| | | | | |
|---|---|---|---|---|
| **Laboratory** | **HBL Power Systems Limited, Central Test Facility, Survey No. 64 to 67 & 77 to 81, Village: Nandigaon, Mandal: Kothur, Dist: Mahaboob Nagar, Andhra Pradesh** | | | |
| **Accreditation Standard** | **ISO/IEC 17025: 2005** | | | |
| **Discipline** | **Electrical Testing** | **Issue Date** | **04.09.2013** | |
| **Certificate Number** | **T-1955** | **Valid Until** | **03.09.2015** | |
| **Last Amended on** | **-** | **Page** | **1 of 25** | |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **I. CELLS & BATTERIES** | | | |
| **1.** | **Lead Acid Starter Batteries** | | **IEC 60095-1 : 2006** | |
| | | 20 hr Capacity check Ce | Cl. Nos.: 9.1 & 10 | 4V to 12 V Batteries Upto 300 Ah |
| | | Reserve capacity check Cr, e | Cl. Nos.: 9.2 & 10 | 4V to 12 V Batteries Upto 300 Ah |
| | | Endurance test for batteries (Corrosion test) | Cl. Nos.: 9.6.1 & 10 | 4V to 12 V Batteries Upto 170 Ah |
| | | | **IEC 60254-1 : 2005** | |
| | | Capacity test (5 hr capacity) | Cl. No.: 5.2 | 2 V Cells Upto 3000 Ah & 4V to12 V Batteries Upto 300 Ah |
| | | Charge retention test | Cl. No.: 5.3 | 2 V Cells Upto 3000 Ah & 4V to12 V Batteries Upto 300 Ah |
| | | High-rate discharge performance test | Cl. No.: 5.4 | 2 V Cells Upto 2100 Ah & 4V to12 V Batteries Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Cyclic endurance test | Cl. No.: 5.5 | 2 V Cells<br>Upto 1600 Ah &<br>4V to12 V Batteries<br>Upto 300 Ah |
| **2.** | **Lead-acid Traction Batteries** | | **IEC 60254-2 : 2008** | |
| | | Main dimensions of traction battery cells | Cl. No.: 3 | Upto 300 mm / 0.01 mm<br>&<br>Upto 1000 mm / 1 mm |
| | | Marking of polarity on traction battery cells and Dimensions of corresponding symbols (Visual examination) | Cl. No.: 4 | Upto 300 mm / 0.01 mm |
| | | Basic dimensions of traction battery terminals | Cl. No.: 5 | Upto 300 mm / 0.01 mm |
| **3.** | **Stationary Lead Acid Batteries - Vented Type** | | **IEC 60896-11 : 2002** | |
| | | Capacity test (240 hr, 20 hr, 10 hr, 8 hr, 5 hr, 3 hr, 2 hr, 1 hr & 0.5 hr) | Cl. Nos.: 7 & 14 | 2 V Cells<br>Upto 3000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test of suitability for floating battery operation | Cl. Nos.: 8 & 15 | 2 V Cells<br>Upto 3000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Endurance in discharge - charge cycles | Cl. Nos.: 9.1 & 16 | 2 V Cells<br>Upto 2700 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Endurance in over charge | Cl. Nos.: 9.2 & 17 | 2 V Cells<br>Upto 2100 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Charge retention test | Cl. Nos.: 10 & 18 | 2 V Cells<br>Upto 3000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Short circuit current & Internal resistance determination | Cl. Nos.: 11 & 19 | 2 V Cells<br>Upto 600 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| **4.** | **Stationary Lead Acid Batteries - Valve Regulated Types** | | **IEC 60896-21&22 : 2004** | |
| | | Gas emission | Cl. No.: 6.1 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Short circuit current and D.C. internal resistance | Cl. No.: 6.3 | 2 V Cells<br>Upto 600 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Discharge capacity (10 hr rate, 8 hr rate, 3 hr rate, 1 hr rate & 0.25 hr rate) | Cl. No.: 6.11 | 2 V Cells Upto 5000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Charge retention during storage | Cl. No.: 6.12 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Float service with daily discharges | Cl. No.: 6.13 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Recharge behaviour | Cl. No.: 6.14 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Abusive over-discharge | Cl. No.: 6.17 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| **5.** | **Aircraft Batteries** | | **IEC 60952-1 : 2004** | |
| | | Rated Capacity $C_1$ | Cl. No.: 5.1.1 | 4V to 12 V Batteries Upto 300 Ah |
| | | Capacity at 1 $I_1$ and 50° C | Cl. No.: 5.1.4 | 4V to 12 V Batteries Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Rapid discharge capacity at 23° C | Cl. No.: 5.3.1 | 4V to 12 V Batteries Upto 180 Ah |
| | | Charge retention | Cl. No.: 5.4 | 4V to 24 V Batteries Upto 300 Ah |
| | | Water consumption test | Cl. No.: 5.11 | 4V to 24 V Batteries Upto 300 Ah having weights: Upto 3 kg /0.2 gm Upto 30 kg / 2 gm Upto 150 kg / 20 gm |
| | | Overcharge endurance | Cl. No.: 5.12 | 4V to 24 V Batteries Upto 300 Ah |
| | | Cyclic endurance | Cl. No.: 5.13 | 4V to 24 V Batteries Upto 300 Ah |
| **6.** | **Secondary Cells and Batteries for Renewable Energy Storage** | | **IEC 61427-1 : 2013** | |
| | | Capacity Test (120 hr Rate & 10 hr Rate) | Cl. Nos.: 8.1 & 7.2 | 2 V Cells Upto 5000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Generic cycling endurance Test | Cl. Nos.: 8.2 & 7.2 | 2 V Cells Upto 2700 Ah & 4V to 12 V Batteries Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | | **IEC 61427-1 : 2013** | |
| | | Charge retention test | Cl. Nos.: 8.3 & 7.2 | 2 V Cells<br>Upto 3000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Cycling endurance test in photovoltaic applications (extreme conditions) | Cl. Nos.: 8.4 & 7.2 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| **7.** | **IEEE Standard for Qualification of Class 1E Lead Acid Storage Batteries for Nuclear Power Generation Stations** | | **IEEE Std. 535 - 2006** | |
| | | Aging Procedure | Cl. No.: 8.2 | 2 V Cells<br>Upto 1600 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| **8.** | **Lead acid Batteries – Stationary cells with positive tubular plates; Cells in plastic container** | | **DIN 40736-P1: 1992** | |
| | | Verification of dimensions & Weight | Page 4 | Upto 300 mm / 0.01 mm<br>Upto 1000 mm / 1 mm<br>Upto 3 kg / 0.2 gm<br>Upto 30 kg / 2 gm<br>Upto 150 kg / 20 gm |
| | | Capacity test (10 hr rate, 5 hr rate, 3 hr rate & 1 hr rate) | Page 4 | 2 V Cells<br>Upto 3000 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **9.** | **Lead acid batteries – Stationary valve regulated batteries with positive tubular plates and immobilized electrolyte** | | **DIN 40742 : 1999** | |
| | | Verification of dimensions & Weight | Page 3 | Upto 300 mm /0.01 mm<br>&<br>Upto 1000 mm / 1 mm<br>Upto 3 kg / 0.2 gm<br>Upto 30 kg / 2 gm<br>Upto 150 kg / 20 gm |
| | | Capacity test (10 hr rate, 5 hr rate, 3 hr rate & 1 hr rate ) | Page 3 | 2 V Cells<br>Upto 3000 Ah |
| **10.** | **Lead acid batteries – Stationary valve regulated batteries with positive tubular plates and immobilized electrolyte in Plastic-Monobloc Containers** | | **DIN 40744 : 1999** | |
| | | Verification of dimensions & Weight | Page 2 | Upto 300 mm / 0.01 mm<br>&<br>Upto 1000 mm / 1 mm<br>Upto 3 kg / 0.2 gm<br>Upto 30 kg / 2 gm<br>Upto 150 kg / 20 gm |
| | | Capacity test (10 hr rate, 5 hr rate, 3 hr rate & 1 hr rate) | Page 2 | 4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **11.** | **Accumulators; Tests; Sealed lead storage batteries with grid type plates and immobilized electrolyte, maintenance free** | | **DIN 43539-P5: 1984** | |
| | | Capacity test (20 hr & 1 hr) | Cl. No.: 8.2 | 2 V Cells<br>Upto 1800 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Durability in cycle | Cl. No.: 8.3 | 2 V Cells<br>Upto 1800 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Self-discharge | Cl. No.: 8.4 | 2 V Cells<br>Upto 1800 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Deep-discharge | Cl. No.: 8.5 | 2 V Cells<br>Upto 2700 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| **12.** | **Lead-acid starter batteries** | | **JIS D 5301 : 2006** | |
| | | Dimensions | Cl. No.: 9.5.1 | Upto 300 mm / 0.01 mm<br>&<br>Upto 1000 mm / 1 mm |
| | | Reserve capacity (RC) test $C_{r,e}$ | Cl. No.: 9.5.2a | 4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | 5 hr rate Capacity test $C_{5,e}$ | Cl. No.: 9.5.2b | 4V to 12 V batteries<br>Upto 300 Ah |
| | | Heavy load endurance test | Cl. No.: 9.5.5b | 4V to 12 V Batteries<br>Upto 300 Ah |
| | | Marking – Visual examination | Cl. No.: 12 | 4V to 12 V Batteries<br>Upto 300 Ah |
| | | Water consumption test | Annexure 1 – Sl. No. 2 | 4V to 12 V Batteries having weight:<br>Upto 3 kg / 0.2 gm<br>Upto 30 kg / 2 gm<br>Upto 150 kg / 20 gm |
| | | Electrolyte retention test | Annexure 1 – Sl. No. 3 | 4V to 12 V Batteries<br>Upto 300 Ah |
| **13.** | **Stationary Cells & Batteries, Lead-acid type (with Tubular Positive Plates)** | | **IS 1651 : 1991** | |
| | | Constructional requirements – Visual examination | Cl. No.: 6 | 2 V Cells<br>Upto 3000 Ah |
| | | Marking | Cl. No.: 8.1 | 2 V Cells<br>Upto 3000 Ah |
| | | Verification of dimensions | Cl. No.: 12.4 | Upto 300 mm / 0.01 mm<br>Upto 1000 mm / 1 mm |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Test for capacity (C1, C2, C3, C4, C5, C6, C7, C8, C9 & C10 rate of discharge) | Cl. No.: 12.5 | 2 V Cells Upto 3000 Ah |
| | | Loss of capacity on storage | Cl. No.: 12.7 | 2 V Cells Upto 3000 Ah |
| | | Endurance test | Cl. No.: 12.8 | 2 V Cells Upto 1600 Ah |
| | | Ampere-hour & Watt-hour efficiency tests | Cl. No.: 12.9 | 2 V Cells Upto 3000 Ah |
| | | Test for voltage during discharge | Cl. No.: 12.10 | 2 V Cells Upto 3000 Ah |
| **14.** | **Lead-acid storage batteries for Motor Vehicles** | | **IS 7372 : 1995** | |
| | | Physical examination | Cl. No.: 9.3 | 4V to 12 V Batteries Upto 300 Ah |
| | | Dimensions & Layout | Cl. No.: 9.4 | Upto 300 mm /0.01 mm & Upto 1000 mm / 1 mm |
| | | Marking – Visual examination | Cl. No.: 9.5 | 4V to 12 V Batteries Upto 300 Ah |
| | | Air pressure test | Cl. No.: 9.6 | 4V to 12 V Batteries Upto 300 Ah |
| | | Capacity test (10 hr & 20 hr rate) | Cl. No.: 9.7 | 4V to 12 V Batteries Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | | **IS 7372 : 1995** | |
| | | High rate discharge test at normal temperature | Cl. No.: 9.9 | 4V to 12 V Batteries Upto 300 Ah |
| | | High rate discharge test at normal temperature for batteries for Heavy duty application | Cl. No.: 9.11 | 4V to 12 V Batteries Upto 300 Ah |
| | | Retention of charge test | Cl. No.: 9.12 | 4V to 12 V Batteries Upto 300 Ah |
| | | Resistance to over charge test | Cl. No.: 9.13 | 4V to 12 V Batteries Upto 300 Ah |
| | | Storage test (2 Years in Dry condition) | Cl. No.: 9.15 | 4V to 12 V Batteries Upto 300 Ah |
| **15.** | **Stationary Lead-acid Batteries (with Tubular positive plates) in Monobloc Container** | | **IS 13369 : 1992** | |
| | | Constructional requirements | Cl. No.: 6 | 4V to 12 V Batteries Upto 300 Ah |
| | | Marking | Cl. No.: 8.1 | 4V to 12 V Batteries Upto 300 Ah |
| | | Verification of dimensions | Cl. No.: 11.4 | Upto 300 mm / 0.01 mm<br>Upto 1000 mm / 1 mm |
| | | Test for capacity (C1, C3, C5 & C10 rate of discharge) | Cl. No.: 11.5 | 4V to 12 V Batteries Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Loss of capacity on storage | Cl. No.: 11.6 | 4V to 12 V Batteries Upto 300 Ah |
| | | Endurance test | Cl. No.: 11.7 | 4V to 12 V Batteries Upto 300 Ah |
| | | Ampere-hour and Watt-hour efficiency tests | Cl. No.: 11.8 | 4V to 12 V Batteries Upto 300 Ah |
| **16.** | **Lead acid light weight storage batteries for Motorcycles and similar vehicles fitted with AC circuitry** | | **IS 13568 : 1992** | |
| | | Physical Examination | Cl. No.: 7.6 | 4V to 12 V Batteries Upto 300 Ah |
| | | Dimensions | Cl. No.: 7.7 | Upto 300 mm / 0.01 mm & Upto 1000 mm / 1 mm |
| | | Air Pressure test | Cl. No.: 7.8 | 4V to 12 V Batteries Upto 300 Ah |
| | | Test for capacity (10 hr rate) | Cl. No.: 7.9 | 4V to 12 V Batteries Upto 300 Ah |
| **17.** | **Lead-Acid Storage Batteries for Motor Vehicles with Light weight and High cranking performance** | | **IS 14257 : 1995** | |
| | | Physical examination | Cl. No.: 9.3.1 | 4V to 12 V Batteries Upto 300 Ah |
| | | Dimensions and Layout | Cl. No.: 9.3.2 | Upto 300 mm / 0.01 mm & Upto 1000 mm / 1 mm |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Marking – Visual examination | Cl. No.: 9.3.3 | 4V to 12 V Batteries<br>Upto 300 Ah |
| | | Capacity (5 hr Rate) | Cl. Nos.: 9.3.4 & 7.1 | 4V to 12 V Batteries<br>Upto 300 Ah |
| **18.** | **Stationary Valve Regulated Lead-acid Batteries** | | **IS 15549 : 2005** | |
| | | Material and Construction | Cl. Nos.: 4 & 5 | 2 V Cells<br>Upto 5000 Ah |
| | | Markings on cell | Cl. No.: 8 | 2 V Cells<br>Upto 5000 Ah |
| | | Checking of dimensions as per manufacturer's drawing | Cl. No.: 10.1.1b | Upto 300 mm / 0.01 mm<br>Upto 1000 mm / 1 mm |
| | | Test for C10 Capacity | Cl. No.: 12.1 | 2 V Cells<br>Upto 5000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Voltages during C10 discharge test | Cl. No.: 12.1.1 | 2 V Cells<br>Upto 5000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test for C1 Capacity | Cl. No.: 12.2 | 2 V Cells<br>Upto 2500 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | | **IS 15549 : 2005** | |
| | | Capacity test at other discharge rates (C2, C3, C4, C5 & C8) | Cl. No.: 12.3 | 2 V Cells<br>Upto 5000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Ampere-hour and Watt-hour efficiency | Cl. No.: 12.4 & 12.5 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test for retention of charge | Cl. No.: 12.6 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test for Oxygen recombination efficiency | Cl. No.: 12.9 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Endurance life cycle test | Cl. No.: 12.10 | 2 V Cells<br>Upto 1360 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **19.** | **Dual Bank Charger with Twin Bank Low Maintenance Lead Acid Batteries for use on Block line circuit** | | **IRS : S : 85 : 92** | |
| | | Air pressure test | Cl. No.: 11.1 | 4V to 12 V Batteries Upto 300 Ah |
| | | Non-Spillability test | Cl. No.: 11.2 | 4V to 12 V Batteries Upto 300 Ah |
| | | Capacity test at 10 hour rate | Cl. No.: 11.3.2 | 4V to 12 V Batteries Upto 300 Ah |
| | | Marking on the Batteries – Visual examination | Cl. No.: 11.4 | 4V to 12 V Batteries Upto 300 Ah |
| | | Dimensional check & Weight measurement | Cl. No.: 11.5 | Upto 300 mm / 0.01 mm & Upto 1000 mm / 1 mm Upto 3 kg / 0.2 gm |
| | | Constructional requirements – Visual examination | Cl. No.: 12.5 | 4V to 12 V Batteries Upto 300 Ah |
| | | Test for Voltage during discharge | Cl. No.: 12.5 | 4V to 12 V Batteries Upto 300 Ah |
| | | Endurance test | Cl. No.: 12.5 | 4V to 12 V Batteries Upto 300 Ah |
| | | Test for Loss capacity on storage | Cl. No.: 12.5 (b) | 4V to 12 V Batteries Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | | **IRS : S : 85 : 92** | |
| | | Ampere hour & Watt hour efficiency test | Cl. No.: 12.5 (c) | 4V to 12 V Batteries Upto 300 Ah |
| | | Life cycle test | Cl. No.: 12.5 (d) | 4V to 12 V Batteries Upto 300 Ah |
| **20.** | **Low Maintenance Lead Acid Stationary Secondary Cells For S & T Installations** | | **IRS : S : 88 : 2004** | |
| | | Verification of constructional requirements – Visual examination | Cl. No.: 7.2 | 2 V Cells Upto 3000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Verification of Marking – Visual examination | Cl. No.: 7.3 | 2 V Cells Upto 3000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Verification of Dimensions | Cl. No.: 7.4 | Upto 300 mm / 0.01 mm & Upto 1000 mm / 1 mm |
| | | Test for Capacity (10 hr rate) | Cl. No.: 7.5 | 2 V Cells Upto 3000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Test for Loss capacity on storage | Cl. No.: 7.6 | 2 V Cells Upto 3000 Ah & 4V to 12 V Batteries Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Endurance test | Cl. No.: 7.7 | 2 V Cells<br>Upto 1600 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Ampere hour & Watt hour efficiency test | Cl. No.: 7.8 | 2 V Cells<br>Upto 3000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test for Voltage during discharge | Cl.No.: 7.9 | 2 V Cells<br>Upto 3000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Life test | Cl. No.: 7.10 | 2 V Cells<br>Upto 1600 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Storage test<br>(2 Years in Dry condition) | Cl. No.: 7.11 | 2 V Cells<br>Upto 3000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Loss of water test | Cl. No.: 7.12 | 2 V Cells<br>Upto 1600 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah having weight :<br>Upto 3 kg / 0.2 gm<br>Upto 30 kg / 2 gm<br>Upto 150 kg / 20 gm |
| | | Equilibrium float current test | Cl. No.: 7.13 | 2 V Cells<br>Upto 1600 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Sulphation test | Cl. No.: 7.14 | 2 V Cells<br>Upto 3000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Air pressure test | Cl. No.: 7.15 | 2 V Cells<br>Upto 3000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **21.** | **Valve Regulated (Sealed) Lead Acid Stationary Battery and Charger for Railway S & T Installations** | | **IRS : S : 93 : 96** | |
| | | Verification of Dimensions | Cl. No.: A.10.1.1c | Upto 300 mm / 0.01 mm<br>&<br>Upto 1000 mm / 1 mm |
| | | Verification of Constructional requirements – Visual examination | Cl. No.: A.10.2 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Verification of Marking – Visual examination | Cl. No.: A.10.3 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test for capacity (C1, C2, C3, C4, C5 & C10 rate of discharge) | Cl. No.: A.10.4 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test for Charge retention | Cl. No.: A.10.5 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Endurance test | Cl. No.: A.10.6 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Ampere-hour & Watt-hour efficiency tests | Cl. No.: A.10.7 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test for voltage during discharge | Cl. No.: A.10.8 | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test for Endurance under short circuit conditions | Cl. No.: A.10.9 | 2 V Cells<br>Upto 2000 Ah<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Test for Gas recombination efficiency | Cl. No.: A.10.11 | 2 V Cells<br>Upto 2000 Ah<br>4V to 12 V Batteries<br>Upto 300 Ah |
| **22.** | **Valve Regulated Lead Acid (VRLA) Batteries** | | **TEC/GR/TX/BAT-001/ 04. JUNE.2011** | |
| | | Verification of Dimensions & Weight | Cl. No.: 7.5.1 (4) | Upto 300 mm / 0.01 mm<br>&<br>Upto 1000 mm / 1 mm<br>Upto 3 kg /0.2 gm<br>Upto 30 kg / 2 gm<br>Upto 150 kg / 20 gm |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Tests for Capacity (C/3, C/4, C/5, C/6, C/8, C/10, C/20, C/72 & C/120 rates) | Cl. No.: 7.6.3.1 | 2 V Cells Upto 5000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Charging at Float voltage | Cl. No.: 7.6.3.2 (A) | 2 V Cells Upto 1800 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Charging at 2.450 V/Cell | Cl. No.: 7.6.3.2 (B) | 2 V Cells Upto 1800 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Sulphation test | Cl. No.: 7.6.3.2 (C) | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Voltage during discharge (At C/10 rate) | Cl. No.: 7.6.3.4 | 2 V Cells Upto 5000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Loss of capacity during storage | Cl. No.: 7.6.3.6 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | | **TEC/GR/TX/BAT-001/ 04.JUNE.2011** | |
| | | Ampere-hour & Watt-hour efficiency | Cl. Nos.: 7.6.3.7 & 7.6.3.8 | 2 V Cells Upto 5000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Short circuit test | Cl. No .: 7.6.3.9 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Oxygen recombination efficiency | Cl. No.: 7.6.4.1 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Gassing | Cl. No.: 7.6.4.3 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Service life or Ageing test (Only electrical testing) | Cl. No.: 7.6.4.4 | 2 V Cells Upto 1360 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Thermal runaway | Cl. No.: 7.6.4.5 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **23.** | **Tubular Valve Regulated Lead Acid (VRLA) Batteries based on Gel Technology** | | **TEC/GR/TX/BAT-003/ 02.MAR.2011** | |
| | | Verification of Dimensions & Weight | Cl. No.: A.1 / 5.1 (4) | Upto 300 mm / 0.01 mm<br>&<br>Upto 1000 mm / 1 mm<br>Upto 3 kg /0.2 gm<br>Upto 30 kg / 2 gm<br>Upto 150 kg / 20 gm |
| | | Tests for Capacity (C/3, C/4, C/5, C/6, C/8, C/10, C/20, C/72 & C/120 rates) | Cl. No.: A-1/6.3.1 | 2 V Cells<br>Upto 5000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Charging at Float voltage | Cl. No.: A-1/6.3.2 (A) | 2 V Cells<br>Upto 1800 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Charging at 2.450 V/Cell | Cl. No.: A-1/6.3.2 (B) | 2 V Cells<br>Upto 1800 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |
| | | Sulphation test | Cl. No.: A-1/6.3.2 (C) | 2 V Cells<br>Upto 2000 Ah &<br>4V to 12 V Batteries<br>Upto 300 Ah |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Voltage during discharge (At C/10 rate) | Cl. No.: A-1/6.3.4 | 2 V Cells Upto 5000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Loss of capacity during storage | Cl. No.: A-1/6.3.6 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Ampere-hour & Watt-hour efficiency | Cl. Nos.: A-1/6.3.7 & A-1/6.3.8 | 2 V Cells Upto 5000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Short circuit test | Cl. No.: A-1/6.3.9 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Oxygen recombination efficiency | Cl. No.: A-1/6.4.1 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Gassing | Cl. No.: A-1/6.4.3 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |

| | | | |
|---|---|---|---|
| **Laboratory** | **HBL Power Systems Limited, Central Test Facility, Survey No. 64 to 67 & 77 to 81, Village: Nandigaon, Mandal: Kothur, Dist: Mahaboob Nagar, Andhra Pradesh** | | |
| **Accreditation Standard** | **ISO/IEC 17025: 2005** | | |
| **Discipline** | **Electrical Testing** | **Issue Date** | **04.09.2013** |
| **Certificate Number** | **T-1955** | **Valid Until** | **03.09.2015** |
| **Last Amended on** | **-** | **Page** | **25 of 25** |

| S.No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Service life or Ageing test (Only electrical testing) | Cl. No.: A-1/6.4.4 | 2 V Cells Upto 1360 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Partial state of charge test | Cl. No.: A-1/6.4.5 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |
| | | Thermal runaway | Cl. No.: A-1/6.4.6 | 2 V Cells Upto 2000 Ah & 4V to 12 V Batteries Upto 300 Ah |

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