

ELECTRIC MOBILITY – INDIAN HOMOLOGATION REQUIREMENTS & TESTING INFRASTRUCTURE

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TYPICAL ELECTRIC VEHICLES IN INDIA



TYPICAL HYBRID ELECTRIC VEHICLES IN INDIA



Maruti SX4 Hybrid



Ashok Leyland Hybrid Bus



Tata Motors Hybrid Bus



Toyota Prius Hybrid



Honda Civic Hybrid



Mahindra Scorpio Hybrid

EV - INDIAN HOMOLOGATION



Exemption Category

Type Approval Category

EV Exemption Category Requirements

Vide GSR 589(E) dated 16 Sep 2005, battery operated vehicles with following specifications are not deemed as motor vehicles and hence exempted from CMVR

- Thirty minute power of motor is less than 250W
- The vehicle maximum speed is less than 25 km/h

However, to get the exemption certificate they need to be tested for the verification of the above conditions along with confirmation of presence of the following

1. White reflectors on the front side
2. Red reflectors on the rear side
3. Brakes

EV - INDIAN HOMOLOGATION REQUIREMENTS

Indian Standard	Brief Requirements	ECE Regulation Ref.
AIS 038	Construction & Functional Safety – Battery mounting, ventilation, creepage distance, insulation resistance, protection against electric shock, on board charger, water effects tests (washing, flooding, heavy rainstorm)	ECE R-100
AIS 039	Measurement of electrical energy consumption	ECE R-101
AIS 040	Measurement of electrical range	ECR R-101
AIS 041	Measurement of net power, max. 30 min power	ECE R-85

EV - INDIAN HOMOLOGATION REQUIREMENTS

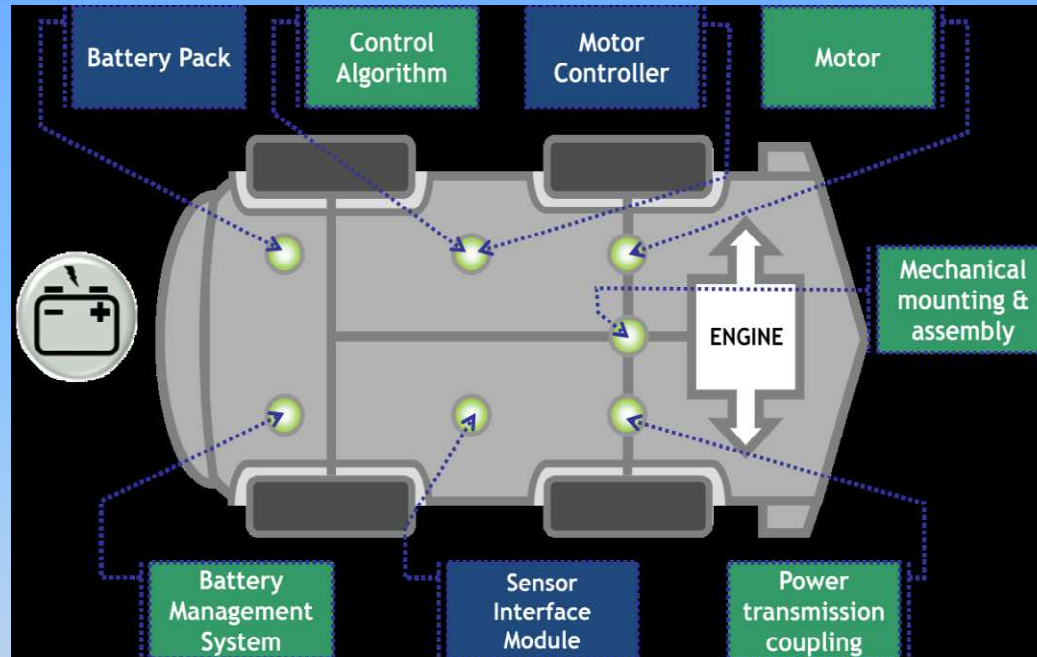
Indian Standard	Brief Requirements	ECE Regulation Ref.
AIS 048	Safety Requirements for Traction Batteries – Electrical & Mechanical Abuse Tests	USABC EV Battery Test Procedures Manual
AIS 049	Type Approval of Electric Vehicles – Brake performance, grade ability, pass-by noise level, EMI, wiper, lighting system, safety belt, steering column, dashboard etc.	---

Note: Revision of AIS standards is in process in alignment with latest ECE Regulations

HEV - INDIAN HOMOLOGATION REQUIREMENTS

Indian Standard	Brief Requirements	ECE Regulation Ref.
AIS 102 (Part 1)	Type Approval of Hybrid Electric Vehicles – Category L, M, N (GVW < 3500 kg) Tailpipe emissions, fuel consumption, brake performance, engine power, motor power, pass-by noise level, construction & functional safety, grade ability, EMI, wiper, lighting system, safety belt, steering column, dashboard etc.	ECE R-13H ECE R-10 ECE R-83 ECE R-85 ECE R-100 ECE R-101
AIS 102 (Part 2)	Type Approval of Hybrid Electric Vehicles – Category M, N (GVW > 3500 kg) Same as above except engine out emissions, bus body code, interior noise etc.	----- Above ECE regulations are taken as reference for formulating Indian standard

HYBRID ELECTRIC KIT RETROFITMENT



- Promising technology for improving fuel economy, emission performance and running cost of on road vehicles
- Draft approval standard AIS 123 (Draft) is under formulation. Probably first of its kind in the world

EV/HEV TESTING INFRASTRUCTURE



Chassis Dynamometer with Emission Measurement Setup



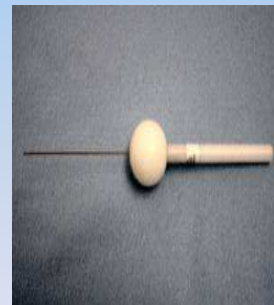
EV/HEV TESTING INFRASTRUCTURE



Power Meter



100V/300A DC Supply

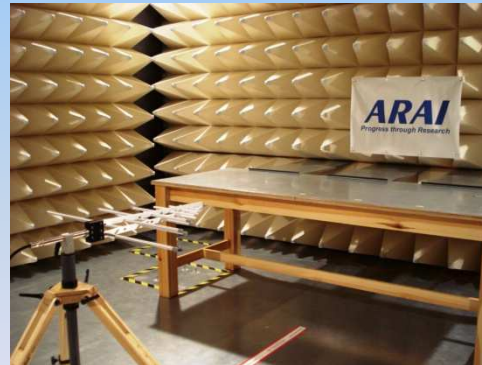


Access Probes

EV/HEV TESTING INFRASTRUCTURE



Vehicle EMC Chamber (VRDE)



Component EMC Chamber (ARAI)

Testing Infrastructure under Planning



E-Motor Test Bed with Battery Simulator



Battery Test System

Govt. of India Policy Initiatives

National Electric Mobility Mission Plan (NEMMP) 2020

Working Group on R&D

- BMS & Battery
- Power Electronics & Motors
- **Testing Infrastructure**, Human Resources, Energy efficient Technologies

Working Group on Infrastructure

- Technology & Standards
- Infrastructure Rollout

Working Group on Demand & Supply

- Demand Incentive Scheme
- Incentive Delivery & Monitoring Mechanism
- Promotion of Hybrid Retro-fitment Kits

Challenges & Future Scope of Work

- EMC Evaluation of EV/HEV
- Electrical Safety
- Driving Cycle Development for HEV Goods Carrier Vehicles (> 3500 kg)
- BMS Development for Li-Ion Batteries
- Charging Infrastructure

EMC Evaluation of EV/HEV

- EV/HEV Specific EMC Test Procedures
- Vehicle Condition during Test
- Test Setups
- Limits and Acceptance Criteria
- EMC Requirements for On-board Charger

Electrical Safety of EV/HEV

- Different regulatory standards exist for electrical safety of EV/HEV e.g. EU, USA, Japan, China
- Need for harmonization
- Proposal for formation of GTR on EV Electrical Safety has been adopted by UNECE

Driving Cycle Development for HEV

- Conventional heavy goods carrier vehicles typically have engines tested and approved for emissions
- To quantitatively evaluate emission and fuel economy benefits of hybrid goods carrier vehicle (>3500 kg), need is felt to develop driving cycle for chassis dynamometer emission test
- Simulation based certification for emissions

Thank You...