

Laboratory **MPS Electrical Test Laboratory, Larsen & Toubro Limited, Mysore
Campus, KIADB Industrial Area, Hebbal Hootagalli, Mysore, Karnataka**

Accreditation Standard **ISO/IEC 17025: 2005**

Certificate Number **TC-5740 (In lieu of T-1283)**

Page 1 of 18

Validity **04.06.2017 to 03.06.2019**

Last Amended on --

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|-----|----------------------------|-------------------------|---|--|
|-----|----------------------------|-------------------------|---|--|

ELECTRICAL TESTING

| AT LABORATORY | | | | |
|--|--|-----------------|---|---|
| I. MEASURING INSTRUMENTS - ELECTRICAL AND ELECTRONIC (STATIC) ENERGY METERS | | | | |
| 1. | AC Static Watt-hour Meters(Class 1 & 2) Electronic Trivector Meter Special Energy Meter. Pre Payment Meter Smart Meter | Impulse voltage | IEC 62052-11 Clause 7.3.2 IEC 62053-21 Clause 7 IEC 62053-22 Clause 7 IEC 62053-23 Clause 7 IEC 60060-1 | ± 0.5kV to ±12kV (500Ω impedance) |
| | | Impulse voltage | CBIP-88, Clause 5.4.6.2 CBIP-304, Clause 5.4.6.2 CBIP 325 Clause 5.4.6.2 IEC 61000-4-5, IS13779 Clause 12.7.6.2, IS 14697 Clause 12.7.6.2, IS 15884 Clause 5.4.6.2, IEC 62055-31 Clause 7.7, IS 16444 (Part 1) Clause 6.10.6, IS 16444 (Part2) Clause 6.10.6 | ± 0.5kV to ±12kV 0.25-6kA (2 Ω impedance) |
| | | AC High Voltage | IS13779 Clause.12.7.6.3 IS 14697 Clause.12.7.6.3 IEC 62052-11 Clause.7.4 & Clause. No.7.3.3, IEC 62053-21 Clause. 7.4, IEC 62053-22 Clause.7.4, IEC 62053-23 Clause.7.4, CBIP-88 Clause 5.4.6.3, CBIP-304 Clause 5.4.6.3, CBIP-325 Clause 5.4.6.3, IS 15884 Clause 5.4.6.3, IEC 62055-31 Clause 7.7, IS 16444(Part 1) Clause 6.10.6, IS 16444 (Part2) Clause 6.10.6 | 1 kV to 5 kV 0.01 s to 180s |

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Convenor**

**N. Venkateswaran
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Certificate Number **TC-5740 (In lieu of T-1283)** **Page 2 of 18**

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| | | Insulation Resistance | IS13779 Clause 12.7.6.4 IS 14697 Clause 12.7.6.4 CBIP-88 Clause 5.4.6.4 CBIP-304 Clause 5.4.6.4 CBIP-325 Clause 5.4.6.4 IS 15884 Clause 5.4.6.4 IS 16444 (Part 1) Clause 6.10.6 IS 16444 (Part 2) Clause 6.10.6 | 20MΩ to 1000MΩ 0.01 s to 180 s At 500V DC +/- 50V DC |
| | | Limits of Error | IS13779 Clause 11.1 IS 14697 Clause 11.1 IEC 62052-11 IEC 62053-21 Clause 8.1 IEC 62053-22 Clause 8.1 IEC 62053-23 Clause 8.1 CBIP-88 Clause 5.6.8 & 4.6.1 CBIP-304 Clause 5.6.8 CBIP-325 Clause 5.6.8 IS 15884 Clause 5.6 & 4.6.1 IEC 62055-31 Clause No 8.1 IS 16444 (Part 1) Clause 6.12 IS 16444 (Part 2) Clause 6.12 | Single phase & Three phase: 40 V to 300 V 0.01 A to 120 A Cosφ/Sinφ: 0.2 to 1 (lag/Lead) 45 to 65 Hz |
| | | Meter constant | IS13779 Clause 12.15 IS 14697 Clause 12.14 IEC 62052-11 Clause 8.4 IEC 62053-21 IEC 62053-22 Clause 8.4 IEC 62053-23 Clause 8.4 CBIP-88 Clause 5.6.6 CBIP-304 Clause 5.6.6 | Single phase & Three phase: 40 V to 300 V 0.01 A to 120 A |

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| | | | CBIP-325 Clause 5.6.6 IS 15884 Clause 4.6.5 & 5.6.5 IEC 62055-31 Clause 8 IS 16444 (Part 1) Clause 6.12 IS 16444 (Part2) Clause 6.12 | |
| | | Starting condition | IS13779 Clause 12.14 IS 14697 Clause 12.13 IEC 62052-11 IEC 62053-21 Clause 8.3.3 IEC 62053-22 Clause 8.3.3 IEC 62053-23 Clause 8.3.3 CBIP-88 Clause 5.6.5 & 4.6.4.3 CBIP-304 Clause 4.6.9.1 & 4.6.9.3 & 5.6.5 CBIP-325 Clause 5.6.5 IS 15884 Clause 4.6.4.3 IEC 62055-31 Clause 8 IS 16444 (Part 1) Clause 6.12 IS 16444 (Part2) Clause 6.12 | Single phase & Three phase: 40 V to 300 V 0.01 A to 120 A |
| | | Initial Startup of the meter | IS 13779 Clause 12.14 IS 14697 Clause 12.13 IEC 62052-11 IEC 62053-21 Clause 8.3.1 IEC 62053-22 Clause 8.3.1 IEC 62053-23 Clause 8.3.1 CBIP-88 Clause 5.6.5 & 4.6.4.3 CBIP-304 Clause 4.6.9.1 & 4.6.9.3 & 5.6.5 CBIP-325 Clause 5.6.5 | Single phase & Three phase: 40 V to 300 V 0.01 s to 10 s |

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Certificate Number **TC-5740 (In lieu of T-1283)** **Page 4 of 18**

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| | | | IS 15884 Clause 4.6.4.3 IEC 62055-31 Clause 8 IS 16444 (Part 1) Clause 6.12 IS 16444 (Part2) Clause 6.12 | |
| | | No-Load Condition | IS13779 Clause 12.13 IS 14697 Clause 12.12 IEC 62052-11 Clause 8.3.2 IEC 62053-21 Clause 8.3.2 IEC 62053-22 Clause 8.3.2 IEC 62053-23 Clause 8.3.2 CBIP-88 Clause 5.6.4 CBIP-304 Clause 5.6.4 CBIP-325 Clause 5.6.4 IS 15884 Clause 4.6.4.2 & 5.6.3 IEC 62055-31 Clause 8 IS 16444 (Part 1) Clause 6.12 IS 16444 (Part2) Clause 6.12 | Single phase & Three phase: 40 V to 300 V |
| | | Repeatability of Errors | IS13779 Clause 12.17 IS 14697 Clause 12.16 CBIP-88 Clause 5.6.9 & 4.6.6 CBIP-304 Clause 5.6.9 CBIP-325 Clause 5.6.9 IS 15884 Clause 5.6.7 IS 16444 (Part 1) Clause 6.12 IS 16444 (Part2) Clause 6.12 | Single phase & Three phase: 0.01 A to 120 A |

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Certificate Number **TC-5740 (In lieu of T-1283)** **Page 5 of 18**

Validity **04.06.2017 to 03.06.2019** **Last Amended on --**

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|-----|----------------------------|---|---|--|
| | | Ambient temperature-Influence | IS13779 Clause 12.12 IS 14697 Clause 12.11 IEC 62052-11 Clause 8.2 IEC 62053-21 Clause.8.2 IEC 62053-22 Clause 8.2 IEC 62053-23 Clause 8.2 CBIP-88 Clause 5.6.3 & 4.6.3 CBIP-304 Clause. 5.6.3 CBIP-325 Clause. 5.6.3 IS 15884 Clause 4.6.3 IEC 62055-31 Clause 8 IS 16444 (Part 1)Clause 6.12 IS 16444 (Part2) Clause 6.12 | Single phase & Three phase: 40 V to 300 V 0.01 A to 120 A -40 °C to 70 °C |
| | | Test of Influence Quantities. -Voltage variation -Frequency variation - Reverse phase sequence. -Voltage Unbalance -Auxialary voltage - 10% of 3 rd harmonics in current circuit -5th harmonics in current and Voltage Circuits - Sub harmonics in AC current circuit. -Odd harmonics in AC current circuits -DC and even harmonics in ac current circuits | IS13779 Clause 12.11 IS 14697 Clause 12.10 IEC 62052-11 IEC 62053-21Clause 8.2 IEC 62053-22Clause 8.2 IEC 62053-23Clause 8.2 CBIP-88 Clause 5.6.2 & 4.6.2 CBIP-304 Clause 5.6.2 CBIP-325 Clause 5.6.2 IS 15884 Clause 4.6.2 IEC 62055-31 Clause 8 IS 16444 (Part 1)Clause 6.12 IS 16444 (Part2) Clause 6.12 | Single phase & Three phase: 40 V to 300 V 0.01 A to 120 A 45 Hz to 55 Hz |

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Certificate Number **TC-5740 (In lieu of T-1283)** **Page 8 of 18**

Validity **04.06.2017 to 03.06.2019** **Last Amended on --**

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|-----|----------------------------|---------------------------------|--|---|
| | | Influence of self-Heating. | IS13779 Clause 12.7.4 IS 14697 Clause 12.7.4 IEC 62052-11 Clause 7.3 IEC 62053-21 Clause 7.3 IEC 62053-22 Clause 7.3 IEC 62053-23 Clause 7.3 CBIP-88 Clause 5.4.4 CBIP-304 Clause 5.4.4 CBIP-325 Clause 5.4.4 IS 15884 Clause 4.4.4 & 5.4.4 IEC 62055-31 Clause 7.6 IS 16444 (Part 1) Clause 6.10.4 IS 16444 (Part2) Clause 6.10.4 | Single phase & Three phase: 40 V to 300 V, 0.01 A to 120 A |
| | | Influence of heating | IS13779 Clause 12.7.5 IS 14697 Clause 12.7.5 IEC 62052-11 Clause 7.2 IEC 62053-21 Clause 7 IEC 62053-22 Clause 7 IEC 62053-23 Clause 7 CBIP-88 Clause 5.4.5 CBIP-304 Clause 5.4.5 CBIP-325 Clause 5.4.5 IS 15884 Clause 4.4.5 & 5.4.5 IEC 62055-31 Clause 7.5 IS 16444 (Part 1) Clause 6.10.5 IS 16444 (Part2) Clause 6.10.5 | Single phase & Three phase: 40 V to 300 V, 0.01 A to 120 A Ambient to +100°C |
| | | Immunity to Earth / Phase fault | IS13779 Clause 12.8 IS 14697 Clause 12.17 IEC 62052-11 Clause 7.4 IEC 62053-21 Clause 7 | Three phase: 40 V to 300 V, 0.01 A to 120 A |

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Certificate Number **TC-5740 (In lieu of T-1283)**

Page 9 of 18

Validity **04.06.2017 to 03.06.2019**

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| | | | IEC 62053-22 Clause 7 IEC 62053-23 Clause 7 IS 16444 (Part 1) Clause 6.10.7 IS 16444 (Part2) Clause 6.10.7 | |
| | | Abnormal voltage conditions | CBIP-304 Clause 4.4.7 CBIP-325 Clause 4.4.7 IS 15884 Clause 4.4.2.6 IEC 62055-31 Clause 7.2.3 | 69 V to 519 V (P-P) 0.01 A to 120 A |
| | | Electrical fast transients Burst | IS13779 Clause 12.9.4 IS 14697 Clause 12.8.4 IEC 62052-11 Clause 7.5.4 IEC 62053-21 Clause 7 IEC 62053-22 Clause 7 IEC 62053-23 Clause 7 CBIP-88 Clause 5.5.4 CBIP-304 Clause 5.5.3 CBIP-325 Clause 5.5.3 IEC61000-4-4 ed. 3 IS 15884 Clause 5.5.4 IEC 62055-31 Clause 7.8.4 IS 16444 (Part 1) Clause 6.11 IS 16444 (Part2) Clause 6.11 | ± 0.5 kV to ± 4.0 kV (Power line, 1Ph & 3Ph) |
| | | Immunity to Electrostatic discharge | IS13779 Clause 12.9.2 IS 14697 Clause 12.8.2 IEC 62052-11 Clause 7.5.2 IEC 62053-21 Clause 7 IEC 62053-22 Clause 7 IEC 62053-23 Clause 7 CBIP-88 Clause 5.5.2 CBIP-304 Clause 5.5.2 CBIP-325 Clause 5.5.2 IEC61000-4-2 ed. 2 | Contact Discharge: ± 0.2kV to ±8kV Air Discharge: ±0.2kV to ±15kV |

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Certificate Number **TC-5740 (In lieu of T-1283)**

Page 11 of 18

Validity **04.06.2017 to 03.06.2019**

Last Amended on --

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| | | Radiated Emission using absorption clamp | IS13779 Clause.12.9.5 IS 14697 Clause.12.8.5 IS 6842 CBIP-88 Clause 5.5.5 IS 16444 (Part2) Clause 6.11 | 30 MHz to 300 MHz |
| | | Conducted Emission | IS13779 Clause 10.1 & 12.9.5 IS 14697 Clause 10.1 & 12.8.5 IEC 62052-11 Clause 7.5.8 IEC 62053-21 Clause 7 IEC 62053-22 Clause 7 IEC 62053-23 Clause 7 IS 6842 CBIP-88 Clause 5.5.5 CBIP-304 Clause 5.5.8 CBIP-325 Clause 5.5.5 CISPR 11 CISPR 22 (Class A & B) IS 15884 Clause 5.5.5 IEC 62055-31 Clause 7.8.8 IS 16444 (Part 1) Clause 6.11 IS 16444 Part2 Clause 6.11 | 150 kHz to 30 MHz (Power line, 1Ph & 3Ph) |
| | | Immunity to conducted disturbances, Induced by Radio frequency fields | IEC 62052-11 Clause 7.5.5 IEC 62053-21 Clause 7 IEC 62053-22 Clause 7 IEC 62053-23 Clause 7 CBIP-304 Clause 5.5.5 IEC 61000-4-6 IEC 62055-31 Clause 7.8.5 | 150 kHz to 230 MHz, 1 to 10V (CW), 80%AM |
| | | Damped oscillatory Wave immunity | IEC 62052-11 Clause 7.5.7 IEC 62053-21 Clause 7 IEC 62053-22 Clause 7 IEC 62053-23 Clause 7 | ± 0.5 kV to ± 2.5 kV 100kHz , 1 MHz (Power Line 1Ph and 3Ph) |

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Page 12 of 18

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| | | | CBIP-304 Clause 5.5.6 IEC 61000-4-18 IEC 62055-31 Clause 7.8.7 | |
| | | Dry heat | IS13779 Clause 12.6.1 IS 14697 Clause 12.6.1 IEC 62052-11 Clause 6.3.1 IEC 62053-21 Clause 6 IEC 62053-22 Clause 6 IEC 62053-23 Clause 6 CBIP-88 Clause 5.3.1 CBIP-304 Clause 5.3.1 CBIP-325 Clause 5.3.1 IS 9000 Part 3 IEC 60068-2-2 IS 15884 Clause 5.3.1 IEC 62055-31 Clause 6 IS 16444 (Part 1) Clause 6.9 IS 16444 (Part2) Clause 6.9 | Ambient to +100°C 1m X 1m X 1m |
| | | Cold | IS13779 Clause 12.6.2 IS 14697 Clause 12.6.2 IEC 62052-11 Clause 6.3.2 IEC 62053-21 Clause 6 IEC 62053-22 Clause 6 IEC 62053-23 Clause 6 CBIP-88 Clause 5.3.2 CBIP-304 Clause 5.3.2 CBIP-325 Clause 5.3.2 IS 9000 (Part 2) IEC 60068-2-1 IS 15884 Clause 5.3.2 IEC 62055-31 Clause 6 IS 16444 Part 1 Clause 6.9 IS 16444 Part2 Clause 6.9 | Ambient to (-) 40°C 1m X 1m X 1m |

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Certificate Number **TC-5740 (In lieu of T-1283)** **Page 13 of 18**

Validity **04.06.2017 to 03.06.2019** **Last Amended on --**

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| | | Damp heat (cyclic) | IS13779 Clause 12.6.3 IS 14697 Clause 12.6.3 IEC 62052-11 Clause 6.3.3 IEC 62053-21 Clause 6 IEC 62053-22 Clause 6 IEC 62053-23 Clause 6 CBIP-88 Clause 5.3.3 CBIP-304 Clause 5.3.3 CBIP-325 Clause 5.3.3 IS 9000 (Part 5) IEC 60068-2-30 IS 15884 Clause 5.3.3 IEC 62055-31 Clause 6 IS 16444 (Part 1) Clause 6.9 IS 16444 (Part2) Clause 6.9 | 25 °C to 55 °C 30 % to 95 % RH |
| | | Vibration | IS13779 Clause 12.3.2 IS 14697 Clause 12.3.2 IEC 62052-11 Clause 5.2.2.3 IEC 62053-21 Clause 5 IEC 62053-22 Clause 5 IEC 62053-23 Clause 5 CBIP-88 Clause 5.2.3 CBIP-304 Clause 5.2.3 CBIP-325 Clause 5.2.3 IS 9000 (Part 8) IEC 60068-2-6 IS 15884 Clause 5.2.3 IEC 62055-31 Clause 5.3 IS 16444 (Part 1) Clause 6.5 IS 16444 (Part2) Clause 6.5 | 10 Hz to 2 kHz 1000 kgf 5g |

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Certificate Number **TC-5740 (In lieu of T-1283)** **Page 14 of 18**

Validity **04.06.2017 to 03.06.2019** **Last Amended on --**

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| | | Spring hammer | IS 13779 Clause 12.3.3 IS 14697 Clause 12.3.3 IEC 62052-11 Clause 5.2.2.1 IEC 62053-21 Clause 5 IEC 62053-22 Clause 5 IEC 62053-23 Clause 5 CBIP-88 Clause 5.2.1 CBIP-304 Clause 5.2.1 CBIP-325 Clause 5.2.1 IS 15884 Clause 5.2.1 IEC 62055-31 Clause 5.3 IS 9000 (Part 7) IEC 60068-2-75 IS 16444 (Part 1) Clause 6.5 IS 16444 (Part2) Clause 6.5 | Qualitative (0.20 Nm to 0.5 Nm) |
| | | Protection against penetration of dust and water. | IS 13779 Clause 12.5 IS 14697 Clause 12.5 IEC 62052-11 Clause 5.9 IEC 62053-21 Clause 5 IEC 62053-22 Clause 5 IEC 62053-23 Clause 5 CBIP-88 Clause 5.2.5 CBIP-304 Clause 5.2.5 CBIP-325 Clause 5.2.5 IS 12063 IEC 60529 IS 15884 Clause 4.2.9 & 5.2.5 IEC 62055-31 Clause 5.10 IS 16444 (Part 1) Clause 6.5 IS 16444 (Part2) Clause 6.5 | IP5X: 1.0 X 1.0 X 1.0 m (Without suction) IPX1, IPX2: 1.0 X 1.0 X 0.4 m IPX3, IPX4 500mbar to 1500 mbar |

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Page 15 of 18

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| | | Resistance to heat and fire. | IS 13779 Clause 12.4 IS 14697 Clause 12.4 IEC 62052-11 Clause 5.8 IEC 62053-21 Clause 5 IEC 62053-22 Clause 5 IEC 62053-23 Clause 5 CBIP-88 Clause 5.2.4 CBIP-304 Clause 5.2.4 CBIP-325 Clause 5.2.4 IS 11000 (Part 2/ sec 1) IEC 60695-2-11 IS 15884 Clause 5.2.4 IEC 62055-31 Clause 5.9 IS 16444 (Part 1) Clause 6.4 IS 16444 (Part2) Clause 6.5 | 650 °C to 960 °C |
| | | Verification of General and constructional requirements (Except flammability, optical characteristics and heat deflection) Verification of Marking of meters | IS13779 Clause 6 & 7 IS 14697 Clause 6 & 7 IEC 62052-11 Clause 5 IEC 62053-21 Clause 5 IEC 62053-22 Clause 5 IEC 62053-23 Clause 5 CBIP-88 Clause 4.2 CBIP-304 Clause 4.2 CBIP-325 Clause 4.2 IS 15884 Clause 4 IEC 62055-31 Clause 5 IS 16444 (Part1) Clause 6.2 IS 16444 (Part2) Clause 6.2 | Upto 300 mm |
| | | Functional performance | IS 15884 Annex A IEC 62055-31 Annex A IS 16444 (Part 1) Clause 11 IS 16444 (Part2) Clause 10 | Qualitative |

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| | | No-Load Condition (Reference conditions) | IS13779 Clause 12.13 IS 14697 Clause 12.12 IEC 62052-11 Clause 8.3.2 IEC 62053-21 Clause 8.3.2 IEC 62053-22 Clause 8.3.2 IEC 62053-23 Clause 8.3.2 CBIP-88 Clause 5.6.4 CBIP-304 Clause 5.6.4 CBIP-325 Clause 5.6.4 IS 15884 Clause 4.6.4.2 & 5.6.3 IEC 62055-31 Clause 8 IS 16444 (Part 1) Clause 6.12 IS 16444 (Part2) Clause 6.12 | Single phase & Three phase Upto 300V |

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