

AUTOMOTIVE INDUSTRY STANDARDS

**SPECIFIC REQUIREMENTS FOR
ELECTRIC POWER TRAIN OF
VEHICLES**

**PART I: REQUIREMENTS OF A VEHICLE WITH REGARD
TO SPECIFIC REQUIREMENTS FOR THE ELECTRIC
POWER TRAIN**

**PART II: REQUIREMENTS OF A RECHARGEABLE
ELECTRICAL ENERGY STORAGE SYSTEM (REESS) WITH
REGARD TO ITS SAFETY**

(REVISION 2)

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ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLE RULES – TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA

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**Specific Requirements for M, N Category Electric Power
Train Vehicles**

1.0 Page 103/106,

Add new Annex IX-K after Annex IX-J

Annexure IX-K

**Technical Requirements for Traction Battery (REESS) of M, N Category
Electric Power Train Vehicles**

0. The Traction Battery Pack (REESS) design and manufacture guidelines as specified in this Annexure, to be followed by REESS manufacturer. Same shall be verified by test agency at the time of type approval and CoP of REESS
1. The manufacturing date of battery cells shall be clearly written / embossed on the cells used to build REESS, with clear month and year of manufacture. Manufacture date in the form of code is not acceptable as it cannot be interpreted properly.
2. Cells used to make REESS, shall be certified as per as per IS 16893-Part 2 and Part 3 by NABL accredited lab.
3. Cells used to make REESS, shall undergo minimum 5 cycles of charge-discharge at C/3 current rate. Data of this cycling shall be maintained at REESS pack manufacturer.
4. REESS shall have pressure release vent provided, to avoid building up of internal pressure and release of gases in case internal single cell short circuit. Joints, in the coolant lines which pass inside the battery, to be strictly avoided.
5. REESS shall have Active paralleling circuits for the parallel connection of cells and strings to eliminate circulating currents. These power semiconductor devices used for interconnecting strings will also act as protection/safety switches which will detect any faulty strings and isolate them. They will allow bidirectional flow of currents to charge and discharge the pack. The parallel cells and strings will get isolated if it is detected to be faulty. Therefore, active paralleling should be mandatory in the battery packs.

Alternatively, fuses / bond wires can also be used to prevent circulating currents flowing through the cells connected in parallel. Such precautionary devices will help in isolation of faulty cells connected in parallel.

6. Sufficient cell-to-cell spacing distance should be maintained for effective heat transfer from the cell and also to isolate the cells in case of thermal run away in REESS. The inter cell gap in REESS should be decided based on the type

of cell geometry used viz., cylindrical, prismatic or pouch and capacity of cells.

7. REESS shall have additional safety fuse or circuit breaker in addition to the features available in Battery Management System (BMS).
8. REESS with 100% SoC shall be tested for water ingress protection IP X7 as per IEC 60529. There shall be no fire or explosion during IP X7 testing of REESS
9. BMS shall be microprocessor/microcontroller-based circuit.
10. BMS shall comply EMC requirements as per AIS 004 Part 3 or AIS 004 Part 3 Rev 1 as applicable.
11. BMS of REESS shall be verified for following safety features during REESS testing as per Annex IX of this standard.
 - a) Over-voltage protection
 - b) Over-charge protection
 - c) Over-discharge protection
 - d) Over-temperature protection:
 - e) Overcurrent protection
 - f) Short circuit protection
12. Onboard/portable charger
 - a) Charger shall have Charge voltage cut-off to avoid over charging of REESS (Traction Battery)
 - b) Charger shall have time-based charge cut-off function which shuts off further charging based on timeout.
 - c) Charger shall have soft-start function every time REESS is connected for charging.
 - d) Charger shall have Pre-charge Function to detect over-discharge condition of battery.
 - e) Charger shall have input supply variation protection, output voltage and current regulation.
 - f) Charger shall have earth leakage detection.
 - g) On-board/portable charger shall have communication with battery (BMS).

13. Each REESS manufactured should have a traceability document in which the details of cells, BMS, charger used along with serial/batch number, charge discharge data values etc should be maintained with the REESS manufacturer.
14. Adequate protection of cells in case of regenerative braking must be considered in REESS design.
15. Data logging feature is required in BMS which has also been mentioned in IS17387 standard and should be adhered
16. Each battery pack must be associated with RFID tags and the BMS should be capable of RF reading and writing. Important battery parameters relating to history, transactions and state of health should be dynamically written onto the RFID tag which can be useful during swapping and also for tracking and debugging in case of damages.

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