MHz  | 4% to 5.5%                                 |  |

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|-----|---|---|--|--|
| 12. | Temperature Simulatio<br>For Temperature Indica   | n –<br>ator/ Controller <sup>#</sup>  |  |  |
|     | RTD - Pt 385 Ω<br>Thermocouple<br>T/C- B-Type<br>T/C-E-Type<br>T/C-J-Type<br>T/C-K-Type<br>T/C-N-Type<br>T/C-R-Type<br>T/C-R-Type<br>T/C-S-Type<br>T/C-T-Type | (-)200°C to 800°C<br>600°C to 1820°C<br>(-)250°C to 1000°C<br>(-)210°C to 1200°C<br>(-)200°C to 1372°C<br>(-)200°C to 1300°C<br>0°C to 1767°C<br>0°C to 1767°C<br>(-)250°C to 400°C | 0.08°C to 0.28°C<br>0.52°C<br>0.58°C<br>0.31°C<br>0.46°C<br>0.47°C<br>0.57°C<br>0.57°C<br>0.90°C | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method                      |
|     | Temperature<br>Simulation – For<br>Temperature<br>Indicator/ Controller <sup>\$</sup><br>C- Thermocouple<br>Type  | 0°C to 2316°C   | 0.97°C   | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method                      |
| 13. | DC Power <sup>\$</sup>  | 100mV to 1000V,<br>100mA to 20A   | 0.08%  | Using Multi-function<br>Calibrator with Scope<br>Option, Fluke-5520A by<br>Direct Method |
|     |   | <b>50Hz @ UPF</b><br>120V to 240V<br>0.01A to 20A<br>1.2W to 4.8kW  | 0.12%  |  |
|     |   | <b>50Hz @ 0.8 pF</b><br>120V to 240V<br>0.1A to 20A<br>9.6W to 3.8kW  | 0.23%  |  |

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|-----|---|--|--|---|
|     |   | <b>50Hz @ 0.5Pf</b><br>120V to 240V<br>0.1A to 20A<br>6W to 2.4kW                | 0.5%   | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method             |
|     |   | 50Hz @ 0.2pF<br>120V to 240V<br>0.1A to 20A<br>2.4W to 960W                      | 1.23%  |   |
| 15. | Power Factor/<br>Phase Angle <sup>\$</sup>                    | 40 Hz to 62.5Hz<br>24V to 480 V,<br>0.04A to 100 A<br>0.01 to UPF<br>(0 to 360°) | 0.0011%  | Using Precision Power<br>Calibration System<br>(PPCS)/ Zera By Direct<br>Method |
| 16. | AC Power/ Energy <sup>\$</sup><br>1 Phase &<br>3 Phase 4 Wire | <b>40Hz to 62.5Hz</b><br>24V to 480V<br>40mA to 100A<br>PF = 0.01 to 1           | 16ppm to 35ppm/PF  | Using Precision Power<br>Calibration System<br>(PPCS)/ Zera By Direct           |
|     | Active  | 0.0096W to 48kW<br>0.0288W to 144kW  |  | Method  |
|     | Apparent  | 0.96VA to 48kVA<br>2.88VA to 144kVA  |  |   |
|     | Reactive  | 0.0096VAr to 48kVAr<br>0.0288VAr to 144kVAr                                      |  |   |
| II. | MEASURE   |  |  |   |
|     | DC Voltage <sup>\$</sup>                                      | 1 mV to 100mV<br>100mV to 10V<br>10V to 100V<br>100V to 1000V                    | 120 ppm to 15 ppm<br>15 ppm to 10 ppm<br>10 ppm to 12 ppm<br>12.29 ppm | Using 8½ Digital<br>Multimeter Wavetek/<br>1281 by Direct Method                |

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|-----|-----------------------------------|--|---|---|
|     | DC Voltage*                       | 1mV to 100mV<br>100mV to 1V<br>1V to 10V<br>10V to 100V<br>100V to 1000V | 1.95 % to 0.03 %<br>0.03 % to 0.008 %<br>0.008 % to 0.005 %<br>0.006 %<br>0.006 % | Using 6 ½ Digital<br>Multimeter, Keithley/<br>2000 by Direct Method |
|     | DC High Voltage <sup>#</sup>      | 1kV to 28 kV   | 2.45%   | Using High Voltage<br>Probe Fluke by Direct<br>Method               |
|     | AC Voltage <sup>\$</sup>          | 50 Hz to 1 kHz<br>1mV to100mV<br>100mV to 100V<br>100V to 1000V          | 0.38% to 0.011%<br>0.011% to 0.012%<br>0.012%                                     | Using 8½ Digital<br>Multimeter Wavetek/<br>1281 by Direct Method    |
|     | AC Voltage*                       | 50Hz<br>1mV to1V<br>1V to 10V<br>10V to 100V<br>100V to 750V             | 1.01% to 0.12%<br>0.12%<br>0.047%<br>0.06%  | Using 6½ Digital<br>Multimeter, Keithley/<br>2000 by Direct Method  |
|     | AC High Voltage <sup>\$</sup>     | <b>50Hz</b><br>1kV to 20 kV  | 8%  | Using High Voltage<br>Probe Fluke/80K-40<br>by Direct Method        |
|     | AC High Voltage <sup>◆</sup>      | <b>50Hz</b><br>1kV to 15kV   | 8%  | Using High Voltage<br>Probe Fluke/80K-40<br>by Direct Method        |
|     |                                   | 1μA to 100μA<br>100μA to 1mA<br>1mA to 100mA<br>100mA to 1A              | 0.25% to 0.010%<br>0.010% to 0.012%<br>0.012%<br>0.012% to 0.025%                 | Using 8½ Digital<br>Multimeter Wavetek/<br>1281 by Direct Method    |

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|-----|-----------------------------------|--|---|--|
|     |                                   | 1A to 10A  | 2.68%   | Using Power Analyzer<br>by Direct Method   |
|     | DC Current*                       | 1mA to 10mA<br>10mA to 100mA<br>100mA to 1A<br>1A to 3A                            | 0.07%<br>0.07% to 0.15%<br>0.15%<br>0.15% to 0.16%        | Using 6½ Digital<br>Multimeter, Keithley/<br>2000 by Direct Method   |
|     |                                   | <b>50 Hz to 1 kHz</b><br>30 μA to 100 μA<br>100 μA to 100 mA<br>100 mA to 1 A      | 0.08 % to 0.047%<br>0.047 % to 0.035%<br>0.035% to 0.085% | Using 8½ Digital<br>Multimeter Wavetek/<br>1281 by Direct Method   |
|     |                                   | <b>50Hz to 1kHz</b><br>1A to 20A   | 1.25%   | Using Power Analyzer<br>by Direct Method   |
|     |                                   | 5A to 3200A  | 0.15%   | Using Precision Current<br>Transformer, Eltel/<br>AITTS-98 - Automatic<br>instrument transformer<br>test set (AITTS) by<br>Direct Method |
|     | AC Current*                       | <b>50Hz to 1kHz</b><br>100mA to 1A<br>1A to 3A                                     | 0.21%<br>0.21% to 0.27%                                   | Using 6½ Digital<br>Multimeter, Keithley/<br>2000 by Direct Method   |
|     |                                   | <b>1kHz to 5kHz</b><br>30μA to 100μA<br>100μA to 100mA<br>100mA to 1A<br>1A to 10A | 0.078%<br>0.078% to 0.042%<br>0.042% to 0.24%<br>0.24%    | Using 8½ Digital<br>Multimeter Wavetek/<br>1281 by Direct Method   |
|     |                                   | <b>1kHz to 5kHz</b><br>10A to 20A  | 1.25%   | Using Power Analyzer<br>by Direct Method   |

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|-----|-----------------------------------|---|--|--|
|     |                                   | <b>40 Hz to 70Hz</b><br>10mA to 120A  | 0.013 to 0.05%   | Using Ref. Power/<br>Energy Comparator,<br>COM3003 by Direct<br>Method         |
|     | DC Resistance <sup>\$</sup>       | 0.01Ω to 100Ω<br>100Ω to 10kΩ<br>10kΩ to 1MΩ<br>1MΩ to 10MΩ<br>10MΩ to 100MΩ<br>100 MΩ to 1000MΩ          | 0.77% to 0.0017%<br>0.0017% to 0.0014%<br>0.0014% to 0.0028%<br>0.0028% to 0.017%<br>0.017% to 0.106%<br>0.106% to 0.35% | Using 8½ Digital<br>Multimeter Wavetek/<br>1281 by Direct Method               |
|     |                                   | 1GΩ to 10GΩ<br>10GΩ to 1TΩ  | 0.48% to 1.10%<br>1.10% to 4.28%   | Using High Resistance<br>Meter - Keithley/ 6517A<br>by Direct Method           |
|     | DC Resistance*                    | 1Ω to 100Ω<br>100Ω to 1kΩ<br>1kΩ to 10kΩ<br>10kΩ to 100kΩ<br>100kΩ to 1MΩ<br>1MΩ to 10MΩ<br>10MΩ to 100MΩ | 0.18%<br>0.023%<br>0.014%<br>0.014%<br>0.024%<br>0.085%<br>0.196%  | Using 6½ Digital<br>Multimeter, Keithley/<br>2000 by Direct Method             |
| 6.  | Inductance <sup>\$</sup>          | <b>1 kHz</b><br>0.1mH to 10H  | 0.37% to 0.14%   | Using Precision LCR<br>Meter, Agilent/ 4284A<br>by Direct Method               |
| 7.  | Capacitance <sup>§</sup>          | <b>1 kHz</b><br>0.01nF to 1mF   | 0.61% to 1%  | Using Precision LCR<br>Meter, Agilent/ 4284A<br>by Direct Method               |
|     | Frequency <sup>\$</sup>           | 1Hz to 2.7GHz   | 0.30 ppm to 0.030 ppm  | Using High Resolution<br>Frequency Counter<br>Fluke/ 6680B by Direct<br>Method |

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| SI. | Quantity Measured /<br>Instrument   | Range/Frequency  | *Calibration Measurement<br>Capability (±)                                   | Remarks  |
|-----|---|--|--|--|
|     | Frequency*  | DC to 300kHz   | 0.02%  | Using 6½ Digital<br>Multimeter, Keithley/<br>2000 by Direct Method   |
|     | Time/ Time Interval <sup>\$</sup>   | 60 s to 8 hr   | 0.35s  | Using High Resolution<br>Frequency Counter<br>Fluke/ 6680B by Direct<br>Method   |
|     | Time/ Time Interval*  | 10 s to 8 hr.  | 0.35s  | Using Stop Watch by<br>Direct Method   |
|     | Temperature<br>Simulation – For<br>Temperature<br>Indicator/ Controller <sup>#</sup><br>T/C- B-Type<br>T/C-E-Type<br>T/C-K-Type<br>T/C-K-Type<br>T/C-N-Type<br>T/C-R-Type<br>T/C-S-Type<br>T/C-T-Type | 600°C to 1820°C<br>(-)250°C to 1000°C<br>(-)210°C to 1200°C<br>(-)200°C to 1372°C<br>(-)200°C to 1300°C<br>0°C to 1767°C<br>0°C to 1767°C<br>(-)250°C to 400°C | 0.51°C<br>0.78°C<br>0.33°C<br>0.49°C<br>0.31°C<br>0.80°C<br>0.80°C<br>0.90°C | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method  |
|     | Temperature<br>Simulation – For<br>Temperature<br>Indicator/ Controller <sup>\$</sup><br>T/C- C- Type<br>RTD/ Pt-100  | 0°C to 2316°C<br>(-)200°C to 850°C   | 0.97°C<br>0.034°C  | Using Multi-function<br>Calibrator, Fluke-5520A<br>by Direct Method<br>Using Self-Cal DMM<br>Datron/1281 by Direct<br>Method |

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| SI. | Quantity Measured /<br>Instrument  | Range/Frequency   | *Calibration Measurement<br>Capability (±)                       | Remarks  |
|-----|--|---|--|--|
|     | Temperature<br>Simulation – For<br>Temperature<br>Indicator/ Controller<br>RTD/ Pt-100 *     | (-)200°C to 850°C   | 0.034°C  | Using 6½ Digital<br>Multimeter, Keithley/<br>2000 by Direct Method   |
| 11. | R.F. Level <sup>\$</sup><br>(500 KHz to<br>18 GHz -Sensor<br>Dependent)                      | 100 kHz to 4.2 GHz<br>(-)50 dBm to 13 dBm                       | 4.64 % to 6 %  | Using Synthesized<br>Signal Generator<br>R & S /100A RF Power<br>Meter Boonton/ 5321<br>by Direct Method   |
| 12. | Current Transformer <sup>\$</sup><br>(Primary Injection)<br>Ratio Error<br>Phase Angle Error | 5A to 3200A (Primary)<br>1A & 5A (Secondary)                    | Ratio Error :<br>0.052 to 0.066%<br>Phase Error :<br>2.53 Minute | Using Precision Current<br>Transformer &<br>Automatic Instrument<br>transformer test set<br>(AIITS), Eltel/ AITTS-98<br>by Comparison Method                                 |
| 13. | Potential<br>Transformer <sup>\$</sup><br>Ratio Error<br>Phase Angle Error                   | 6.6kV/√3 to 33kV<br>(Primary)<br>110V/√3 to 110V<br>(Secondary) | Ratio Error :<br>0.075 %<br>Phase Error:<br>3.43 Minute          | Using Electronic<br>Potential Divider 33kV &<br>Standard Capacitor with<br>Automatic Instrument<br>transformer test set<br>(AIITS) – Eltel/ AITTS-98<br>by Comparison Method |

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|-----|---|--|--|--|
| 14. | AC Power/ Energy <sup>\$</sup><br>1 Phase & 3 Phase | <b>40Hz to 70Hz</b><br>40V to 320V<br>10mA to 120A<br>PF = 0.25 to 1   | 0.013% to 0.03% PF                         | Using Reference Power/<br>Energy Comparator,<br>COM3003 - by Direct /                      |
|     | Active  | 0.1W to 38.4kW<br>0.3W to 115.2kW                                      |  | Comparison Method  |
|     | Apparent  | 0.4VA to 38.4kVA<br>1.2VA to 115.2kVA                                  |  |  |
|     | Reactive  | 0.1VAr to 38.4kVAr<br>0.1VAr to 115.2kVAr                              |  |  |
| 15. | Power Factor <sup>\$</sup>                          | <b>40Hz to 70Hz</b><br>0.01 to UPF<br>Lead/ Lag                        | 0.007PF                                    | Using Reference Power/<br>Energy Comparator,<br>COM3003 - by Direct /<br>Comparison Method |
| 16. | AC Power/ Energy*<br>1 Phase & 3 Phase              | <b>40Hz to 62.5Hz</b><br>40V to 320V<br>10mA to 120A<br>PF = 0.25 to 1 | 0.029% to 0.051% PF                        | Using Reference Power/<br>Energy Standard EPZ-<br>303-5 - by Direct /<br>Comparison Method |
|     | Active  | 0.1W to 38.4kW<br>0.3W to 115.2kW                                      |  |  |
|     | Apparent  | 0.4VA to 38.4kVA<br>1.2VA to 115.2kVA                                  |  |  |
|     | Reactive  | 0.1VAr to 38.4kVAr<br>0.1VAr to 115.2kVAr                              |  |  |

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| SI.   | Quantity Measured /<br>Instrument | Range/Frequency       | *Calibration M<br>Capability (±) | leasuremei                         | nt Remarks          |

| !   | l                       |                   |       |                        |
|-----|-------------------------|-------------------|-------|------------------------|
| 17. | Harmonics <sup>\$</sup> | 2nd to 40th Order |       |                        |
|     |                         | 40Hz to 70Hz      |       |                        |
|     | Voltage Harmonics,      | 10 V to 240V      | 0.47% | Using Reference Power/ |
|     | Current Harmonics       | 10mA to 50A       | 0.8%  | Energy Comparator,     |
|     |                         |                   |       | COM3003 - by Direct /  |
|     |                         |                   |       | Comparison Method      |

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|-----|---|--|--|---|
|     |   | FLUID FLOW (                                   | CALIBRATION                                |   |
| 1.  | FLOW MEASURING D                          | EVICES   |  |   |
| 1.  | Liquid Volume <sup>\$</sup><br>(Water)    | 0.2 m <sup>3</sup> to 2.0 m <sup>3</sup>       | 0.5 % of rdg.                              | Using 3 Ton Weighing<br>System by Gravimetric<br>Method as per ISO 4185 |
| 2.  | Volume Flow Rate <sup>\$</sup><br>(Water) | 1.0 m <sup>3</sup> /h to 200 m <sup>3</sup> /h | 0.6 % of rdg.                              | Using 3 Ton Weighing<br>System by Gravimetric<br>Method as per ISO 4185 |
| 3.  | Liquid Volume <sup>\$</sup><br>(Water)    | 0.3 m <sup>3</sup> to 2.0 m <sup>3</sup>       | 0.7 % of rdg.                              | Using Electro-magnetic<br>Flow Meter DN80 by<br>Comparison Method       |
| 4.  | Volume Flow Rate <sup>\$</sup><br>(Water) | 3.0 m <sup>3</sup> /h to 200 m <sup>3</sup> /h | 0.7 % of rdg.                              | Using Electro-Magnetic<br>Flow Meter by<br>Comparison Method            |

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| SI.        | Quantity Measured /<br>Instrument   | Range/Frequency   | *Calibration Measurement<br>Capability (±)          | Remarks  |  |
|            |   | MECHANICAL (  | CALIBRATION   |  |  |
| I.         | DIMENSION (BASIC  | MEASURING INSTRUMEN   | T, GAUGE ETC.)                                      |  |  |
| 1.         | Calipers <sup>\$</sup><br>(All Type)<br>L.C.: 10 μm<br>L.C.: 20 μm              | 0 to 200 mm<br>0 to 600 mm  | 17 μm<br>28 μm                                      | Using Gauge Block Set<br>& Caliper Checker by<br>Comparison method<br>as per IS 3651 |  |
| 2.         | Height Gauge <sup>\$</sup><br>(All Type)<br>L.C.: 20 µm                         | 0 to 600 mm   | 25 µm   | Using Gauge Block Set<br>& Caliper Checker by<br>Comparison method<br>as per IS 2921 |  |
| 3.         | External Micrometer <sup>\$</sup><br>L.C.: 1 µm<br>L.C.: 10 µm                  | 0 to 25 mm<br>25 mm to 150 mm<br>150 mm to 300 mm<br>0 to 25 mm<br>25 mm to 150 mm<br>150 mm to 300 mm                                    | 2.1 μm<br>3.7 μm<br>5.7 μm<br>6 μm<br>7 μm<br>11 μm | Using Gauge Block Set<br>by Comparison method<br>as per IS 2967                      |  |
| 4.         | Micrometer Head/<br>Depth Micrometer <sup>\$</sup><br>L.C.: 1 µm<br>L.C.: 10 µm | 0 to 25 mm<br>0 to 25 mm  | 2.6 µm<br>6 µm                                      | Using ULM by<br>Comparison method<br>as per IS 9483                                  |  |
| 5.         | Micrometer Setting<br>Rods <sup>\$</sup>  | 25 mm to $\leq$ 100 mm<br>> 100 mm to $\leq$ 200 mm<br>> 200 mm to $\leq$ 300 mm<br>> 300mm to $\leq$ 400 mm<br>> 400 mm to $\leq$ 500 mm | 1.9 μm<br>2.5 μm<br>3.1 μm<br>4.2 μm<br>5.3 μm      | Using Gauge Block Set<br>& ULM by Comparison<br>method                               |  |

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| SI. | Quantity Measured /<br>Instrument                                     | Range/Frequency   | *Calibration Measurement<br>Capability (±) | Remarks   |
|-----|---|---|--|---|
| 6.  | Plunger Type Dial<br>Gauge <sup>\$</sup><br>L.C.: 1 μm<br>L.C.: 10 μm | 0 to 25 mm<br>0 to 30 mm                                  | 1.5 μm<br>7.5 μm                           | Using Gauge Block Set<br>& ULM by Comparison<br>method as per IS 2092           |
| 7.  | Lever Type Dial<br>Gauge <sup>\$</sup><br>L.C.: 2 µm                  | 0 to 1 mm   | 1.6 µm                                     | Using ULM by<br>Comparison method<br>as per IS 11498                            |
| 8.  | Plain Plug Gauge <sup>\$</sup>  | 1 mm to 100 mm  | 2.2 μm                                     | Using Gauge Block Set<br>& ULM by Comparison<br>method as per IS 3455           |
| 9.  | Plain Ring Gauge <sup>\$</sup>  | 3 mm to 15 mm<br>15 mm to 100 mm                          | 1.5 μm<br>2.2 μm                           | Using Ring Gauge,<br>ULM & Stylus Tip by<br>Comparison method<br>as per IS 3485 |
| 10. | Feeler Gauge/<br>Thickness Gauge <sup>\$</sup>                        | 0.03 mm to 1 mm   | 1.2 μm                                     | Using ULM by<br>Comparison method<br>as per IS 3179                             |
| 11. | Universal Length<br>Measuring Machine <sup>\$</sup><br>L.C.: 0.01 μm  | 0 to ≤ 10 mm<br>> 10 mm to ≤ 50 mm<br>> 50 mm to ≤ 100 mm | 0.52 μm<br>0.92 μm<br>1.48 μm              | Using Gauge Block<br>Set by Comparison<br>Method                                |
| 12. | Bevel Protractor <sup>\$</sup><br>L.C.: 5 Min.                        | 0 to 360 °  | 4 min. of Arc                              | Using Angle Gauge<br>Block Set by<br>Comparison method<br>as per IS 4239        |

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| SI. | Quantity Measured /<br>Instrument   | Range/Frequency  | *Calibration Measurement<br>Capability (±) | Remarks  |
|-----|---|--|--|--|
| 13. | Combination Set <sup>\$</sup><br>L.C.: 1 °                                      | 0 to 180 °   | 35 min.                                    | Using Angle Gauge<br>Block Set by<br>Comparison method<br>as per IS 4239                             |
| 14. | Internal Micrometer <sup>\$</sup><br>L.C.: 1 μm<br>L.C.: 10 μm                  | 5 mm to 50 mm<br>50 mm to 300 mm   | 3.7 μm<br>9 μm                             | Using Gauge Block Set,<br>Gauge Block<br>Accessories & ULM<br>by Comparison method<br>as per IS 2966 |
| 15. | Long Slip Gauge <sup>\$</sup>   | <ul> <li>&gt; 100 mm to ≤ 200 mm</li> <li>&gt; 200 mm to ≤ 300 mm</li> <li>&gt; 300 mm to ≤ 400 mm</li> <li>&gt; 400 mm to ≤ 500 mm</li> </ul> | 2.3 μm<br>2.9 μm<br>3.5 μm<br>4.2 μm       | Using Gauge Block Set<br>& ULM by Comparison<br>method as per<br>as per ISO 3650                     |
| 16. | Thread Measuring<br>Wire/ Sphere <sup>\$</sup>                                  | 0.17 mm to 6.35 mm   | 1.1 μm                                     | Using ULM by<br>Comparison method<br>as per IS 6311  |
| 17. | Ultrasonic Thickness<br>Gauge <sup>\$</sup><br>L.C.: 10 µm                      | 0.3 mm to 95 mm  | 375 μm                                     | Using Thickness Master<br>& Thickness Gauge by<br>Comparison method                                  |
| II. | DIMENSION (PRECIS   | ON INSTRUMENTS)  |  |  |
| 1.  | Profile Projector <sup>\$</sup><br>Linear L.C.: 0.001mm<br>Angular L.C.: 0.001° | 0 to 50 mm<br>0 to 360 °   | 3.6 μm<br>2 min of Arc                     | Using Glass Scale,<br>Gauge block Set and<br>Angle Gauge Block Set<br>by Comparison Method           |

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| SI.  | Quantity Measured /<br>Instrument   | Range/Frequency                   | *Calibration Measurement<br>Capability (±)            | Remarks   |
|------|---|-----------------------------------|---|---|
| 111. | ACCELERATION AND  | SPEED                             |   |   |
| 1.   | Rpm <sup>#</sup><br>Tachometer<br>(Contact Type)  | 100 RPM to 3000 RPM               | 1 % rdg.  | Using RPM source and<br>Digital Tachometer by<br>Comparison method                |
| IV.  | PRESSURE INDICATI   | NG DEVICES                        | <u> </u>  |   |
|      |   | 3 bar to 34.7 bar (g)             | (0.0035 bar +<br>163E-06 x p)<br>Where p is pressure  |   |
|      |   | 13.8 bar to 689.5 bar (g)         | (0.035 bar +<br>186E-06 x p)<br>Where p is pressure   |   |
| 2.   | Pressure<br>(Pneumatic) <sup>\$</sup><br>Digital/Analog<br>Pressure Gauge,<br>Digital Pressure<br>Calibrator,<br>Pressure Transmitter,<br>Pressure Recorder | 0.07 bar to 1.37 bar (g)          | (0.00006 bar +<br>160E-06 x p)<br>Where p is pressure | Using Pneumatic Dead<br>Weight Tester by<br>Comparison method as<br>per DKD-R 6-1 |
| 3.   | Pressure<br>(Pneumatic) <sup>\$</sup><br>Vacuum Gauge,<br>Vacuum Calibrator   | (-)0.89 bar to<br>(-)0.07 bar (g) | (0.00004 bar +<br>160E-06 x p)<br>Where p is pressure | Using Pneumatic Dead<br>Weight Tester by<br>Comparison method<br>as per DKD-R 6-2 |
| 4.   | Pressure<br>(Pneumatic) <sup>\$</sup><br>Absolute Pressure<br>Gauge, Absolute<br>Pressure Calibrator,<br>Barometer  | 800 mbar to<br>1100 mbar (abs)    | 2.3 mbar  | Using Digital Pressure<br>Calibrator by Direct<br>Comparison method               |

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| <b>C</b> 1 |  |  | *Calibratian Massurament  | Demerice   |
|------------|--|--|---|--|
| SI.        | Quantity Measured /  | Range/Frequency  | Campration measurement  | Remarks  |
|            | manument   |  |   |  |
| 5.         | Pressure (Hydraulic)*<br>Pressure Gauge,<br>Pressure Transmitter,<br>Pressure Recorder,<br>Pressure Calibrator | 34.47 bar to 344.7 bar(g)  | 0.43 bar  | Using Digital Pressure<br>Calibrator by<br>Comparison method as<br>per DKD-R 6-1   |
| V.         | ACCOUSTIC  |  |   |  |
| 1.         | Sound Level <sup>#</sup><br>Sound Level Meter  | <b>1kHz</b><br>94 dB & 114 dB  | 0.66 dB   | Using Sound Level<br>Calibrator by Direct<br>Comparison method   |
| VI.        | WEIGHTS  |  |   |  |
|            | Mass/Weights <sup>\$</sup><br>(Conventional Mass)<br>Calibration of F2<br>Class Weights And<br>Coarser         | 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<br>50 g<br>100 g<br>200 g | 0.02 mg<br>0.02 mg<br>0.02 mg<br>0.025 mg<br>0.03 mg<br>0.04 mg<br>0.05 mg<br>0.06 mg<br>0.06 mg<br>0.108 mg<br>0.12 mg<br>0.12 mg<br>0.14 mg<br>0.16 mg<br>0.18 mg<br>0.25 mg<br>0.25 mg<br>0.3 mg | Using Standard weights<br>of E2 Class & Precision<br>Balances upto 50g<br>by Comparison method<br>as per OIML R-111,<br>"ABBA" weighing cycle<br>Balance Used:<br>Cap: 50 g,<br>LC: 0.00001 g<br>Cap: 200 g,<br>LC: 0.0001 g |
|            | For Calibration of M2<br>Class Weights And<br>Courser  | 500 g<br>1 kg<br>2 kg<br>5 kg  | 19 mg<br>45 mg<br>85 mg<br>95 mg  | Using Standard weights<br>of E2 Class & Precision<br>Balances upto 1 kg<br>Balance Used:   |

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| SI.  | Quantity Measured /<br>Instrument   | Range/Frequency   | *Calibration Measurement<br>Capability (±) | Remarks   |
|------|---|---|--|---|
|      |   | 10 kg<br>20 kg<br>50 kg   | 450 mg<br>850 mg<br>950 mg                 | Cap: 1000 g,<br>LC: 0.02 g<br>Cap: 5000 g,<br>LC:0.1g<br>Cap: 10 kg,<br>LC: 0.0005 kg<br>Cap: 50 kg, LC: 0.001 kg |
| VII. | WEIGHING SCALE AN   | ND BALANCE  |  |   |
| 1.   | Electronic Weighing<br>Balances <sup>#</sup><br>Calibration of Class I<br>weighing balances &<br>coarser<br>$d \ge 0.01 \text{ mg}$<br>$d \ge 0.1 \text{ mg}$ | 1 mg to 50 g<br>> 50 g to 200 g   | 0.06 mg<br>0.3 mg                          | Using Standard weights<br>of E2 Class 1 mg to<br>200g as per OIML R 76  |
| 2.   | Calibration of Class II<br>weighing balances &<br>coarser $^{\#}$<br>d $\geq$ 50 mg<br>d $\geq$ 100 mg<br>d $\geq$ 500 mg<br>d $\geq$ 1 g                     | > 200 g to 1 kg<br>> 1 kg to 5 kg<br>> 5 kg to 10 kg<br>> 10 kg to 50 kg  | 150 mg<br>300 mg<br>1.5 g<br>3 g           | Using Standard weights<br>of E2 Class >200g to 50<br>kg as per OIML R 76  |
| 3.   | Calibration of Class<br>III & IV weighing<br>balances & coarser $\#$<br>d $\ge$ 10 g<br>d $\ge$ 50 g<br>d $\ge$ 100 g<br>d $\ge$ 200 g<br>d $\ge$ 250 g       | <ul> <li>&gt; 50 kg to 200 kg</li> <li>&gt; 200 kg to 500 kg</li> <li>&gt; 500 kg to 1000 kg</li> <li>&gt; 1000 kg to 2000 kg</li> <li>&gt; 2000 kg to 2500 kg</li> </ul> | 30 g<br>150 g<br>300 g<br>600 g<br>750 g   | Using Standard weights<br>of M1 Class >50kg to<br>2500 kg   |

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|-------|--|---|--|---|
| VIII. | VOLUME   |   |  |   |
| 1.    | Volume @27°C<br>Pipette <sup>\$</sup><br>(Piston Type)   | 10 μl to 100 μl<br>> 100 μl to 200 μl<br>> 200 μl to 1000 μl<br>> 1 ml to 10 ml | 0.8 μΙ<br>1.2 μΙ<br>5 μΙ<br>15 μΙ          | Using Precision Balance<br>(Cap: 50 g, LC: 0.00001<br>g) and Distilled water by<br>Gravimetric method<br>as per IS 8655-6 |
| 2.    | Volume @27°C<br>Conical flask,<br>Measuring Cylinder,<br>Beaker,<br>Volumetric Flask <sup>\$</sup> | ≥ 1 ml to 100 ml  | 0.5 % rdg.                                 | Using Precision Balance<br>and Distilled water by<br>Gravimetric method<br>as per ISO 4787                                |

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| Validity               | 19.11.2018 to 05.12.2019  | Last Ame | nded on 27.05.2019 |  |

| SI. | Quantity Measured /<br>Instrument        | Range/Frequency      | *Calibration Measurement<br>Capability (±) | Remarks   |  |  |  |
|-----|--|----------------------|--|---|--|--|--|
|     | THERMAL CALIBRATION                      |                      |  |   |  |  |  |
| l.  | TEMPERATURE                              |                      |  |   |  |  |  |
| 1.  | Calibration of SPRTs/                    | PRTs/Thermocouples A | At Fixed Points Of                         |   |  |  |  |
| a.  | Triple Point Of Water <sup>\$</sup>      | 0.01 °C              | 0.005 °C                                   | Using TPW Cell with<br>Maintenance Apparatus,<br>Resistance Bridge by<br>Fixed Point Calibration<br>as per ITS-1990         |  |  |  |
| b.  | Tin Freeze Point <sup>\$</sup>           | 231.928 °C           | 0.006 °C                                   | Using Tin Cell with<br>Maintenance Apparatus,<br>Resistance Bridge by<br>Fixed Point Calibration<br>as per ITS-1990         |  |  |  |
| C.  | Zinc Freeze Point <sup>\$</sup>          | 419.527 °C           | 0.0065 °C                                  | Using Zinc Cell with<br>Maintenance Apparatus,<br>Resistance Bridge by<br>Fixed Point Calibration<br>as per ITS-1990        |  |  |  |
| d.  | Aluminum Freeze<br>Point <sup>\$</sup>   | 660.323 °C           | 0.010 °C                                   | Using Aluminum Cell<br>with Maintenance<br>Apparatus, Resistance<br>Bridge by Fixed Point<br>Calibration as per<br>ITS-1990 |  |  |  |
| e.  | Triple Point Of<br>Mercury <sup>\$</sup> | (-)38.8344 °C        | 0.006 °C                                   | Using Mercury Cell with<br>Liquid Bath, Resistance<br>Bridge by Fixed Point<br>Calibration as per<br>ITS-1990               |  |  |  |

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| SI. | Quantity Measured /<br>Instrument   | Range/Frequency                         | *Calibration Measurement<br>Capability (±) | Remarks   |
|-----|---|---|--|---|
| f.  | Boiling Point Of LN2 <sup>\$</sup>  | ≈ -196 °C                               | 0.015 °C                                   | Using LN2 Comparator,<br>SPRT with Resistance<br>Bridge by Comparison<br>Method at B.P. of LN2              |
| 2.  | RTDs, T/Cs Sensor<br>With Or Without<br>Temperature<br>Indicator,<br>Temperature Gauge,<br>Temperature<br>Transmitter,<br>Glass Thermometer <sup>\$</sup> | (-)65 °C to 288 °C                      | 0.03 °C                                    | Using SPRT with<br>Temperature Readout &<br>Silicon/Methanol Oil<br>baths by Comparison<br>Method           |
| 3.  | RTDs, T/Cs Sensor<br>With Or Without<br>Temperature<br>Indicator,<br>Temperature Gauge,<br>Temperature<br>Transmitter <sup>§</sup>                        | 288 °C to 660 °C                        | 0.06 °C                                    | Using SPRT with<br>Temperature Readout &<br>Fluidized baths by<br>Comparison Method                         |
| 4.  | RTDS, T/Cs Sensor<br>With Or Without<br>Temperature<br>Indicator,<br>Temperature<br>Transmitter <sup>§</sup>  | 660 °C to 1300 °C                       | 1.45 °C                                    | Using Standard Type<br>"R" Thermocouple with<br>Temperature Readout &<br>TC Furnace by<br>Comparison Method |
| 5.  | Temperature<br>Indicator Of Bath/<br>Dry Block Calibrator/<br>Furnace <sup>\$</sup>   | (-)65 °C to 660 °C<br>660 °C to 1300 °C | 0.09 °C<br>1.59 °C                         | Using PRT Sensor/<br>Standard TC &<br>Temperature Scanner<br>(Single Position<br>Calibration)               |

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| SI. | Quantity Measured /<br>Instrument  | Range/Frequency                         | *Calibration Measurement<br>Capability (±) | Remarks   |
|-----|--|---|--|---|
| 6.  | Calibration Of Oven,<br>Bath, Freezer, Test<br>Chambers, Furnace <sup>#</sup>      | (-)65 °C to 150 °C                      | 1.58 °C                                    | Using PRT Sensors &<br>Temperature Scanner<br>(Multi Position<br>Calibration)                           |
|     |  | (-)45 °C to 140 °C<br>140 °C to 660 °C  | 0.12 °C<br>0.47 °C                         | Using PRT Scanner &<br>Metrology Well by<br>Comparison Method   |
|     |  | 660 °C to 1200 °C                       | 1.88 °C                                    | Using Standard Type<br>"R" Thermocouple with<br>Scanner & Dry Block<br>Furnace by Comparison<br>Method  |
| 8.  | Temperature<br>Indicator of Bath/<br>Dry Block Calibrator/<br>Furnace <sup>+</sup> | (-)45 °C to 660 °C<br>660 °C to 1200 °C | 0.47 °C<br>1.76 °C                         | Using PRT Sensor/<br>Standard Thermocouple<br>& Temperature Scanner<br>(Single Position<br>Calibration) |
| 11. | SPECIFIC HEAT AND HUMIDITY   |   |  |   |
| 1.  | Hygrometer, Humidity<br>Indicator With Inbuilt<br>Or External Sensor <sup>\$</sup> | 15% RH to 95 % RH<br>@≈25°C             | 1.69%RH<br>@≈25°C                          | Using Humidity Indicator<br>with Sensor & Humidity<br>Generator/chamber by<br>Comparison Method         |
| 2.  | Humidity Indicator<br>With Sensor Of<br>Chamber <sup>\$</sup>                      | 15% RH to 95 % RH<br>@≈25°C             | 1.69%RH<br>@≈25°C                          | Using Humidity Indicator<br>with Sensor (Single<br>Position Calibration)                                |

#### \* Measurement Capability is expressed as an uncertainty (±) at a confidence probability of 95% <sup>\$</sup>Only in Permanent Laboratory

\*Only for Site Calibration

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