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| **Technical Specifications - Battery Operated Vehicles** | | |
| **Clause No.** | **Description** |  |
| **1.0** | **General description of vehicle** | |
| 1.1 | Vehicle Model |  |
| 1.2 | Vehicle Type |  |
| 1.3 | Drawing and /or Photographs of the vehicle |  |
| **2.0** | **Description of The Traction Battery Pack** | |
| 2.1 | Make and Trade name (If any) |  |
| 2.2 | Kind of Electro – Chemical Chemistry |  |
| 2.3 | Nominal Voltage (V) at Pack level |  |
| 2.3.1 | Nominal Voltage (V) at Cell Level |  |
| 2.4 | Number of Cells/Modules and its Configuration |  |
| 2.5 | Battery Energy (kWh) |  |
| 2.6 | Battery Capacity (C5), |  |
| 2.7 | End of Discharge Voltage Value (V) at Pack Level |  |
| 2.8 | Provision of ventilation for battery Yes / No |  |
| 2.8.1 | Brief description of the battery pack ventilation system adopted in the vehicle. Provide drawing if necessary. |  |
| 2.9 | Traction Battery Approval as per AIS 048 :Report Number |  |
| 2.10 | On-board Indication of battery state of charge (SOC) |  |
| 2.10.1 | Details of indication when state of charge (SOC) of the battery reaches a level when the manufacturer recommends re-charging. |  |
| 2.10.1.1 | Indication format. |  |
| 2.10.1.2 | Relationship of state of charge indicator and the indication. |  |
| 2.10.1.3 | Make |  |
| 2.10.1.4 | Model |  |
| 2.10.2 | Indication of state of charge of battery reaches a level at which driving vehicle further may cause damage to batteries |  |
| 2.10.2.1 | Indication format. |  |
| 2.10.2.2 | Relationship of state of charge indicator and the indication. |  |
| 2.11 | Battery Mass (kg) |  |
| 2.12 | Brief description of maintenance procedure of battery pack, if any |  |
| **3.0** | **Battery Management System (BMS)** |  |
| 3.1 | Make |  |
| 3.2 | Model Number / Part Number |  |
| 3.3 | Software Version |  |
| 3.4 | Hardware Version |  |
| 3.5 | Architecture (attach circuit board diagram and Cell configuration structure ) |  |
| 3.6 | Balancing Type (Active/Passive) |  |
| 3.7 | Communication Protocol |  |
| **4.0** | **DC – DC Converter** |  |
| 4.1 | Make |  |
| 4.2 | Model Number / Part Number |  |
| 4.3 | Hardware Version |  |
| 4.4 | Input Range (Current in A and Voltage in V) |  |
| 4.5 | Output Range (Current in A and Voltage in V) |  |
| **5.0** | **Description of The Drive Train** |  |
| 5.1 | General |  |
| 5.1.1 | Make |  |
| 5.1.2 | Type |  |
| 5.1.3 | Use : Mono motor / multi motors (number) |  |
| 5.1.4 | Transmission Arrangement parallel / Transaxial / others to precise |  |
| 5.1.5 | Test Voltage (V) |  |
| 5.1.6 | Motor Nominal Speed (min -1) |  |
| 5.1.7 | Motor Maximum Speed, Min –1 or by default reducer outlet shaft / gear box speed (specify gear engaged) |  |
| 5.1.8 | Maximum Power Speed (min –1) and (km/h) |  |
| 5.1.9 | Maximum Power (kW) |  |
| 5.1.10 | Maximum Thirty Minutes Power (kW) |  |
| 5.1.11 | Maximum Thirty Minutes speed km/h (Reference in AIS-039 (Rev.1) and AIS-040 (Rev.2) |  |
| 5.1.12 | Range as per AIS 040 (Rev.1) (km) |  |
| 5.1.13 | Speed at the beginning of the range (min –1) |  |
| 5.1.14 | Speed at the end of the range (min –1 ) |  |
| 5.2 | Traction Motor |  |
| 5.2.1 | Make |  |
| 5.2.2 | Model Number / Part number |  |
| 5.2.3 | Type (BLDC, DC, AC etc) |  |
| 5.2.4 | Working Principle |  |
| 5.2.4.1 | Direct current / alternating current / number of phases |  |
| 5.2.4.2 | Separate excitation / series / compound |  |
| 5.2.4.3 | Synchron / asynchron |  |
| 5.2.4.4 | Coiled rotor / with permanent magnets / with housing |  |
| 5.2.4.5 | Number of Poles of the Motor |  |
| 5.2.5 | Motor power curve (kW) with motor RPM (min-1) / vehicle speed in (km/h), (Provide Graph) |  |
| 5.3 | Power Controller |  |
| 5.3.1 | Make |  |
| 5.3.2 | Model Number / Part number |  |
| 5.3.3 | Software Version |  |
| 5.3.4 | Hardware Version |  |
| 5.3.5 | Type |  |
| 5.3.6 | Control Principle : vectorial / open loop / closed / other (to be specified ) |  |
| 5.3.7 | Maximum effective current supplied to the Motor (A) |  |
| 5.3.8 | Voltage range use (V to V) |  |
| 5.4 | Cooling System  motor : liquid / air  controller : liquid / air  Battery : liquid / air |  |
| 5.4.1 | Liquid cooling equipment characteristics |  |
| 5.4.1.1 | Nature of the liquid ,  circulating pumps, yes / no |  |
| 5.4.1.2 | Characteristics or make(s) and type(s) of the pump |  |
| 5.4.1.3 | Thermostat : setting |  |
| 5.4.1.4 | Radiator : drawing(s) or make(s) and type(s) |  |
| 5.4.1.5 | Relief valve : pressure setting |  |
| 5.4.1.6 | Fan : Characteristics or make(s) and type(s) |  |
| 5.4.1.7 | Fan : duct |  |
| 5.4.2 | Air-cooling equipment characteristics |  |
| 5.4.2.1 | Blower : Characteristics or make(s) and type(s) |  |
| 5.4.2.2 | Standard air ducting |  |
| 5.4.2.3 | Temperature regulating system yes / no |  |
| 5.4.2.4 | Brief description |  |
| 5.4.2.5 | Air filter : make(s)  type(s) |  |
| 5.4.3 | Maximum temperatures recommended by the manufacturer: |  |
| 5.4.3.1 | Motor Outlet : oC |  |
| 5.4.3.2 | Controller inlet : oC |  |
| 5.4.3.3 | Battery inlet : oC |  |
| 5.4.3.4 | At motor reference point(s) oC |  |
| 5.4.3.5 | At controller reference point(s) oC |  |
| 5.4.3.6 | At Battery reference point(s) oC |  |
| 5.5 | Insulating Category : |  |
| 5.5.1 | Ingress Protection (IP)-Code : |  |
| 5.6 | Lubrication System Principle  Bearings : friction / ball  Lubricant : grease / oil  Seal : yes / no  Circulation : with / without |  |
| **6.0** | **Charger** : |  |
| 6.1 | Charger : on board / external |  |
| 6.1.1 | Make |  |
| 6.1.2 | Model |  |
| 6.1.3 | Software Version |  |
| 6.1.4 | Hardware Version |  |
| 6.1.5 | Type (AC/DC, Slow /Fast) |  |
| 6.1.6 | Standard Protocol (BEVC DC001(or) BEVC AC001(or) CCS (or) GB/T (or) CHAdeMO (or) SAE J1772 (or) if other specify) |  |
| 6.2 | Description of the normal profile of charging system |  |
| 6.3 | Specifications |  |
| 6.3.1 | Mains Supply : single phase/ three phase |  |
| 6.3.1 | Input Nominal Voltage (V) & frequency (Hz) with tolerances. |  |
| 6.3.3 | Output Voltage Range (V) and Current Range (A) |  |
| 6.4 | Reset period recommended between the end of the discharge and the start of the charge |  |
| 6.5 | Recommended duration of a complete charge |  |
| 6.6 | In case of on-board charger |  |
| 6.6.1 | Continuous rating of charger socket (A) : |  |
| 6.6.2 | Time rating (h) of charger socket, if any : |  |
| 6.6.3 | Whether soft-start facility Yes / No : |  |
| 6.6.4 | Maximum initial in-rush current (A) |  |
| **7.0** | **Electrical details of vehicle for functional safety** |  |
| 7.1 | Schematic diagram showing the electrical layout giving all major electrical items along with their physical location in the vehicle. It shall include batteries, power-train components, protection fuses, circuit breakers etc. |  |
| 7.2 | Specifications of circuit breakers/ fuses used for protection of batteries / power-train |  |
| 7.2.1 | IS / IEC specifications |  |
| 7.2.2 | Rating (A) |  |
| 7.2.3 | Opening time (ms) |  |
| 7.3 | Working voltage V |  |
| 7.4 | Schematic highlighting physical location of live parts having working voltage greater than 60 V DC or 25 V AC |  |
| 7.5 | Electric cables / connectors / wiring harness |  |
| 7.5.1 | IEC protection class |  |
| 7.5.2 | Insulation material used |  |
| 7.5.3 | Is Conduits provided? Write Yes / No |  |
| 7.6 | List of exposed conductive parts of on-board equipment. |  |
| 7.6.1 | Any potential equalization resistance used to electrically connect these parts Yes/ No |  |
| 7.6.2 | If yes, give details |  |
| 7.7 | List of failures due to which the vehicle will come to standstill |  |
| 7.8 | List of conditions under which the performance of vehicle is limited and how. |  |
| **8.0** | **Electrical energy consumption of Vehicle in W-h/km, as per AIS-039** |  |