GUIDELINES ON THE MINIMUM RECOMMENDED SAFETY FEATURES OF TWO-WHEELER ELECTRIC VEHICLES

All vehicles should be roadworthy. The driver should be in possession of a valid driving licence and other legal/statutory approvals. The minimum safety requirements given below needs to be met:

VEHICLE STABILITY

2 Wheeler EVs should be designed to ensure stability during normal operation, including:

- Adequate tyre grip
- Suspension
- Frame design
- Speed range (Kms on road)
- Weight with battery
- Torque

BATTERY

Battery Standards:
Strictly AIS 156 Phase 2 certified batteries.

Battery Types:
1. LFP Battery = Lithium Ferro Phosphate, type of Lithium -Ion battery.
2. NMC Battery = Lithium Nickle Manganese-type of Lithium ion Battery

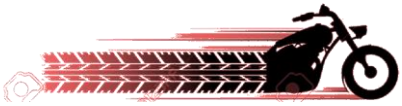
Battery Capacity:
1. 2 kwh: Minimum 80km/charge on road (15K cheaper than 3 kwh solution.)
2. 3kwh may give 120km/charge in ECO mode

Battery Warranty:
Minimum 3 years OR 60,000 kms.

Battery Charging Time:
1. 2 KWH battery - 80% in 2.5 hrs, 100% in 4 hrs
2. 3 KWH battery - 80% in 4 hrs, 100% in 6 hrs

Removable battery and charger
Allows the user to charge the battery at home, office or any other location

Battery Placement:
Ideal position of the battery is at the centre.
This helps maintain centre of gravity and makes the vehicle stable




Motor

Motor Type

Mid mounted IP67 PMSM (to withstand water logging conditions in India**)**

Torque:

- Motor torque 20 Nm
- Wheel torque 140 Nm

Motor warranty:

3 years or 50,000 kms

Drive & transmission:

Single or double stage

Wheels Front/Rear:

17"/17" Alloy preferable

Brakes Front/Rear:

- **Braking System:** Electric motorcycles should have an efficient and reliable braking system capable of safely stopping the vehicle within a reasonable distance - Combined Braking System + Disc

Motor Position: -

- Mid Mounted - the safest position
- HUB motors –not recommended high risk of frequent damages, the maximum wear & tear, high exposure to stress fractures

Lighting and Signalling:

- 2 wheeler EVs must be equipped with proper lighting systems, including headlights, taillights, and turn signals, to ensure visibility and communicate the rider's intentions to other road users.

Mirrors:

- Rear-view mirrors (left and right) are essential for providing adequate rear visibility to the rider, enabling them to monitor surrounding traffic.

Horn:

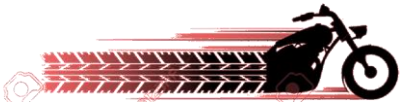
- An audible horn or other warning device should be installed to alert pedestrians and other vehicles of the rider's presence.

Speedometer:

- Two-wheeler EVs should have a speedometer to enable the rider to monitor their speed and comply with speed limits

Seat Dimensions

- Seat height: 775 mm
- Seat Length: 853 mm



Ground clearance:

175 mm – to safely negotiate potholes and humps in the road

Shock absorbers

- Dual suspensions in front and back are better suited for Indian roads.
- Larger shock absorbers with longer travel can help prevent shoulder & back pain.

Battery Chargers

CAN enabled; ensures battery safety, prevents incidences of fire/burning while charging

Vehicles with inbuilt Vehicle Control Unit (VCU) & Battery Management System (BMS). Smart BMS and Motor controller with CAN communication

a. CAN enabled VCU acts as additional safety layer overall battery BMS and Motor MCU. It is a MANDATORY safety measure for continuous temperature monitoring with safe mode to continue riding under fault condition.

Fall detection and safety cut off of traction motor to prevent severe accidents.

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30/08/2023

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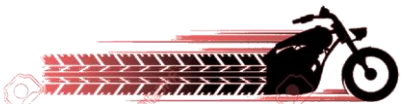
31/08/2023



GUIDELINES ON THE MINIMUM RECOMMENDED SAFETY FEATURES OF TWO-WHEELER ELECTRIC VEHICLES

Final Audit Report 2023-08-31

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