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## Type Approval, Homologation & Safety Standards

CMVR Rules, AIS Standards, ARAI/iCAT, Small-Series Approval & Import Homologation



COMPLIANCE



HOMOLOGATION



SAFETY



STANDARDS



HOMOLOGATION TESTING



CRASH TEST



OCCUPANT SAFETY



ENVIRONMENT SAFETY



NOISE EMISSION

# Type Approval, Homologation & Safety Standards

CMVR Rules, AIS Standards, ARAI/iCAT, Small-Series Approval & Import Homologation

*Booklet II of VI*

Bhatt & Joshi Associates, Advocates & Legal Consultants

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## CHAPTER ONE

# The Whole Vehicle Type Approval Framework

*Legal Basis in CMVR Rules 126–126B, MoRTH Notification Structure, Testing Agency Roles, and Approval Documentation*

*The Whole Vehicle Type Approval (WVTA) system is the legal gateway through which every motor vehicle model enters the Indian market. For automobile manufacturers and importers, type approval is not merely a formality — it is the compliance foundation that determines product eligibility, launch timelines, and ongoing regulatory obligations.*

## 1.1 Legal Framework: Rules 126–126B of the CMVR

Rule 126 of the Central Motor Vehicles Rules, 1989 is the foundational provision establishing the requirement for type approval of motor vehicles before their commercial manufacture, import, or sale in India. The Rule requires that before any motor vehicle is manufactured or assembled in India, or before any motor vehicle is imported for use or sale, the manufacturer or importer must obtain a Type Approval Certificate from the designated testing agency, confirming that the vehicle type complies with all applicable Automotive Industry Standards (AIS) issued by the CMVR Technical Standing Committee (CMVR-TSC). Rule 126A addresses the specific requirements for the test application, including the documentation that must be submitted (technical specifications, drawings, and a representative test vehicle), the fees payable, and the procedure for handling variants and derivatives

of an approved type. Rule 126B deals with the Production Conformity (PoC) requirement, imposing on manufacturers and importers the ongoing obligation to ensure that every unit of an approved type produced or imported conforms to the approved specifications — an obligation that is monitored through periodic production conformity audits conducted by the testing agencies.

The legal consequence of the type approval framework is that a vehicle model that does not hold a valid WVTA Certificate from an accredited Indian testing agency — either ARAI (Automotive Research Association of India, Pune) or iCAT (International Centre for Automotive Technology, Manesar) — cannot be lawfully sold, registered, or used on Indian roads. The testing agency issues the WVTA Certificate on the basis of a full technical assessment of the vehicle's compliance with all applicable AIS standards, including crash safety tests, emission tests, braking performance tests, lighting tests, and electromagnetic compatibility (EMC) tests. The certificate specifies the exact vehicle type, all approved variants and derivatives, the applicable AIS standards, and any conditions or limitations on the approval. The certificate is linked to the manufacturer's Form 22 system, under which every individually produced or imported unit is certified by the manufacturer as conforming to the approved type, and the RTO accepts this certification without independent testing when registering the vehicle.

The distinction between the "type" level approval and the "variant" and "version" concepts within the WVTA framework is commercially important for OEMs managing large and complex product portfolios. A "type" is the highest level of grouping of vehicles sharing the same basic structural and engineering characteristics; a "variant" is a subdivision of the type covering combinations of powertrain, body style, and safety equipment that may require separate testing for specific standards; and a "version" is a specific commercial specification within a variant that combines particular trim levels, optional equipment, and colour choices that do not affect the regulated characteristics and therefore do not require separate type approval testing. Managing the type-variant-version structure to minimise the testing cost while maximising the commercial flexibility of the product range is a core function of the OEM's homologation management team.

## **1.2 The Testing Agencies: ARAI and iCAT**

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The Automotive Research Association of India (ARAI), established in 1966 in Pune under the administrative oversight of MoRTH and technically affiliated with the Society of Indian Automobile Manufacturers (SIAM), is India's primary vehicle testing and homologation agency. ARAI is recognised by MoRTH as the designated testing agency for Whole Vehicle Type Approval for most categories of motor vehicles, and its testing facilities span over 650 acres at Pune, including crash test laboratories (with full barrier crash and pole impact capability), emission testing chambers (compliant with BS VI WLTC requirements), noise testing facilities (anechoic chambers and outdoor test tracks), braking test areas, durability test tracks, and climatic simulation chambers. ARAI issues approximately 4,000–5,000 type approval certificates annually across all vehicle categories, handling the bulk of new model type approvals for both domestic OEMs and imported vehicles.

The International Centre for Automotive Technology (iCAT), established in 2006 at Manesar, Haryana, provides an alternative venue for vehicle type approval testing and is particularly convenient for the large cluster of automobile manufacturers concentrated in the NCR-Delhi region (Maruti Suzuki's Manesar plant, Hero MotoCorp's Dharuhera facilities, and the component manufacturing ecosystem of Gurgaon and Faridabad). iCAT has progressively expanded its testing capability since its establishment, including the addition of BS VI emission testing facilities and crash testing infrastructure, and now offers the full range of WVTA testing required for most vehicle categories. The existence of two nationally accredited testing agencies provides

OEMs and importers with commercial flexibility in scheduling type approval tests and avoids the delays that would arise from a single-agency monopoly.

Both ARAI and iCAT are accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) to the ISO/IEC 17025 standard for testing laboratories, providing international recognition of their testing competence. This NABL accreditation is relevant for imported vehicle manufacturers seeking to leverage foreign test results in the Indian homologation process: a foreign test report from a laboratory accredited to ISO/IEC 17025 to the same UN ECE regulation that underlies the relevant AIS standard can, in principle, be accepted by ARAI or iCAT in lieu of repeating the test in India, provided MoRTH's policy on partial mutual recognition authorises such acceptance for the specific standard in question.

### **1.3 The WVTA Application Process: Documentation and Timeline**

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The application for Whole Vehicle Type Approval requires submission to the testing agency of a comprehensive Technical Specification (TS) package, covering: vehicle identification (type designation, variant and version coding, manufacturer details); body configuration (number of seats, doors, and payload); powertrain specifications (engine type, displacement, rated power, fuel system, emission control devices); transmission type; suspension and steering geometry; braking system description; tyre and wheel specifications; lighting equipment list; safety systems (airbags, seatbelts, ISOFIX, ESC, ABS); and for EVs, the traction battery specifications and electric motor ratings. The TS package must be accompanied by engineering drawings and a representative test vehicle (or, for import homologation, a vehicle specification aligned with the actual production model to be imported). The completeness and accuracy of the TS documentation is critical: discrepancies between the TS and the actual test vehicle delay the approval process and may require re-submission, adding weeks or months to the timeline.

The typical timeline for a new WVTA application for an M1 category passenger car — starting from the receipt of the complete documentation and the test vehicle by the testing agency and ending with the issue of the WVTA Certificate — is 8–16 weeks for a domestic OEM applying for a new Indian model, and 12–24 weeks for an imported model seeking Indian type approval for the first time. The extended timeline for imported models reflects the additional documentation requirements (foreign approval certificates, translation of technical documents, verification of AIS equivalence), the possibility of additional tests required for standards not covered by the foreign approval, and the need for the testing agency to make a detailed assessment of the technical equivalence between the foreign approval and the Indian AIS requirements. For an importer planning a new model launch, the homologation timeline is a critical path item that must be commenced 9–12 months before the intended commercial launch date to allow for testing delays, documentation queries, and any required vehicle modifications to achieve AIS compliance.

### **1.4 Conformity of Production: Rule 126B and Post-Approval Obligations**

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Rule 126B of the CMVR imposes a continuing obligation on the holder of a WVTA Certificate to ensure that every vehicle of the approved type produced or imported after the approval continues to conform to the approved specifications — the "Conformity of Production" (PoC) requirement. This requirement reflects the reality that the WVTA testing is conducted on a representative prototype or pre-production vehicle, while the commercial production involves potentially millions of units, each of which must conform to the approved type if the WVTA is to retain its legal validity as evidence of fleet-wide compliance. The testing agencies audit PoC through: periodic factory audits (typically annually for major manufacturers) during which samples from the production line are inspected against the type approval specifications; review of the manufacturer's internal quality management

data on in-line measurements of regulated parameters (dimensions, weight, emissions, braking distances); and random sampling of vehicles from the production floor for partial or full conformity testing.

For imported vehicle OEMs, PoC is assessed through equivalent audits at the foreign manufacturing facility (which may be conducted by ARAI or iCAT under international audit arrangements, or by a recognised foreign technical service acting on their behalf) supplemented by random testing of samples from imported consignments at the Indian port of entry. The cost and logistical complexity of PoC audits for imported vehicles — particularly for premium brands that import relatively small volumes — is a significant component of the total homologation management cost, and some manufacturers address this through comprehensive PoC plans that leverage their existing international certification (such as the European whole vehicle type approval Production Conformity framework) as evidence of compliance for the Indian PoC audit.

# Automotive Industry Standards: Architecture and Key Documents

*CMVR-TSC Structure, AIS Catalogue, Critical Standards for M1 Vehicles, and Amendment Tracking*

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*The Automotive Industry Standards (AIS) are the technical soul of India's vehicle regulatory framework. Understanding the AIS architecture — how standards are developed, structured, and amended — is essential for OEM engineers and legal teams managing type approval compliance across complex vehicle portfolios.*

## 2.1 CMVR-TSC Structure and AIS Development Process

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The CMVR Technical Standing Committee (CMVR-TSC) is constituted by MoRTH as the apex technical advisory body for the development and review of vehicle safety and emission standards in India. The Committee's composition reflects the key stakeholder communities: SIAM (representing passenger vehicle, commercial vehicle, and two-wheeler OEMs); ACMA (representing component and system suppliers); ARAI and iCAT (the testing agencies that will implement the standards); the Bureau of Indian Standards (BIS); the National Automotive Testing and Research and Development Infrastructure Project (NATRiP) technical centres; MoRTH officials with responsibility for safety and emission regulations; and independent technical experts. The CMVR-TSC works through specialist sub-committees — on passive safety, active safety, emission, noise, lights and signals, EV safety, and autonomous vehicles — each of which maintains a work programme of new and revised AIS documents reflecting emerging technology requirements and evolving international regulatory developments.

The AIS development process follows a structured consultation model: a technical subject is identified for new or revised standardisation (prompted by new vehicle technologies, accident data, international regulatory changes, or Government policy priorities); the relevant sub-committee develops a draft AIS document (typically adapting the corresponding UN ECE regulation, ISO standard, or SAE standard to the Indian context, with modifications for Indian road and use conditions); the draft is circulated for public comment, with stakeholder workshops to resolve contested technical points; the revised draft is reviewed and adopted by the sub-committee; the adopted document is submitted to the full CMVR-TSC for endorsement; and the endorsed document is submitted to MoRTH for Gazette notification, incorporating it into the CMVR framework with a specified applicability date. The typical timeline from sub-committee initiation to MoRTH Gazette notification is 12–30 months, depending on the technical complexity and the degree of industry consensus on the requirements.

For OEM compliance teams, the critical aspect of the AIS development process is tracking the sub-committee work programme — specifically, identifying which new or revised AIS documents are being developed, their projected technical content, and their expected applicability timelines — well in advance of formal notification. An OEM that begins vehicle design changes required by a new AIS document only after its Gazette notification will face a compressed timeline for type approval testing and may need to request compliance extensions from MoRTH or delay vehicle model launches. Proactive engagement with the CMVR-TSC process — through SIAM working group participation, technical inputs to draft AIS documents, and regular liaison with ARAI and iCAT on forthcoming standards — is the standard practice of well-resourced OEM compliance teams.

## 2.2 Key AIS Documents for M1 Passenger Vehicles

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The M1 vehicle category — passenger cars, SUVs, and MPVs with up to eight passenger seats in addition to the driver's seat — is the regulatory category most relevant to premium passenger vehicle OEMs and importers. The primary AIS documents applicable to M1 vehicles include: AIS-098 (Safety of Motor Vehicles — Frontal Impact, aligned with UN ECE R94); AIS-100 (Safety of Motor Vehicles — Side Impact, aligned with UN ECE R95 and the pole test from Bharat NCAP protocols); AIS-145 (Electronic Stability Control, aligned with UN ECE R13-H); AIS-012 (Anti-Lock Braking Systems); AIS-023 (Approval of Rear Protective Devices); AIS-024 (Head Restraints); AIS-014 (Safety Glazing Materials); AIS-015 (Safety Belts); AIS-016 (ISOFIX Child Restraint Systems); AIS-008 (Lighting and Light-Signalling Devices Installation); AIS-009 (Braking of Vehicles other than Motorcycles); AIS-001 (Speedometer); AIS-004 (Noise Limits for Vehicles); AIS-137 (Speed Alert System); and the BS VI emission standards incorporating WLTC test protocol requirements.

The interaction between these multiple AIS standards creates a complex compliance matrix for each vehicle model, particularly when a variant (such as a different powertrain option or body style) may require separate or partial re-testing under one or more standards. For imported vehicles, the situation is further complicated by the need to assess the equivalence between each applicable AIS document and the corresponding foreign regulation under which the vehicle was originally certified — an assessment that must be documented in the homologation file and reviewed by ARAI or iCAT as part of the type approval process. Premium imported vehicle OEMs typically maintain a detailed AIS-to-ECE/FMVSS equivalence matrix for each of their Indian model variants, updated whenever either the Indian AIS or the foreign regulation is amended, to ensure that any divergences are identified and addressed before they become compliance issues.

## 2.3 Emission Standards: BS VI and the OBD Framework

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The Bharat Stage VI (BS VI) emission standards — notified by MoRTH and the Ministry of Environment, Forest and Climate Change in collaboration, effective from 1 April 2020 for all new vehicles — represent the most significant upgrade in India's emission regulation history, leapfrogging from BS IV directly to BS VI (equivalent to Euro VI for four-wheeled vehicles) without a BS V transition phase. The BS VI standards apply to all categories of motor vehicles — M, N, L categories — and prescribe limits for tailpipe emissions of carbon monoxide (CO), hydrocarbons (HC), particulate matter (PM), nitrogen oxides (NO<sub>x</sub>), and particle number (PN) measured over the Worldwide Harmonised Light Vehicles Test Cycle (WLTC) for passenger vehicles and the WHTC for heavy vehicles. The WLTC test, which replaced the earlier NEDC cycle, more accurately reflects real-world driving conditions by including high-speed and aggressive driving phases in addition to the urban and suburban phases of the NEDC, resulting in more representative emission and fuel efficiency measurements.

The OBD (On-Board Diagnostics) requirements under BS VI mandate the fitment of OBD-II compliant systems in all BS VI vehicles, capable of: detecting malfunctions in the emission control system (catalytic converter, oxygen sensors, EGR, evaporative system); storing diagnostic trouble codes (DTCs) in the ECU memory for retrieval by workshops during service; illuminating the Malfunction Indicator Lamp (MIL) on the instrument cluster when an emission-relevant malfunction is detected; and supporting standardised OBD communication protocols for diagnostic tool access. The OBD requirements extend the emission compliance obligation beyond the type approval test to the in-use performance of production vehicles: a vehicle whose OBD system incorrectly reports emission compliance (through miscalibrated sensors or disabled monitors) violates the BS VI OBD requirements and is non-compliant with the CMVR, potentially triggering recall obligations under Section 110A of the MVA.

In addition to OBD, BS VI introduced Real Driving Emissions (RDE) requirements — testing of actual on-road emissions using a Portable Emissions Measurement System (PEMS) attached to the vehicle's exhaust — which apply to M1 and N1 category vehicles. RDE testing verifies that the vehicle's emission performance in actual driving conditions (on public roads across a defined range of driving conditions, temperature, altitude, and speed) is within a defined conformity factor multiple of the WLTC laboratory test limit. The RDE requirements are designed to prevent the defeat device manipulation of emission results that was exposed in the Volkswagen Dieselgate scandal, ensuring that vehicles which pass the laboratory test are genuinely clean in real-world use. For Indian OEMs and importers, RDE compliance requires both effective hardware (low-emission combustion systems, efficient aftertreatment) and robust calibration practices that maintain emission compliance across the full range of real-world driving conditions.

## **2.4 CAFE (Corporate Average Fuel Efficiency) Standards**

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The Fuel Consumption and CO<sub>2</sub> Emission Standards for passenger vehicles in India — commonly referred to as the CAFE (Corporate Average Fuel Efficiency) Standards — were first notified by MoRTH in September 2017 under the Energy Conservation Act, 2001 and implemented in two phases: Phase I (2017–2022) required a fleet-average CO<sub>2</sub> emission of not more than 130 g/km; Phase II (2022–2027) tightens the requirement to 113 g/km. The CAFE standards apply to all manufacturers (domestic and importers) of M1 category passenger vehicles who sell more than a specified minimum number of vehicles in the Indian market annually. Each manufacturer's "corporate average" CO<sub>2</sub> performance is computed by mass-weighting the certified CO<sub>2</sub> values of each model variant sold in the year by the number of units sold, and comparing the result to the applicable fleet-average target. Manufacturers who fail to meet their fleet-average target are liable to pay a fine of Rs. 25,000 per vehicle for every gram per kilometre by which they exceed the target — a potentially significant financial penalty for volume manufacturers with fuel-inefficient portfolios.

The CAFE framework creates specific compliance strategies for OEMs. Manufacturers can improve their corporate average by: introducing more fuel-efficient powertrains (turbocharged petrol, diesel, hybrid, and EV) in their highest-volume models; qualifying for "super-credits" awarded for EV and PHEV sales (which count more than one vehicle towards the fleet average for CAFE compliance purposes); and phasing out their highest-CO<sub>2</sub> models. For importers of premium performance vehicles with high specific CO<sub>2</sub> emissions (sports cars and performance SUVs typically emit 180–300 g/km), the CAFE fine is an additional cost of doing business that is typically absorbed into the vehicle's India-market pricing. The CAFE standard's interaction with the EV policy (FAME II incentives for EVs) creates a combined policy push towards electrification: OEMs who achieve their CAFE targets partly through EV super-credits are incentivised to introduce EV models, and those EV sales also qualify for FAME II demand incentives.

# Import Homologation: The Step-by-Step Process for Imported Vehicles

*S.No. 41 Notification, Competent Authority Route, Small Series Approval, and Luxury Brand Strategy*

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*Import homologation — the process of obtaining Indian type approval for a vehicle model that was designed and certified in another market — is the critical regulatory pathway for every automobile importer. This chapter examines the complete procedure, the key decision points, and the strategic options available to premium importers.*

## 3.1 The Import Policy for Motor Vehicles: S.No. 41 of the Import Policy

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The import of motor vehicles into India is subject to the Customs Tariff Act, 1975 and the Foreign Trade (Development and Regulation) Act, 1992, with the specific import conditions for motor vehicles governed by S.No. 41 of the ITC(HS) Import Policy Schedule. S.No. 41 specifies the import licensing conditions for new motor vehicles, which are classified as "Free" subject to meeting specified technical and regulatory conditions: the vehicles must be new (first registration not older than 3 years from the date of manufacture); they must comply with all applicable CMVR and emission standards; they must be right-hand drive (for countries observing left-hand traffic rules, as India does); and they must conform to the minimum safety standards specified by MoRTH for imported vehicles. The "Free" import status means that no specific import licence is required, but this does not reduce the regulatory compliance requirements — every imported vehicle must still obtain Indian type approval (or qualify for an exemption) before it can be registered and used on Indian roads.

The import of used vehicles (those previously registered in another country) is prohibited under the Indian import policy, with very limited exceptions for certain specialised categories. This prohibition is commercially significant for the grey market in used luxury and performance vehicles: a used imported vehicle brought into India without proper customs clearance is an illegal import, subject to confiscation by customs authorities and ineligible for registration. The prohibition on used vehicle imports has been consistently maintained by successive Indian governments as a measure to protect the domestic automobile industry and to prevent the import of vehicles that do not comply with India's emission and safety standards. Premium importers who operate in the grey market — selling vehicles that have been informally imported without proper customs clearance and without Indian type approval — face serious legal exposure under the Customs Act, 1962 and the CMVR, and their customers face the risk of vehicles that cannot be legally registered and insured in India.

## 3.2 The Type Approval Route for Importers: Full Homologation

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The standard route for an importer seeking to establish an official import programme for a new vehicle model is the Full Homologation route, in which the importer submits a complete WVTA application to ARAI or iCAT, provides a representative test vehicle (typically shipped from the foreign manufacturing facility), and undertakes the full testing programme required for the applicable vehicle category. For an M1 category passenger car, the full testing programme includes: frontal impact test (AIS-098), side impact test (AIS-100), ABS performance test (AIS-012), ESC test (AIS-145), speed alert system test, BS VI emission test

(WLTC cycle), RDE test, lighting installation check, noise measurement, and various other construction and equipment standard verifications. The total testing cost for a full M1 homologation — covering testing fees, test vehicle preparation, freight from the foreign manufacturing plant, and technical documentation preparation — typically ranges from Rs. 30–80 lakh depending on the testing scope and the extent of test data from foreign approvals that can be leveraged.

The homologation timeline for a new import model follows a critical path that OEM planning teams must map carefully: technical documentation preparation and submission to the testing agency (4–6 weeks); test vehicle shipment and customs clearance (4–8 weeks); laboratory scheduling and testing (8–16 weeks); resolution of any test failures requiring vehicle modifications and retesting (variable, potentially 4–12 additional weeks); and WVTA Certificate issue (2–4 weeks after successful testing). The total minimum timeline from project initiation to WVTA Certificate receipt is therefore 5–8 months for a vehicle that clears all tests on first attempt, and 8–12+ months for vehicles that require modifications to achieve compliance. Importers who have built their model introduction planning around a 12-month pre-launch homologation programme and then experience unexpected delays in emission or crash compliance have occasionally been forced to delay commercial launches, with significant consequences for dealer network expectations, pre-booking deposits, and marketing investment.

### **3.3 Small Series Type Approval: The 2500-Unit Limit**

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The Small Series Type Approval (SSTA) route provides a simplified homologation pathway for vehicle types that are produced or imported in small volumes — specifically, types for which the total annual production or import does not exceed 2,500 units. The SSTA route, provided under MoRTH's notifications on type approval for small volume manufacturers, involves a reduced testing programme compared to the full WVTA, with certain tests (particularly the crash impact tests, which are destructive and require separate test vehicles) replaced by engineering assessments or by acceptance of test data from recognised foreign approvals. The SSTA route is specifically designed to accommodate: exclusive and ultra-premium imported vehicle brands (such as Ferrari, Lamborghini, Maserati, Rolls-Royce, Bentley, and Aston Martin) who sell fewer than 2,500 units annually in India; specialist low-volume domestic manufacturers; and certain categories of commercial vehicles produced in small numbers for specialised applications.

For premium imported brands using the SSTA route, the specific advantages are: reduced testing cost (no need for dedicated crash test vehicles); faster testing timeline (engineering assessments and document reviews replace time-consuming physical tests); and flexibility to introduce new variants and derivatives without full retesting (subject to technical assessment confirming that the variant's design does not materially differ from the approved type in the characteristics relevant to the reduced test scope). The SSTA route is not entirely test-free: emission testing (including BS VI WLTC cycle testing), braking system testing, and certain other standards assessments are still required even under SSTA. The SSTA holder's ongoing PoC obligations are also less intensive than under the full WVTA, reflecting the limited production scale, though the manufacturer must still maintain documented evidence of production quality management and provide ARAI or iCAT access for periodic PoC audits.

### **3.4 The Competent Authority Route: Leveraging Foreign Approvals**

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The Competent Authority Route — established through MoRTH notifications providing for partial or full recognition of vehicle approvals issued by recognised foreign regulatory authorities — offers the most streamlined homologation pathway for OEMs importing vehicles that have been type-approved to international standards harmonised with the relevant AIS documents.

Under this route, the importer submits the foreign type approval certificate (issued by a recognised Competent Authority such as the European Union's type approval authorities, the United Kingdom's DVSA, or other UNECE member state authorities) to ARAI or iCAT as the primary evidence of compliance with the equivalent AIS standard, with testing being reduced to those standards for which no equivalent foreign approval exists or where the Indian AIS deviates materially from the foreign standard.

The practical benefit of the Competent Authority Route for European market vehicles — which are type-approved to UNECE Regulations that form the basis of the AIS documents — is a substantial reduction in testing scope: for a European-certified M1 vehicle with UNECE R94 (frontal impact), R95 (side impact), R13-H (braking/ESC), R48 (lighting), R51 (noise), and the applicable emission regulation certifications, the Indian testing scope may be reduced to emission testing (as the Indian BS VI WLTC standard may differ from the European Euro VI test cycle in specific parameters), and verifications of India-specific requirements that have no European equivalent (such as the Speed Alert System under AIS-137). This reduced testing scope can compress the homologation timeline from 8–12 months to 4–6 months and significantly reduce the testing cost, improving the economics of India market entry for medium-volume premium brands.

# Crash Safety Standards and Bharat NCAP

*AIS-098 Frontal Impact, AIS-100 Side Impact, Bharat NCAP Protocol, and the Safety Premium in Indian Automotive Market*

*The crash safety regulatory framework has undergone fundamental transformation with the introduction of Bharat NCAP in 2023. Understanding both the mandatory regulatory standards and the voluntary NCAP programme is essential for OEMs positioning their vehicles in India's safety-conscious premium segment.*

## 4.1 Mandatory Crash Safety: AIS-098 and AIS-100

AIS-098, "Safety of Motor Vehicles — Protection of Occupants in the Event of a Frontal Collision," specifies the mandatory frontal impact requirements for M1 category vehicles sold in India. The standard requires testing using a 56 km/h full-width rigid barrier impact, measuring occupant protection through a combination of injury risk criteria assessed from instrumented dummies placed in the driver and front passenger seats: Head Injury Criterion (HIC36), chest deflection, chest velocity criterion, neck force and moment criteria, and femur force. AIS-098 is aligned with the UN ECE Regulation R94, allowing vehicles tested to R94 by a recognised European testing laboratory to demonstrate compliance with AIS-098 through the Competent Authority Route, as described in Chapter Three. The mandatory AIS-098 requirement establishes a floor level of frontal impact protection that all vehicles sold in India must achieve — in the test configuration, the vehicle must prevent serious or fatal head, chest, and leg injuries to the front occupant, as determined by the prescribed injury criteria thresholds.

AIS-100, "Safety of Motor Vehicles — Lateral Collision," covers side impact protection against a moving deformable barrier (MDB) impact at 50 km/h and a pole impact test at 29 km/h. The MDB test simulates the scenario of another vehicle hitting the test vehicle from the side, while the pole test simulates the scenario of the vehicle running into a rigid pole (such as a lamp post or tree). Together, the frontal and side impact tests cover the two most common and severe accident scenarios in Indian road conditions, providing a minimum standard of structural integrity and occupant protection that every new M1 vehicle must meet. The mandatory crash standards do not test rear impact protection, roof strength, or rollover resistance — these are assessed voluntarily in the Bharat NCAP and global NCAP protocols, creating a commercial differentiation between vehicles that only meet the mandatory minimums and those that have voluntarily demonstrated higher levels of safety performance.

The practical compliance challenge for OEMs is that AIS-098 and AIS-100 testing is destructive — each test requires a complete vehicle to be crashed — making the testing cost significant, particularly for low-volume imported models where the value of each test vehicle is high. The SSTA route for small series importers addresses this through the replacement of physical crash testing with engineering assessments, but for mainstream volume OEMs the cost of crash tests (typically 2–4 vehicles per test configuration, at test vehicle values of Rs. 20–60 lakh each for premium vehicles) is a substantial element of the total type approval cost. OEMs who manage their variant portfolios carefully — structuring derivative variants to share crash test results through engineering equivalence assessments rather than repeat testing — can optimise their homologation cost without compromising compliance integrity.

## 4.2 Bharat NCAP: Framework and Protocol

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Bharat NCAP (New Car Assessment Programme) — launched by MoRTH in August 2023 — is India's national car safety rating programme, providing an independent star-based (0–5 stars) assessment of the crash safety performance of new M1 category passenger vehicles tested at ARAI or iCAT using protocols adapted from the Global NCAP framework. Bharat NCAP test results are published publicly on the MoRTH and Bharat NCAP websites, with separate star ratings for Adult Occupant Protection (AOP) and Child Occupant Protection (COP). The Bharat NCAP protocol includes tests additional to the mandatory AIS-098 and AIS-100 requirements: a higher-severity 64 km/h Moderate Overlap Frontal Impact test (similar to the IIHS small overlap test), a 50 km/h side MDB test consistent with AIS-100 but assessed against stricter Bharat NCAP criteria, and assessments of the presence of specific safety technology features (ESC, ADAS, seatbelt reminders).

The commercial significance of Bharat NCAP for premium OEMs is substantial. Five-star Bharat NCAP ratings — achieved by vehicles with strong structural design, high levels of standard safety equipment (multiple airbags, ESC, AEB, lane departure warning), and good occupant protection metrics in all test modes — provide a powerful, independent, India-specific safety credential that premium brands use prominently in their marketing communications. The launch of Bharat NCAP has stimulated significant investment in safety upgrades across the industry: OEMs whose global platform vehicles had previously been sold in India with reduced safety specifications (fewer airbags, no AEB) compared to their performance in European or American NCAP tests have been incentivised to close this gap in response to the competitive pressure from Bharat NCAP ratings.

## 4.3 Advanced Driver Assistance Systems: Regulatory Trajectory

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Advanced Driver Assistance Systems (ADAS) — including Autonomous Emergency Braking (AEB), Lane Departure Warning (LDW), Lane Keeping Assist (LKA), Blind Spot Detection (BSD), and Adaptive Cruise Control (ACC) — are currently not mandated as standard equipment on all Indian vehicles, but their increasing prevalence in the premium vehicle segment and their inclusion as criteria in the Bharat NCAP technology safety credits assessment are progressively creating de facto market standards. MoRTH's AV Task Force — which is developing India's regulatory framework for connected and autonomous vehicles — has indicated that mandatory ADAS requirements will be introduced in phases, beginning with AEB for pedestrian and cyclist detection (aligned with the UN ECE Regulation R152 requirements) for new M1 models from a date to be notified.

For premium OEMs, the ADAS regulatory trajectory creates a product planning imperative to ensure that the ADAS hardware and software architectures deployed on Indian-market vehicles are validated for Indian road and traffic conditions — which differ significantly from European or American conditions in respect of pedestrian and cyclist density, mixed traffic flows, road marking inconsistency, and lighting conditions. ADAS systems calibrated for European or North American conditions may underperform in Indian conditions (false positive AEB activations or missed pedestrian detections in congested traffic), creating both safety and customer experience challenges. OEMs who invest in India-specific ADAS calibration and validation — testing their systems on Indian roads across diverse traffic scenarios — are better positioned for both commercial success and regulatory compliance as mandatory ADAS requirements are introduced.

## 4.4 Child Restraint Systems and ISOFIX

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The ISOFIX child restraint system standard — which provides a rigid mechanical connection between the child seat and the vehicle's body structure, bypassing the adult seatbelt — has been mandatory for all new M1 category vehicles in India since 2019

under AIS-016, which is aligned with UN ECE Regulation R44/04 (and subsequently updated to accommodate the R129 "i-Size" standard). The ISOFIX mandate requires every M1 vehicle to be equipped with ISOFIX anchorages in at least two rear seating positions, enabling the use of compatible child restraint systems. For premium OEMs, the ISOFIX mandate is generally well-addressed in their global vehicle platforms which are already equipped with ISOFIX as standard in all markets — the compliance effort is primarily one of documentation verification rather than product modification. However, the specific ISOFIX anchorage geometry and load rating requirements of AIS-016 must be verified against the vehicle's type approval documentation, and any seating configuration variants that modify the rear seat structure must be assessed for ISOFIX compatibility before being offered for sale in India.

# ARAI, iCAT and the NATRiP Infrastructure

*Testing Infrastructure, Accreditation, Capacity, Regional Testing Centres, and the India Automotive R&D Ecosystem*

*The National Automotive Testing and Research and Development Infrastructure Project (NATRiP) has transformed India's automotive testing capability. For OEMs navigating the homologation process, understanding the capabilities and limitations of each NATRiP centre is essential for efficient project scheduling.*

## 5.1 The NATRiP Initiative

NATRiP (National Automotive Testing and Research and Development Infrastructure Project) was established by the Ministry of Heavy Industries in 2005 as a public-private partnership to build world-class automotive testing infrastructure in India. The project, with a total investment of approximately Rs. 2,288 crore from the Government of India, the states hosting the facilities, and the automotive industry, created seven automotive testing and R&D centres across India: ARAI (Pune), iCAT (Manesar), NATRiP (Chennai and Ahmedabad), GARC (Greater Noida Automotive Research Centre), and SAMRTH (Silchar, Assam). Each centre was equipped with specialised testing capabilities aligned with the needs of the automotive sector clusters in its geographic vicinity, providing locally accessible type approval testing, R&D support, and certification services to manufacturers and suppliers in each region.

ARAI, established in Pune in 1966 and upgraded through NATRiP investment, offers the most comprehensive testing capabilities in India, including: a full-scale crash test facility with linear track and barrier testing infrastructure capable of performing all Bharat NCAP and mandatory AIS crash tests; a semi-anechoic chamber for acoustic noise measurement; a climatic chamber capable of simulating temperatures from -40°C to +65°C and humidity from 10% to 95%; a chassis dynamometer for WLTC emission testing with dilute tunnel CVS (constant volume sampling) system; and extensive outdoor test tracks for brake testing, handling assessment, and durability evaluation. ARAI's location in Pune positions it at the centre of India's largest automotive manufacturing cluster, providing convenient access for OEMs based in or near Maharashtra.

iCAT, established at Manesar (Haryana) in 2006, is the testing agency of choice for OEMs operating in the NCR-Delhi automotive cluster, including Maruti Suzuki, Hero MotoCorp, Honda Motorcycle and Scooter India, and the large component manufacturer ecosystem. iCAT's facilities include BS VI emission test laboratories, crash test facility (operational from 2019), vibration and acoustics testing, electrical and electromagnetic compatibility (EMC) testing, and a proving ground for outdoor vehicle dynamics testing. The addition of crash testing capability at iCAT in 2019 has removed the previous bottleneck of routing all crash tests through ARAI, improving testing capacity at the national level and providing OEMs in the NCR region with a local venue for this critical and time-consuming test.

## 5.2 Electromagnetic Compatibility Testing: AIS-004 (EMC)

Electromagnetic Compatibility (EMC) testing — verifying that vehicle electronic systems do not emit excessive radio frequency interference and are immune to electromagnetic disturbances from external sources — has become increasingly important as

vehicle electronic content grows. AIS-004 specifies EMC requirements for motor vehicles aligned with UN ECE Regulation R10 (the primary international EMC standard for motor vehicles), covering both emission limits (radiated and conducted emissions from the vehicle's electronic systems) and immunity requirements (vehicle system operation under specified levels of external electromagnetic disturbance). The growing proliferation of electronic control units (ECUs), wireless communication systems (V2X, cellular, Bluetooth, Wi-Fi), and high-power electric drive systems in modern vehicles — particularly in EVs and hybrid vehicles — creates a complex EMC design challenge that requires rigorous testing to ensure compliance.

For imported vehicles, EMC testing under AIS-004 is typically required even where the vehicle has been certified to ECE R10 in its country of origin, as the Indian standard may have specific requirements or test conditions that diverge from the European standard, and as the vehicle's specific Indian-market configuration (including locally installed infotainment systems, telematics units, and accessories) may differ from the tested European configuration. OEMs who install India-specific telematics hardware (GPS/VLT unit for AIS-140 compliance, EV connectivity systems for government monitoring) must ensure that these locally added components do not disrupt the EMC compliance of the vehicle's pre-approved configuration.

### **5.3 ARAI's Research and Development Support Services**

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Beyond its type approval testing function, ARAI provides research and development support services to automobile manufacturers, component suppliers, and government agencies, including: prototype vehicle design and development assistance; powertrain optimisation for emission and fuel efficiency improvement; vehicle dynamics simulation and testing; material testing and failure analysis; and expert witness and forensic vehicle examination services for accident investigation and litigation support. These R&D services are particularly valuable for smaller domestic manufacturers and component suppliers who do not have in-house R&D capability at the depth required for complex engineering challenges. For premium OEMs, ARAI's forensic examination services are relevant in the context of MACT proceedings and recall investigations, where an independent engineering assessment by a NABL-accredited agency carries significant evidentiary weight.

# Recall Regulations, Post-Market Surveillance, and Product Compliance Management

*2021 Recall Regulations, Voluntary and Mandatory Recall Procedures, CCPA Interface, and OEM Compliance Architecture*

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*India's vehicle recall framework — significantly strengthened by the 2019 MVA Amendment and the 2021 Recall Regulations — requires OEMs to maintain a systematic product compliance management infrastructure. This chapter examines the complete recall legal framework and the OEM compliance practices that support it.*

## 6.1 The Automotive Recall Regulations, 2021

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The Automotive Recall (Procedure for Voluntary and Mandatory Recall of Motor Vehicles) Regulations, 2021, notified by MoRTH under the authority of Section 110A of the MVA (as amended in 2019), establish the detailed procedural framework for both voluntary and mandatory recalls of motor vehicles in India. The 2021 Regulations define a "recall" as any action by a manufacturer to notify owners of vehicles of a safety defect or non-compliance with a regulatory standard, to remedy the defect or non-compliance at no cost to the vehicle owner, and to report the recall to MoRTH. The Regulations distinguish between voluntary recalls (initiated by the manufacturer on its own initiative, without a MoRTH directive) and mandatory recalls (ordered by MoRTH following a safety investigation). Both categories of recall are subject to the notification, remedy, and reporting obligations specified in the Regulations, though the timeline and procedural requirements differ.

For voluntary recalls, the Regulations require the manufacturer to: notify MoRTH of the recall within 3 days of determining that a safety defect or non-compliance exists in a vehicle type; provide a detailed technical report describing the defect, the population of affected vehicles (identified by VINs or production date ranges), the safety risk, and the proposed remedy; issue consumer notifications to all registered owners of affected vehicles within 7 days of the recall decision (through registered mail and electronic communication to the contact information in the vehicle's registration record); and report recall completion rates to MoRTH monthly until the recall is closed. For mandatory recalls ordered by MoRTH following a safety investigation, the timelines are compressed: the manufacturer must acknowledge the mandatory recall order within 24 hours, submit the technical report within 7 days, and commence consumer notifications within 15 days of the order.

The penalty structure for recall non-compliance under Section 182A of the MVA — imprisonment up to one year, fine up to one crore rupees, or a fine of three times the price of the defective vehicle, whichever is higher — creates a severe financial deterrent to non-compliance. The "three times the vehicle price" alternative penalty is particularly punitive for premium and luxury vehicle manufacturers, whose vehicle prices may be Rs. 50 lakh to Rs. 5 crore per unit: at three times the vehicle price, the penalty per affected vehicle could be Rs. 1.5 crore to Rs. 15 crore, creating aggregate recall non-compliance liability that could run to hundreds or thousands of crores for large-scale safety defects affecting significant populations of premium vehicles.

## 6.2 Global Recall Coordination: Indian Requirements in an International Context

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For multinational OEMs managing global vehicle platforms, a safety defect identified in one market typically requires a

coordinated international recall across all markets where affected vehicles were sold, with each market's specific legal requirements governing the local recall procedure. India's 2021 Recall Regulations create obligations that interact with the OEM's global recall management system: the 3-day MoRTH notification requirement (from the date the manufacturer "determines" a defect exists) must be integrated into the global decision-making process for recall initiation, ensuring that the Indian regulatory notification is not delayed by internal deliberations about whether to initiate a recall. The "3 days from determination" standard is an objective trigger — once the manufacturer's internal quality management system generates a determination that a safety defect exists in an Indian-market vehicle population, the MoRTH notification clock starts running regardless of whether the global recall has been formally initiated.

The practical coordination challenge arises because the "determination" of a defect often occurs through a gradual accumulation of evidence — warranty claims, field reports, consumer complaints, laboratory investigations — rather than through a single clear decision point. OEMs must establish robust internal processes for: monitoring warranty claim data for patterns suggestive of systematic defects; escalating field safety reports to the global safety decision-making authority; maintaining records that establish the exact date on which a defect determination was made (for regulatory reporting timeline purposes); and triggering parallel Indian regulatory notifications when global recall decisions are made. The failure to maintain these processes creates the risk that a post-incident regulatory investigation by MoRTH will establish that the OEM had sufficient information to determine a defect earlier than the date of its MoRTH notification, exposing the manufacturer to recall non-compliance liability under Section 182A.

### 6.3 Consumer Complaints and the CCPA Interface

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The Central Consumer Protection Authority (CCPA), established under the Consumer Protection Act, 2019, has jurisdiction over matters relating to unfair trade practices, misleading advertisements, and unsafe goods and services. In the automotive context, the CCPA's powers are directly relevant to: safety defects in vehicles (the CCPA can investigate consumer complaints about defective vehicles, issue safety notices, and recommend recalls independent of MoRTH's recall authority); misleading advertising (the CCPA can take action against OEM marketing claims that exaggerate safety performance, fuel efficiency, or other regulated characteristics); and unfair trade practices in the distribution network (the CCPA has addressed practices such as charging excessive dealer-added margins over the ex-showroom price, mandatory insurance bundling, and non-disclosure of vehicle defects at point of sale). The interaction between MoRTH's recall authority under the MVA and the CCPA's product safety authority under the CPA creates a dual-track regulatory exposure for OEMs facing vehicle safety issues — a defect that triggers a recall under the MVA may also trigger CCPA action under the CPA if consumer complaints are significant.

**Booklet II Key Takeaways:** The type approval and homologation framework under CMVR Rules 126–126B, implemented through ARAI and iCAT and guided by the AIS standards developed by the CMVR-TSC, constitutes the technical-legal gateway for every vehicle entering the Indian market. The BS VI emission standards and CAFE regulations create ongoing fleet-level compliance obligations beyond type approval. The Small Series Type Approval and Competent Authority routes provide commercially valuable streamlined pathways for premium importers. Bharat NCAP has elevated the commercial significance of crash safety performance, creating market pressure for premium safety investment. The 2021 Recall Regulations and the CCPA's product safety jurisdiction have significantly raised the post-sale compliance and liability stakes for OEMs and importers in India's rapidly evolving regulatory environment.

# Type Approval Deep Dive: Advanced Issues for OEM and Importer Counsel

*Post-Approval Changes, Compliance Failures, Technology Mandates, and the Future Homologation Landscape*

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## B.1 Managing Post-Approval Changes: Variants, Updates, and Software

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The type approval framework creates a static snapshot of a vehicle's configuration at the time of testing, but vehicles undergo continuous development after their initial type approval: model year changes introduce new features, engineering updates address quality or performance issues, regulatory compliance updates respond to amended AIS standards, and over-the-air (OTA) software updates modify vehicle behaviour without any physical change to the hardware. Each category of post-approval change raises distinct regulatory questions about whether the change requires a new type approval application, a supplementary approval for the affected system, or merely documentation in the type approval file as a minor permitted change. The CMVR framework distinguishes between "extensions" (changes that fall within permitted deviations from the approved type and can be accommodated within the existing WVTa without retesting) and new type approvals (changes that materially alter the vehicle's compliance with one or more AIS standards, requiring retesting of the affected standard). The practical challenge for OEM homologation teams is accurately classifying each post-approval change — if a change that should be submitted as a new type approval is instead treated as an extension, the resulting vehicle variants will be non-compliant with their type approval, creating recall exposure and Section 182A liability for the manufacturer.

Over-the-air software updates present a particular challenge for the type approval framework. Modern vehicles — including BS VI vehicles with complex engine and emission control software, EVs with battery management system software, and ADAS-equipped vehicles with sensor fusion and control algorithms — may receive OTA software updates that modify critical emission control parameters, safety system behaviour, or performance characteristics. If an OTA update changes the vehicle's emission control calibration in a way that affects BS VI compliance, it effectively creates a new vehicle variant that may not be covered by the original type approval. MoRTH is currently developing guidelines for the regulatory treatment of OTA software updates, drawing on the UN ECE Regulation R156 (Software Update Management Systems) framework that has been adopted in Europe. Until these guidelines are finalised, OEMs deploying OTA updates to Indian-market vehicles must assess whether each update affects regulated characteristics and, if it does, whether a supplementary type approval or updated type approval documentation is required before the update is deployed.

The Production Conformity (PoC) audit — the periodic verification by ARAI or iCAT that production vehicles conform to their type approval — creates a specific compliance risk when model year changes or engineering updates are introduced into production before the corresponding type approval amendment is finalised. If the PoC audit sample vehicles are found to have specifications that deviate from the type approval documentation — even if the deviation arose from a genuine engineering improvement rather than a compliance shortfall — the audit finding of non-conformity can trigger a cascade of regulatory consequences including suspension of the type approval certificate, mandatory quarantine of vehicles already produced with the non-conforming specification, and potentially a recall of already-delivered vehicles. OEM homologation teams must therefore ensure that engineering change management processes are tightly integrated with the type approval amendment process, so that

production changes are never implemented ahead of the corresponding type approval update.

## **B.2 The Bharat NCAP Protocol: Detailed Test Scenarios**

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Bharat NCAP's Adult Occupant Protection (AOP) assessment protocol tests the vehicle in four crash scenarios: a 64 km/h Moderate Overlap Frontal Impact (a vehicle hitting the centre of a deformable barrier at 64 km/h, representing the most common severe frontal crash scenario); a 50 km/h Full-Width Rigid Barrier Frontal Impact (representing high-severity head-on collisions); a 50 km/h Side Moving Deformable Barrier (MDB) Impact (representing a broadside collision from another vehicle); and a 29 km/h Side Pole Impact (representing the vehicle running into a fixed pole or narrow object). The AOP star rating is calculated from a weighted combination of injury risk scores across driver and front passenger dummies (Hybrid III for frontal tests, EuroSID-2re for side tests) across all four scenarios, with a maximum possible AOP score of 34 points corresponding to a 5-star rating. The Child Occupant Protection (COP) assessment uses a dynamic sled test with child dummies representing a 6-year-old and an 18-month-old child in their respective seats and restraints, assessing head, chest, and neck injury criteria in a simulated frontal crash scenario, and also includes a static assessment of child restraint installation information and accessibility.

The Bharat NCAP protocol's alignment with the Global NCAP framework means that Indian test results are broadly comparable with Euro NCAP and ASEAN NCAP results for the same vehicle models, though differences in test parameters (most notably the inclusion of the Full-Width Rigid Barrier test in Bharat NCAP, which is not part of Euro NCAP's current protocol) mean that direct numeric comparisons are not straightforward. For OEMs whose global platforms have been tested under Euro NCAP or ASEAN NCAP, the Bharat NCAP results for the India-market variant provide a specific India-relevant safety credential that customers and fleet procurement officers can use to assess the vehicle's safety performance. Several India-specific market vehicles — including compact SUVs developed specifically for the Indian market without the structural weight savings that premium global platforms can afford — have scored lower on Bharat NCAP than their global counterparts, creating commercial pressure on value-segment OEMs to invest in structural and safety equipment upgrades to improve their scores.

## **B.3 Electric Vehicle Type Approval: Specific Challenges**

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The type approval of electric vehicles involves specific technical and procedural challenges beyond those applicable to conventional ICE vehicles, arising from the unique characteristics of high-voltage electrical systems and large-capacity traction batteries. The EV-specific AIS standards (AIS-038, AIS-049, AIS-156) require testing of: electric shock protection (verifying insulation resistance, isolation monitoring, and connector safety under both normal operation and post-crash conditions); battery system safety (thermal runaway propagation test, overcharge and over-discharge test, short circuit test, vibration and shock test); electromagnetic emissions from the electric drive system; and the interaction between the traction battery's high-voltage system and the vehicle's conventional 12V auxiliary system. These tests require specialised high-voltage test equipment and safety protocols at the testing laboratory, and the test procedures are inherently more complex and time-consuming than the equivalent tests for ICE vehicles. ARAI and iCAT have invested in EV-specific testing infrastructure since the introduction of the FAME programme, but the demand for EV type approval testing — from both new EV model introductions and the periodic PoC audits of in-production EV models — has at times exceeded the available testing capacity, creating scheduling delays that affect OEM launch timelines.

## **B.4 Noise and Vibration Harshness: India-Specific Challenges**

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The noise, vibration, and harshness (NVH) performance of vehicles in India is assessed under the AIS-004 noise standard for type approval purposes, but the real-world NVH challenges of operating in Indian conditions — which include significantly rougher road surfaces, higher ambient temperature extremes, and more aggressive driving patterns than the European conditions for which most premium vehicle platforms are designed — create specific customer satisfaction issues that go beyond the regulatory compliance dimension. Rattles, squeaks, and vibration-related noises that are imperceptible on smooth European roads can become prominent and irritating on India's road network, including the undivided national highways with expansion joints and road surface irregularities, the urban arterial roads with potholes and speed breakers, and the rural roads with unsealed surfaces. Premium OEMs introducing European platform vehicles into the Indian market typically conduct India-specific NVH validation programmes — using Indian test roads at validated test facilities in India, including the NATRIP proving ground — to identify and address India-specific NVH issues before commercial launch, recognising that NVH is one of the most customer-noticeable quality attributes in the premium segment.

## **B.5 Global Regulatory Harmonisation and India's Participation**

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India participates in the UN ECE's World Forum for Harmonisation of Vehicle Regulations (WP.29) through MoRTH's technical experts and the CMVR-TSC, contributing to the development of new UN ECE regulations and 1958 Agreement and 1998 Agreement type approvals that form the basis for AIS standards. India's engagement with WP.29 serves multiple strategic objectives: it enables Indian technical experts to influence the development of new international standards in ways that reflect Indian road conditions, vehicle use patterns, and manufacturing capabilities; it facilitates the progressive harmonisation of AIS standards with international standards, reducing the divergence that creates import homologation complexity for international OEMs; and it positions India to eventually join the 1958 Agreement on type approval (under which the mutual recognition of type approvals between contracting parties would dramatically simplify the import homologation process by allowing European type approvals to be recognised directly in India without repetition of all tests). India's accession to the 1958 Agreement is a long-term regulatory goal that would significantly reduce the cost and timeline of import homologation for premium brands, but requires a comprehensive audit of AIS-ECE standard equivalence and the establishment of mutual recognition agreements with key partner countries.

**Booklet II Comprehensive Summary:** The type approval and homologation framework is the technical gateway through which every vehicle enters the Indian market, and its complexity — spanning CMVR rules, AIS standards, ARAI and iCAT testing procedures, import homologation routes, and post-approval change management — demands systematic expertise from OEM homologation teams and their legal advisors. BS VI emission compliance, CAFE fuel efficiency obligations, Bharat NCAP safety ratings, and the emerging recall regulatory framework collectively define the technical compliance environment within which every vehicle's India-market viability must be assessed. The progressive strengthening of India's vehicle regulations — towards internationally harmonised standards for safety, emission, and efficiency — creates both challenges (investment in vehicle development and testing) and opportunities (India-specific safety credentials, EV super credits, and PLI incentive alignment) for OEMs who engage proactively with the regulatory process.