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**European Union Regulations in Indian
Tyre Industry**

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Abstract

This paper presents, compares and contrasts the existing Indian AIS142 regulations with the UN R117 Regulations that are set to be implemented in the Indian tyre manufacturing industry. The study evaluates the two sets of regulations with respect to safety, environmental and economic aspects. The paper points to the fact that in toto implementation of the UN R117 regulations in a short span of time without considering unique operating structure of country's transport sector poses a greater risk of imposing significant socio-economic costs not only on the tyre industry but also could lead to a cascading impact on other stakeholders of transport industry. The study highlights that many countries in the world notably the USA and China have their own country specific regulation that does not necessarily conform to the UN R117 regulations and take into account their own national interests, namely their own geographical spread and terrain of operation, besides environmental and economic structure of the transportation sector in their countries. The paper posits that a detailed study of the costs and benefits of implementing the UN R117 in India needs to be carried out taking into account the composition of the transportation sector in the country which includes the underlying road infrastructure, socio-economic nature of the operations, the historical development of the sector and its contribution, and the imposition of the standards leading to disruption before its adoption. without any tangible benefits

Keywords: Tyre industry, Structure, Geographical Distribution, Environment, Regulation

JEL Codes: L11, L52, L62, J18, K32

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INTRODUCTION

Adoption of new regulations can significantly affect the structure and performance of an industry. In this working paper we discuss the implications of the impending UN R117 regulations that are likely to be implemented for the tyre industry in India. We begin by highlighting the contribution of the tyre industry to the Indian economy in terms of employment, revenue and downstream effects and then describe the structure of the tyre industry in terms of production of bias and radial tyres. We then trace the evolution of the UN R117 regulations and the India's on AIS 142 regulations and compare these two regulations to highlight that the fact that implementation of the UN R117 regulations irrespective of tyre type is likely to result in significant costs not only for the tyre industry but also for the Indian economy in terms of export, environment and self-reliance effects. We conclude the working paper by suggesting that the Indian AIS 142 regulations may be suitably updated keeping into account the UN R117 regulations through a process of dialogue with all the stakeholders of the tyre industry. We point out that other countries like the USA and China have their own regulations to suit their specific needs and perhaps India too can have its own updated regulations that meet the structure and composition of its tyre industry.

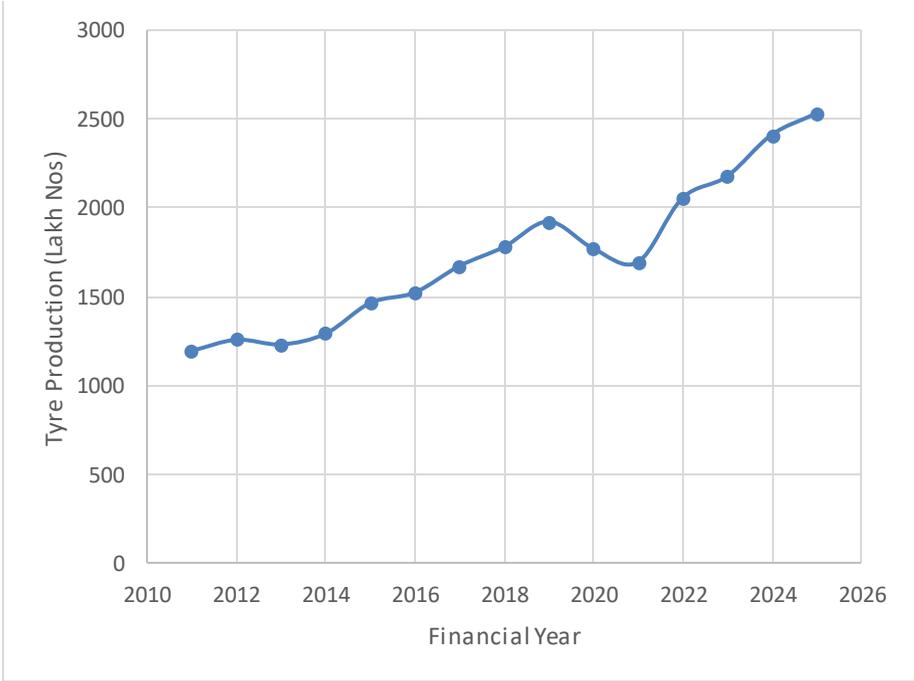
Importance of the Tyre Industry

The tyre industry is a vital contributor to the Indian economy, generating revenue, export income, employment, and supporting the transport and manufacturing ecosystem. The total tyre production has doubled in the last decade from 1192 lakh units in 2010-11 to 2528 lakh units in 2024-25 resulting into a CAGR of 5%. Figure 1 shows the growth trajectory of the tyre production in the country. The growth is expected to continue and transform significantly with revenues projected to multiply twelvefold and touch nearly ₹13 lakh crore by 2047. Premiumisation, stronger replacement demand, and export expansion are likely to shape the sector over the next two decades generating the compound annual growth rate

(CGAR) of 10 per cent until FY47. As India strengthens its road infrastructure, logistics and freight capabilities, such growth trajectory of the tyre industry clearly contributes to India’s larger economic vision of Viksit Bharat 2047 (ATMA and PwC 2025).¹

The tyre industry contributes around 3.4% to India's manufacturing GDP and this is supported by the growth in the investment in the tyre industry. As shown in the Figure 2 below the gross fixed capital formation (GFCF) witnessed an upward trend with GFCF reaching upto Rs. 136 Bn in 2023-24 from Rs. 40 Bn in 2009-10.

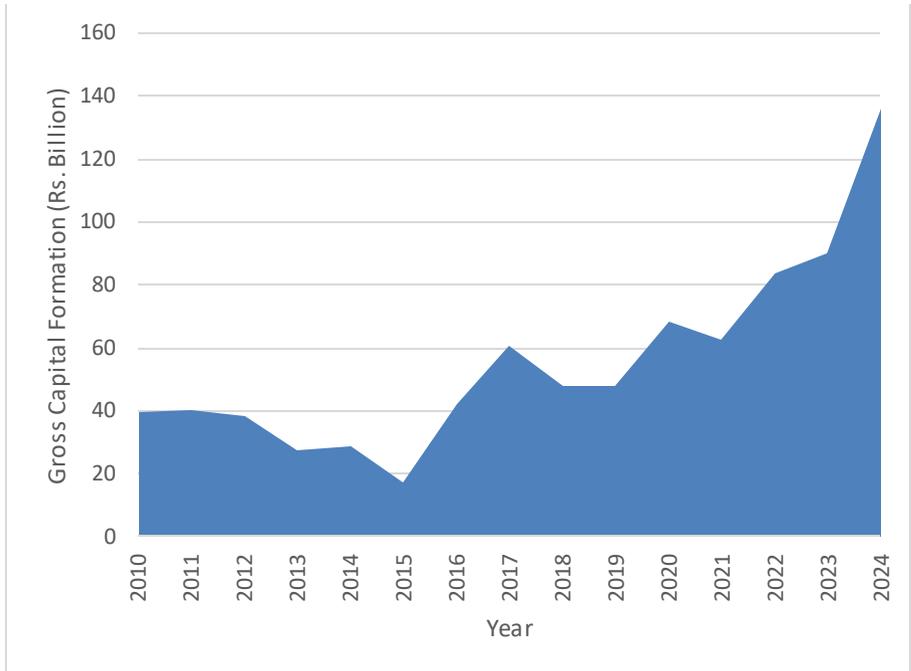
Figure 1: Tyre Production Volume in India 2010-2025



Source: Authors compilation from ATMA Tyre Production Statistics FY24-25

¹ <https://www.pwc.in/press-releases/2025/indian-tyre-industry-poised-to-potentially-deliver-twelve-fold-revenue-growth-till-2047-atma-pwc-report.html>

Figure 2: Gross Fixed Capital Formation in Tyre Industry (2010-2-24)



Source: Authors compilation from Annual Survey of Industries

The industry employed 1.3 Lakh people directly and paid wages and salaries of Rs. 76 Billion in 2023-24.² In addition, it generates large scale employment in the linked MSMEs, plantations, retail and other unorganised sectors by providing livelihood to nearly 3.7 million people such as retreaders, dealers, repairers, transporters etc³. Among the downstream industries, the automotive tyre sector consumes around 49% of all rubber in India, thereby creating the largest indirect employment within the rubber industry, which overall employs around 4 lakh people. As an integral part of the automotive ecosystem, the tyre

³ <https://www.linkedin.com/pulse/how-indias-tyre-industry-quietly-rolling-towards-276-billion-f0jyf/>

sector supports downstream industries such as transport & logistics, petrochemicals, and rubber, reinforcing its broad economic impact. Historically, the output multiplier for the Indian tyre industry has been estimated at, meaning every ₹1 crore of output generates a total economic output of ₹2.47 crore when considering backward and forward linkages.⁴

It is not that only domestic demand that is fuelling growth of tyre industry. In FY25 alone, India exported over ₹25,000 crore worth of tyres, up 9% year-on-year. The country's tyre exports volume reached 51 lakh units which is nearly 20 per cent of the total tyre production in 2023-24. The export revenue increased from Rs. 6,865 Crore in 2010-11 to Rs. 24,873 Crores generating a CAGR of 12 per cent.⁵ The tyre industry accounts for roughly 0.68% of India's total exports, reaching over 170 countries. Leading export destinations include the US (17% share), followed by Germany (6%), Brazil (5%), UAE (4%), and France (4%), with presence in Europe, Southeast Asia, and Latin America.⁶

Structure of the Tyre Industry

The Indian tyre industry is structured across vehicle segments, sales channels and tyre construction. Figure 3 presents the structure and the recent statistics to capture the distribution of tyres across each segmentation. As shown in the Figure, two wheelers dominate the tyre market in India, accounting for a share of 53.8% of the total production followed by passenger cars (27.0%), truck & buses (9.5%), light commercial vehicles (5.1%), three wheelers (3.0%), tractors (3.8%), and others (0.8%). Of these the tyre sales through replacement or aftermarket dominate with a share of 58.2% followed by original equipment sales (41.8%). The tyres are also classified into radial and bias (cross ply) types based on tyre reinforcement material used in the

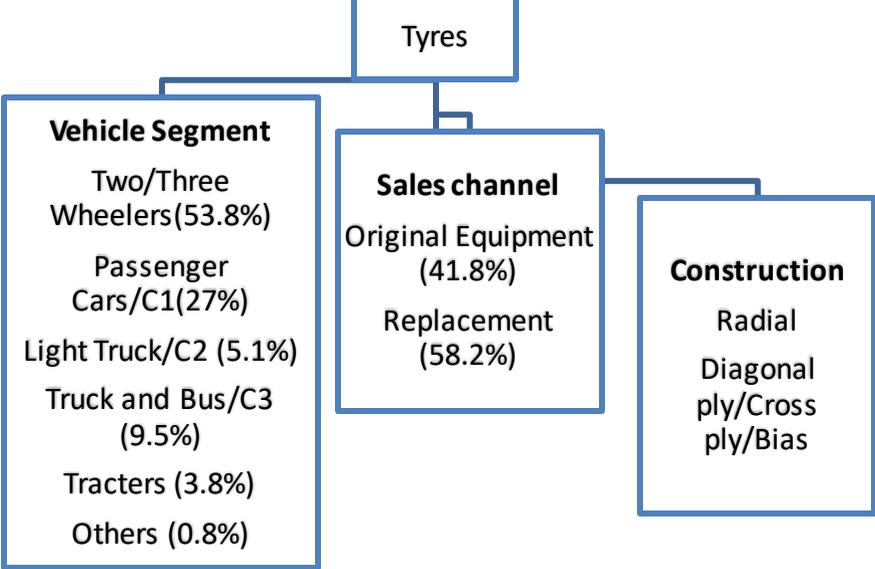
⁴ “Indian tyre industry – turning the wheels of progress”, TARI ed. 2018

⁵ ATMA (2024); ATMA(2025)

⁶ DGFT (2025)

tyre construction, influencing their application across vehicle categories. Radial tyres, with cords running at 90 degrees to the direction of travel, offer higher sidewall flexibility, lower rolling resistance, and improved fuel efficiency, making them suitable for highways (good roads) and long-distance transport. Bias tyres, featuring crisscrossed cord layers, provide greater sidewall strength, shock absorption, and resistance to impact, which suits poor roads [typical of rural and mofussil area] or off-road and heavy-duty use in agricultural, industrial, and rugged commercial settings. Radial tyres dominate passenger car vehicles due to performance attributes like superior traction cum braking characteristics, needed in modern cars besides fuel efficiency, comfort and tyre life [in spite of the failures due to rough road conditions], whereas bias tyres remain prevalent in segments prioritizing durability and lower upfront cost. In 2023-24, bias tyres accounted for 57.7 percent of India’s commercial segment, with radial tyres holding 42.3 percent.

Figure 3: Tyre Industry Segments



Source: Authors compilation from ATMA Tyre Production Statistics CY2024

Globally, the truck and bus bias tyre market has evolved substantially over the past century, shaped by technological change, transport demand, economic growth, regulation, and customer preferences. For much of the twentieth century, bias tyres dominated commercial vehicles because of their robust, low-cost construction that performed reliably under heavy loads and varied operating conditions, especially where roads and maintenance infrastructure were weak. Their cross-ply fabric structure provided strength and durability, making them suitable for long-haul freight, construction, agriculture, and public transport applications. In the period from 2010 to 2021, there has been significant growth in transported freight, especially in emerging markets such as India, China, Uzbekistan, Kazakhstan, even by around 50 percent. But also Eastern European EU member states such as Poland or Romania are experiencing strong increases, while industrialized nations like Japan, Italy, or Great Britain have recorded declining figures.⁷ The latter half of the twentieth century saw a major shift with the diffusion of radial tyre technology, which offered significant gains in fuel efficiency, durability, heat resistance, and overall performance. These benefits steadily redirected demand toward radial tyres in developed markets such as North America, Europe, and Japan, particularly in high-mileage long-haul and premium fleet segments, aided by consistent good quality road infrastructure. As a result, bias tyres were gradually replaced by radial in these developed geographies as the dominant choice for original equipment fitment. However, bias tyres remained important in specific niche segments because of their lower upfront cost, ability to handle uneven terrain, and strong resistance to cuts and damage, attributes valued in mixed-service operations, rural transport, and contexts with weak road infrastructure.

India's tyre market is also largely replacement-market driven, reflecting frequent wear from harsh climates, overloading, and variable road conditions. Tyre lifespans, especially for commercial vehicles, are

⁷ DHL Freight Connections

determined more by usage patterns and harsh environmental conditions—like rough terrain and service abuse—than by the distance travelled alone. This results in significantly shorter replacement intervals compared to global standards. Consequently, replacement tyres constituted the bulk (62%) of domestic production of C3/C2 segment in 2023-24.⁸ The replacement tyre market is expanding rapidly, driven by rising vehicle ownership, increased travel, and proactive tyre maintenance⁹. Additionally, ageing commercial vehicle fleets drive sustained tyre replacement demand through more frequent changes necessitated by accumulated wear from heavy loads, overloading, and tough conditions, boosting aftermarket expansion alongside improved organized retail, e-commerce, and financing availability.

Rapid growth in road freight transport across emerging economies in Asia-Pacific, Latin America, and Africa has sustained demand for bias tyres, which remain attractive due to their affordability, robustness, and suitability for mixed-service and poor-road conditions. Infrastructure expansion and the growth of public transport systems in these regions have reinforced their use in long-haul freight, heavy haulage, and bus and coach applications. At the same time, advances in tread design, rubber compounds, manufacturing processes, and specialized rib configurations have improved rolling resistance, wear, traction, and heat management, enabling modern bias tyres to better match evolving fleet requirements. Retreading —replacing worn treads with new rubber on reusable casings—has emerged as a crucial development within the bias tyre sector, especially in cost-sensitive markets as a suitable alternative to purchase of new tyres. Although retreaded tyres may not match the premium quality or durability of brand-new ones, they deliver key benefits for fleet operators, including

⁸ ATMA Tyre Production Statistics CY2024

⁹ Specifically, bias tyres, with their stiffer sidewalls and diagonal ply construction, demand simpler maintenance suited to rough terrains: frequent visual checks for cuts/flex damage, basic repairs via patches (easier due to layered plies), regular pressure monitoring to combat higher rolling resistance/heating, and retreading after even wear.

substantial cost savings (retreading costs 30-50% lower than new tyre), ready availability, suitability for low-speed urban vehicles like buses and delivery trucks, and the potential for up to two retreads per tyre lifecycle, thereby driving sustained demand. Retreading is largely concentrated in the tyres of commercial vehicles who use them in dummy axles or trailer axles. About 80 percent of the total retreaded tyres are in the commercial segment [of which 60–65 percent in trucks and 15–20 percent in buses], and around 12-15 percent in off-highway tyres such as tractors etc. (ICRA 2024). Retreading has emerged as a crucial development within the bias tyre sector, especially in cost-sensitive markets as a suitable alternative to replacement.

In recent years, retreading market in the country faced a challenge due to the dumping of cheap Chinese tyres in the Truck and Bus Radial (TBR).¹⁰ As a consequence, the Anti-dumping duty on import of new Chinese Truck and Bus tyres for a period of five years was imposed from September 18, 2017 (DGTR 2022).¹¹ However, more recently, the misuse of tyres sent from the developed countries as waste tyres are distorting the retreading market as they are being illegally diverted for usage as a cheaper alternative posing a grave risk to safety and environment (ET 2024; BBC 2024).¹²

By integrating retreading into the waste management framework, Government of India's (GoI) Extended Producer Responsibility (EPR) policy introduced in July 2022 is expected to catalyse the retreading market by recognising retreaders as essential stakeholders. The retreading industry exhibited robust growth in FY2024

¹⁰ Business Standard (2016)

¹¹ In April 2022, DGTR began a sunset review to evaluate the 2017 ADD and recommended a 3-year extension to September 2025. However, there is no official notification is available on this extension. More recently, India imposed Countervailing Duty (CVD) in 2024 on Chinese TBR tyres via Notification No. 03/2024-Customs (CVD), dated July 19.

¹² <https://www.bbc.com/news/articles/cj9wepemrj8o>
<https://auto.economicstimes.indiatimes.com/news/tyres/atma-alarms-the-govt-about-rising-g-import-of-waste-tyres-into-india/111607051>

with organised tyre retreaders (representing 50-55% of the market share) expected to grow by 7-9% in the next three years. Key factors supporting the growth in domestic retreading market include focus on sustainable tyres, improved tyre and retreading technology, better road infrastructure, rising radialisation in CV segment, etc. (ICRA 2024). Future retreading growth will likely stem from economic cost savings, expanded dealer networks, stronger collaborations with fleet operators, and increased participation by tyre manufacturers.

Research objectives

In 1995 the UNECE introduced regulations to specify safety and environmental standards that would be applicable to the tyre industry. These regulations were denoted by the R117. The R117 regulations have since then gone over many modifications with each modification further strengthening the safety and environmental standards. For the domestic market in India the R117 regulations have been adapted for India as Automotive India Standard 142 (AIS 142) for the OEM segment. After a round of COP, it is proposed to enhance current AIS 142 standard, by incorporating the latest amendments of R117. As we have noted in earlier section, India has the bias and radial tyres, imposition of the European standards may impose a significant cost on the economy. In this paper, we investigate the evolution of the EU regulations and Indian regulations till date and draw an understanding of the pre-conditions behind these regulations. Comparison of the two regulations help us draw important implications with respect to country's long term vision of Viksit and Atmanirbhar Bharat and the contribution of automotive industry in general. We draw recommendations on evaluating potential cost that arise as a result of such imposition without adequate execution plan and potential impact areas.

Our study contributes to both literature and practice in the following ways. First, the study provides a comprehensive coverage of the structure of the tyre industry. This helps us to identify the

consumption pattern unique to the country which is likely to be threatened if the tyre industry is impacted by externalities. We also capture the primary reasons for the existence of a unique industry structure in the country. Second, our study provides a direct comparison of the Indian regulations with the global regulations to provide a check on the existing standards in line with the global standards.

The study is organised as follows. Section 2 describes the impending regulation UN R117 followed by evolution of both European and Indian regulations in Section 3. Section 4 draws the comparison if the European regulations are imposed in the country. Section 5 presents the adoption of UN R117 across the world followed by Section 6 to present our observations and potential impact of the imposition. Finally, Section 7 concludes by summarizing adoption challenges, costs of impending regulation and a possible path forward.

REGULATORY LANDSCAPE

India is in the process of implementing more stringent tyre regulations aligned with UNECE Regulation No. 117 (UN R117), which sets uniform requirements for the type approval of new pneumatic tyres (Classes C1, C2, and C3) with respect to rolling sound emissions, wet adhesion (wet grip) performance, and rolling resistance. First introduced in 2005, UN R117 was designed to enhance the safety, environmental performance, and economic efficiency of road transport by establishing mandatory minimum performance standards for tyres. The regulation has since been widely adopted, particularly within the European Union, where tyre labelling programs are closely aligned with UN R117 limits.

Since its inception, UN R117 has undergone multiple revisions to strengthen performance requirements and update testing methodologies. The latest version was implemented in September 2024, reflecting the regulation's dynamic nature. Major recent developments include the adoption of the 03 and 04 series of amendments, which

began around 2019/2020. Notably, the 04 series extends the regulation's scope to include performance standards for worn tyres, marking a significant shift in regulatory focus. These new regulations require testing infrastructure with emphasis on track quality and also sophistication on tyre buffing machine to prepare consistent samples from brand new tyres for a predefined worn tyre condition test as per the standards, ie prior to actual testing. The 03 series entered into force on January 4, 2023, and Contracting Parties may no longer accept type approvals issued under earlier series for Class C1 tyres after July 7, 2024, with full implementation required by July 7, 2026. The UN R117 working group continues to evaluate further proposals, such as those targeting "LT-marked" tyres and updates to testing protocols. Additionally, a new UN Regulation [expected to be in force from 2030] on tyre abrasion is under development, which could eventually incorporate or supersede certain provisions of UN R117 related to wear.

In India, these global standards are being integrated through amendments to the Automotive Indian Standards (AIS) 142:2019, aiming to harmonize domestic tyre requirements with international benchmarks. The phased implementation mandates all new tyre designs to comply with these standards, for all major tyre segments—passenger, truck, and bus – by 2024. The GoI is also developing a 'star rating' system for tyre labelling, modelled after UN R117 recommendations, to help consumers make informed choices based on tyre performance in rolling resistance and wet grip.

To support compliance, India has expanded its testing infrastructure, including facilities such as the Global Automotive Research Centre (GARC) in Chennai, the International Centre for Automotive Technology (ICAT), National Automotive Test Tracks (NATRAX), and the Indian Rubber Manufacturers Research Association (IRMRA). These centers are being equipped to certify tyre performance according to both AIS 142/UN R117 standards. The Bureau of Indian Standards (BIS) is

expected to eventually subsume and enforce these requirements for all tyres sold in India under IS standards, at which point it will apply to all tyres in the replacement market also. However, the current understanding is that the tyres for OEMs will follow the AIS 142 requirements and the replacement market tyres will follow the Bureau of Energy Efficiency (BEE) star labelling requirements. BEE star labelling for tyres primarily bases ratings on the Rolling Resistance Coefficient (RRC) from AIS-142 Annex D coupled with Wet Grip Index (G) from AIS-142 Annex C to ensure safety alongside efficiency.

Recent updates to UN R117, particularly the UN R117-04 amendments in Europe, now mandate minimum wet braking performance for worn tyres, highlighting a growing emphasis on long-term safety. India is considering to adopt similar requirements as testing capabilities and regulatory harmonization continue to advance.

In summary, India's impending UN R117-aligned regulations will require all new and replacement tyres to meet global standards for wet grip, rolling resistance, and external noise, supported by a new tyre labelling and rating system. This regulatory shift is poised to have a significant impact on tyre design, manufacturing, and aftermarket sales from FY2025 onward.

EVOLUTION OF EU AND INDIAN REGULATIONS

European Regulations

The United Nations automotive regulations are governed by three main agreements: the 1958 Agreement, the 1997 Agreement, and the 1998 Agreement. These agreements provide the legal basis for the development and adoption of purpose and framework for international vehicle regulation harmonization. Among these the 1958 and 1998

Agreements focus on harmonising the vehicle standards and approvals.¹³ These standards are administered through the Working Party on the Construction of Vehicles (WP.29), a subsidiary body of the Inland Transport Committee (ITC) of the United Nations Economic Commission for Europe (UNECE) to administer the three agreements (UNECE) .¹⁴ The table below provides the distinctive features of the two agreements:

UN Vehicle Regulation Agreement	Description	Distinguishing features for Contracting Parties
1958 Agreement	Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts	Contracting parties are generally countries and regional entities (e.g., the European Union) that seek legally binding mutual recognition of vehicle type approvals. Parties accept administrative burdens like type approval and conformity verification. It mostly includes developed countries with established regulatory systems.
1998 Agreement	Agreement concerning the Establishing of Global Technical Regulations (GTR) for Wheeled Vehicles, Equipment and Parts	This agreement attracts countries that prefer a more flexible approach with global technical regulations (GTRs) harmonized at the UN level but implemented through national laws without mutual recognition of approvals. It appeals to a broader and more diverse group including developing countries that want to harmonize standards but retain regulatory sovereignty.

Source: Author’s own compilations from UNECE 1958 and UNECE 1998

¹³ Contracting parties are generally countries focused on harmonizing in-use vehicle inspection regimes (PTI) to ensure road safety and environmental compliance. Because it is specialized for periodic technical inspections and not approvals, the number of parties is fewer and includes countries with interest in cross-border acceptance of vehicle inspection certificates.

¹⁴ <https://unece.org/transport/vehicle-regulations>

The 1958 Agreement originated as a regional framework but has gradually expanded beyond Europe, making its type-approval system increasingly global in scope. It has around 60 contracting parties, consisting largely of European Union (EU) member states and the European community along with countries such as Japan, Australia, New Zealand, South Africa, Malaysia, and Thailand. There are currently 164 UNECE regulations annexed to the 1958 Agreement, covering various technical prescriptions for wheeled vehicles, equipment, and parts. Voting takes place in committees on the Agreements. Regional concentration is inevitable as the EC member states account for the large number of votes, and therefore has a de facto decisive majority if vote together.

By contrast, the 1998 Agreement is a more recent, explicitly global framework, open to all UN member states and including major economies such as the EU, United States, Japan, China, Canada, Korea, India, and others. The U.S. proposed and became a party to a separate agreement, the 1998 Global Agreement that focuses only on harmonizing the technical provisions and test methods (creating UN Global Technical Regulations, or UN GTRs) but *does not* include the administrative procedures for mutual recognition of approvals. This allows countries with different certification systems (like the U.S. and those using the 1958 Agreement) to work together on developing global standards without having to change their domestic certification procedures. Under the 1998 Agreement, contracting parties work jointly to develop GTRs, which can then be transposed into national or regional law without requiring mutual recognition of approvals.

In March 2000, the World Forum for Harmonization of Vehicle Regulations (WP.29) was formally established. The primary objective of WP.29 is to initiate and pursue actions aimed at the global harmonization or development of technical regulations for vehicles. These regulations are designed to ensure uniform conditions for periodic technical

inspections and to strengthen economic relations worldwide, with a focus on safety, environmental protection, energy efficiency, and anti-theft performance. WP.29 is supported by six subsidiary bodies known as Groups of Rapporteurs (GRs), which conduct research, analysis, and development of technical requirements within their respective areas of expertise.

Regulatory Structure and Stakeholder Participation

The work of WP.29 is further supported by several informal groups. Membership in the Working Party is open to governmental experts from any United Nations member country, as well as to regional economic integration organizations established by UN member states and experts from governmental organizations. Experts from non-governmental organizations (NGOs) may participate in a consultative capacity. Final decisions are made by government representatives through voting at the WP.29 level.

Technical Recommendations and Decision-Making

The working parties are responsible for making recommendations, including test procedures and limit values, which are then forwarded to WP.29. These recommendations are subsequently reviewed and put to vote by the Committee on the 1958 Agreement. The working parties comprise national delegations and representatives from non-governmental organizations ¹⁵, including industry associations, standardization bodies (such as ISO), representatives from testing centres, type-approval authorities and other stakeholders. Technical experts participating in these groups are expected to base their

¹⁵ Around 30 “NGOs” are accredited to participate in the activities of WP.29, of which the overwhelming majority are European automotive industry groups such as:

OICA – International Organisation of Motor Vehicle Manufacturers

IMMA – International Motorcycle Manufacturers Association

CLEPA – European Association of Automotive Suppliers

ETRTO – European Tyre and Rim Manufacturers Association

CONCAWE – Oil companies European Organisation for Environment, Health and Safety

recommendations on technical expertise rather than national interests or commercial considerations.

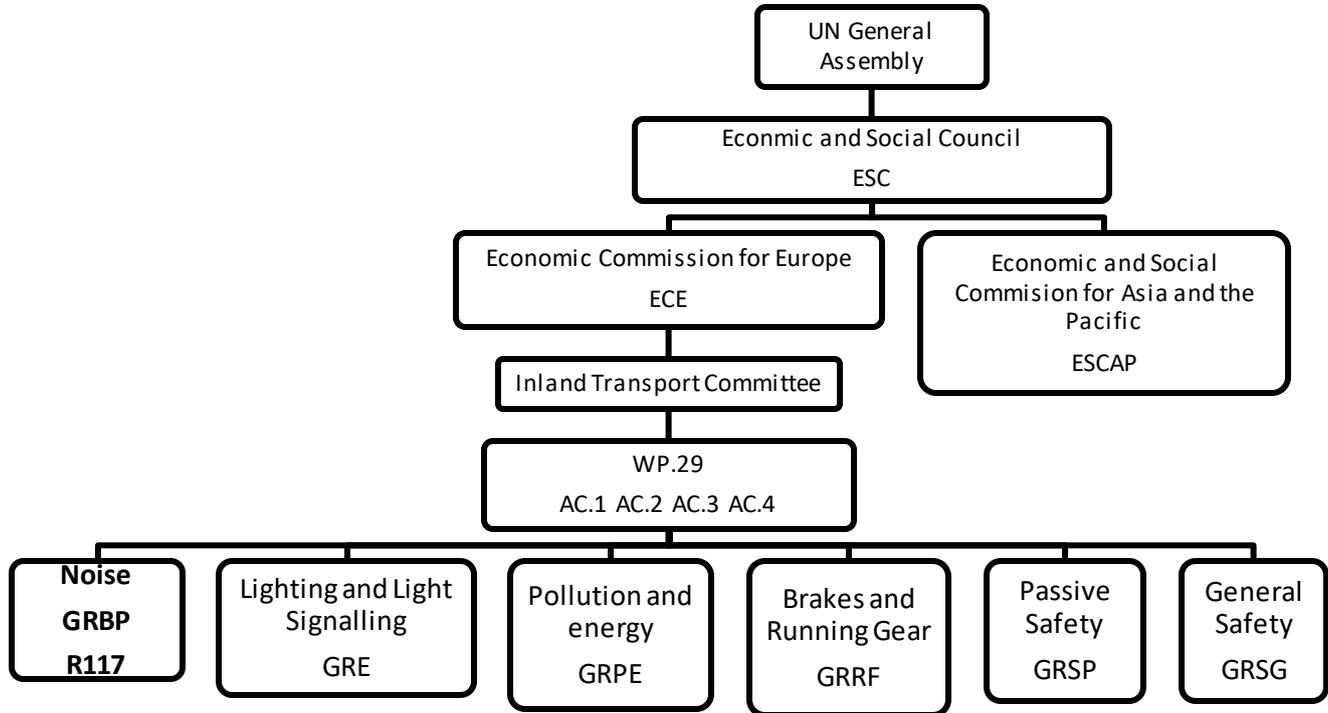
Principles and Agreements

WP.29 operates under the principles of the 1958 Agreement, which establishes procedures for creating uniform standards for new motor vehicles and equipment. The Agreement also facilitates the reciprocal acceptance of approvals for vehicle parts, systems, and equipment issued under its framework.

Organizational Structure of UN Regulations

The organizational structure of UN vehicle regulations is illustrated in Figure 4. As shown, the governance and implementation of Regulation No. 117 (UN R117) are managed through the Economic Commission for Europe (ECE). A notable fact is that there is no direct involvement of the Economic and Social Commission for Asia and the Pacific (ESCAP) in the development of vehicle regulations under the UN umbrella. Instead, ESCAP supports the objectives of the United Nations Economic and Social Council (UNESCO) by promoting interregional cooperation toward achieving UN goals.

Figure 4: UN Regulatory Structure



Source: Author's own compilations from UN General Assembly System

Evolution of UN R117

The initial UNECE Regulation No. 117 (R117), was established as part of the 1958 Agreement on vehicle regulations applied to new pneumatic tyres in Class C1 (passenger car), C2 (light truck), and C3 (truck and bus) classes of tyres by entering into force on 2 February 2007 via the 01 series amendments. The primary goal of the initial regulation was to standardize the criteria for approving new tyres based on these performance aspects, providing a uniform provisions concerning the approval of tyres with regard to rolling sound emissions, adhesion on wet surfaces and rolling resistance across participating countries. The UN R117 specified the initial limits on rolling resistance, noise, and wet grip in its Stage 1 which are progressively tightened through a series of amendments. Europe was the first entity to implement Regulation UN R117, which was amended to version 117.02 in 2011 and came into force on November 1, 2012. The Regulation applies to Classes C1, C2, and C3 tyres for new tyres' sound emissions, rolling resistance, and wet grip, and to Class C1 tyres for wet grip in the worn state. The regulations exclude certain tyre types like temporary spares or professional off-road tyres. Recent revision in the regulation is implemented as UN R117.04 amendments, which became effective in July 2024, now includes requirements for the wet grip performance of worn tyres, ensuring safety remains high even when the tread is low. Since 2006, there are series amendments to the regulation specifying the desirable limits across the three parameters. These amendments also recommended the new testing methods to implement these limits. These series of amendments involve updated testing methods to accurately measure and enforce these limits and ensure tire safety, environmental performance, and energy efficiency. The standard continues to evolve through further amendments (e.g., 03, 04 series) to reflect technological advancements up to 2025.

The UN R117 also imposed systematic marking procedure to ensure transparency and help consumers in making informed choices regarding tyre safety, environmental impact, and fuel efficiency. It is

mandatory for tyres approved under UNECE Regulation 117 to bear these markings for market access in contracting parties. The markings indicate compliance with the three parameters as well as the approval series and stage of each parameter. Table 1 presents the marking scheme which is applicable as of today:

Table 1: Marking Scheme in UN R117

S / S2	Rolling sound emission compliance levels - Initial / Stage2
W / W2	Wet adhesion compliance level of tyres in new state - Initial / Stage 2
R / R2 / R3	Rolling resistance compliance level - Initial / Stage 2 / Stage 3
B	Wet adhesion compliance level of tyres in worn state – Initial

Source: UN R117

For example, a tyre marked "04S2W2R3B" indicates compliance with the 4th series of amendments, Stage 2 rolling sound emission, Stage 2 wet grip (new tyre), Stage 3 rolling resistance, and wet grip on worn tyres. Further, in considering the EU tire labelling program, Regulation 1222/2009 establishes a mandatory labelling scheme for tires sold in the EU. For the tyre labelling regulation, fuel efficiency rating of a tire is defined using its aligned rolling resistance value. The aligned rolling resistance value is calculated by applying a correction formula to the unaligned rolling resistance value obtained through RR testing. It should also be noted that in addition to revising the limits for tightening the specifications, different test methods are also being approved by the UNECE. Table 2 shows the evolution of UN R117 with respect to the revisions in the limits of RR, Wet grip and Noise.

Table 2: Evolution of UN R117

Year	Series amendments	Stage implementation			
		Rolling Resistance	Wet Grip Adhesion for new tyres	Rolling Sound emissions	Worn tyre adhesion
2005	UN R117.0			S1 limits and test methods for C1,C2,C3	
2006	01 Series UN R117.01		Test methods for C1		
2007			W Limits and test methods for C1	S1 limits for C1,C2,C3	
2009		Test methods for C1,C2,C3			
2011	02 Series UN R117.02	R2 limits and new test methods for C1,C2,C3	W Limits and new test methods for C1	S2 for C1,C2,C3	
2012			New test method for C1		
2014	UN R117.03		W limits and test methods for C2,C3		
2022	03 Series UN R117.03		W2 for C1		
2023	04 Series UN R117.04	R3 for C1,C2,C3 specifying load capacity, traction tyres	W2 for C1,C2,C3 including special use tyres	S2 for special use tyres	Measurement and labelling B

Source: Authors own compilations

The most significant recent change (series 04 amendments) has been the introduction of testing requirements for worn tyres, specifically regarding wet grip performance. Previously, performance requirements for rolling resistance, rolling noise, and wet grip applied only to new tyres. UNECE sets threshold limits in R117 through a consensus-driven process involving technical working groups (e.g., WP.29, GRBP, GRB), where industry data from tyre makers (ETRMA, ISO tests), lab measurements (rolling resistance, wet grip), statistical analysis of production variability, and real-world performance baselines inform limit bands. Thresholds evolve via series amendments (e.g., 02 series noise limits phased by tyre width), balancing innovation incentives with safety—new metrics like abrasion (Annex 10, 2024) use market surveillance data for future thresholds post-2025.¹⁶ Each amendment stage generally takes three to four years. This reflects the time needed to address country specific preconditions, including testing infrastructure, technical services, administrative processes, and requirements for qualified engineers before implementing the regulations. From the informal documents and session meeting details it is noteworthy to mention that prior to the announcements of the series amendments and revisions in the UN R117, there is a large scale of stakeholder engagement sessions where the proposals for supplementing the series amendments to the Regulation UN R117 are submitted from various stakeholders and adopted by the GRB from time to time in various sessions to update the testing requirements and methods.¹⁷ Proposals for supplements to series 04 amendments (e.g., Supplement 2, 3, and 4) were released in 2024 and 2025. These supplements primarily focus on modifications in the test methods.

¹⁶ For example, see GRB Discussion paper (2010)

¹⁷ For example, Supplement 4 to the 02 series of amendments to UN R117 was adopted by the GRB in its 57th session based on the proposal from the ETRTO and the UK to update noise test-track requirements.

Indian Regulations

The Indian regulatory framework for the automobile industry constitutes a multifaceted and heterogeneous system involving diverse levels of government and an array of stakeholders. The framework encompasses several key components and entities that collectively govern the sector.

Acts

The Motor Vehicles Act (MVA), 1988, alongside the Central Motor Vehicles Rules (CMVR), 1989, form the cornerstone legislation that delineates safety standards, emission norms, and regulations concerning driver's licensing, vehicle registration, traffic control, and vehicle construction and maintenance. These laws are subject to periodic amendments to accommodate technological advancements and evolving industry standards. The Ministry of Shipping, Road Transport and Highways (MoRTH) serves as the principal regulatory body responsible for the formulation, implementation, and oversight of automotive regulations. It is supported by advisory committees such as the CMVR-Technical Standing Committee (CMVR-TSC) and the Standing Committee on Implementation of Emission Legislation (SCOE). The CMVR-TSC, in turn, receives technical input from the Automotive Industry Standards Committee (AISC)¹⁸, which is tasked with devising and revising safety-related automotive standards. The standards prepared by AISC are approved by the CMVR-TSC. After approval, the Automotive Research Association of India, (ARAI), Pune, being the Secretariat of the AIS Committee, publishes the standards.

The Ministry of Heavy Industries and Public Enterprises (MoHI&PE) plays a pivotal role in fostering the development and expansion of the

¹⁸ The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the erstwhile Ministry of Surface Transport (MOST) has constituted a permanent Automotive Industry Standards Committee (AISC) vide order No. RT-11028/11/97-MVL dated September 15, 1997

automobile sector by providing policy support, incentives, and subsidies. This ministry also manages the National Automotive Testing and R&D Infrastructure Project (NATRiP), aimed at establishing advanced testing and validation infrastructure for the industry.

Automotive Standards

The Bureau of Indian Standards (BIS), India's national standards authority, develops and maintains Indian Standards (IS) is also applicable to the automotive sector and administers the certification schemes that grant the BIS mark to compliant products. BIS enforces quality, safety, and reliability benchmarks through mandatory certification for automotive products.

Testing Infrastructure

Several accredited testing agencies, including the ARAI, Vehicle Research Development and Establishment (VRDE), Central Institute of Road Transport (CIRT), International Centre for Automotive Technology (ICAT), and Global Automotive Research Centre (GARC), undertake testing and certification in accordance with CMVR and IS regulations. These entities also provide research, consultancy, and training services integral to the sector's growth.

Industry Stakeholders

Industry associations such as the Society of Indian Automobile Manufacturers (SIAM), Automotive Component Manufacturers Association (ACMA), Automotive Tyre Manufacturers Association (ATMA), Tractor Manufacturers Association (TMA), and Federation of Automobile Dealers Associations (FADA) represent the interests of manufacturers, component suppliers, and dealers. They contribute valuable data, analysis, and advocacy relevant to industry challenges and opportunities.

Consideration of Tyre Construction in the Regulation

The first formal mention of bias and radial tyres in Indian automotive regulation can be traced to standards and technical regulations developed under the CMVR and AIS. Bias (also called bias-ply or diagonal ply) tyres have traditionally dominated the Indian market due to lower initial costs and certain functional load-bearing advantages in the environment of usage, mainly related to resistance to bruises cuts on account of higher flexing in diverse terrains. Indian regulations and standards specify testing and approval requirements for both diagonal (bias) and radial ply tyres. For example, the IS and AIS standards on C1, C2 and C3 classes of tyres that were first published in 2005 and revised through 2012 and 2022 which specifies these classifications as shown in table 3 below.

Table 3: Tyre Construction in Indian Standards

Standards	Description
IS 15627:2005	Automotive Vehicles - Pneumatic tyres for two and three wheeled motor vehicle
IS 15633:2005 <i>IS 15633:2022</i>	Automotive Vehicles - Pneumatic tyres for passenger car vehicles—diagonal and radial ply
IS 15636:2005 IS 15636:2012 IS 15636:2022	Automotive Vehicles - Pneumatic tyres for commercial vehicles—diagonal and radial ply
AIS-044 (Part1) and Amd1&2	Automotive Vehicles – Pneumatic Tyres for Commercial Vehicles
AIS-044 (Part2) and Amd1 &2	Automotive Vehicles – Pneumatic Tyres for Passenger Cars
AIS-051/ 2004 and Amd1 & 2	Requirements for Vehicles with regard to Selection and Approval for use of Tyres for other than Two and Three-Wheelers
AIS-142 with Amd1 & 2	Evaluation of Tyres with Regard to Rolling Sound Emissions and/or to Adhesion on Wet Surfaces and/or to Rolling Resistance

Source: Authors own compilation

AIS 142

Based on the discussions in the 52nd meeting of AISC in May 2018 it was agreed to form a new AIS standard in line with the UN R117. Subsequently, AIS-142 was prepared in line with Revision 4 of UN R117 covering the tyre of class C1, C2 and C3. The standard was approved in the 58th meeting of AISC and adopted in 52nd meeting of CMVR-TSC. As noted by the stakeholders in the 52nd meeting that while the limits with respect to wet grip and rolling sound have been kept same as that in the UN R117, with respect to Rolling Resistance, limits have been specified considering India specific conditions viz., low rim diameter tyre, use of bias tyres in both C2 and C3 category by heavy commercial vehicles etc. (CMVR-TSC 2018).

The implementation of AIS 142 was subsequent to the development of testing facilities at ICAT, GARC, IRMRA, NATRAX and ARAI and adoption of test methods prescribed in the R117. Following the Gazette no 453 (E) dated 20th June 2023 issued by the MoRTH, these requirements came into effect, aligning Indian tyre performance standards with the Stage 2 limits of UN R117. The Standard applied in a phased manner with Rolling Resistance Coefficient [Stage 2] and Wet Grip Index [Stage 1] specification limits contained as per AIS 142 Amendment 1 and Amendment 2 - applied for all designs wef 1st Jan 2024. Amendment No. 2 to AIS-142 specifies lower reference speeds for bias tyre noise testing, justified by commercial vehicle homologation speeds. The test speed reduction deviation is permitted till Aug 6th 2026.

Specifically, bias and radial tyres have been part of Indian automotive regulatory discourse since at least the late 1990s or early 2000s, with evolving technical standards and test protocols designed to ensure safety and performance differences are appropriately managed within the vehicle certification process. In recent times, India has also undertaken significant efforts towards harmonising the international standards with the existing national standards by covering the entire

industry structure. Therefore, our regulatory ecosystem reflects a collaborative and layered governance structure designed to ensure safety, environmental compliance, and sectoral growth in India’s automobile industry.

As the industry has made significant efforts to adopt the new standards, the EU regulation UN R117 has been revised once again and the next section provides the comparison of existing AIS with the current revision in UN R117 which is to be implemented by the contracting parties by end of 2026.

COMPARATIVE EVALUATION OF UN R117 AND INDIAN REGULATIONS

Rolling Sound Emission

As presented in the tables 4 and 5 below, the comparison of Indian standards with the current limits specified in the EU regulations show that the AIS 142 is completely aligned for all class of tyres – C1, C2 and C3.

Table 4: Comparison of Indian and EU standards – Rolling Sound Emission for Class C1

Tyre Class	Nominal section width	AIS 142	Proposed UN R117.04
C1	185 and lower	70	70
	Over 185 up to 245	71	71
	Over 245 up to 275	72	72
	Over 275	74	74

Source: Authors compilation from AIS 142 and UN R117

Table 5: Comparison of Indian and EU standards – Rolling Sound Emission for Class C2 & C3

Tyre Class	Category of use		AIS 142	Proposed UN R117.04
C2	Normal tyre		72 / 73 (T)	72 / 73 (T)
	Snow tyre		72 / 73 (T)	72 / 73 (T)
		Snow tyre for use in severe snow conditions	73 / 75 (T)	73 / 75 (T)
	Special use tyre		74 / 75 (T)	74 / 75 (T)
		Special use tyre that is classified as tyre for use in severe snow conditions	74 / 75 (T)	74 / 75 (T)
C3	Normal tyre		73 / 75 (T)	73 / 75 (T)
	Snow tyre		73 / 75 (T)	73 / 75 (T)
		Snow tyre for use in severe snow conditions	74 / 76 (T)	74 / 76 (T)
	Special use tyre		75 / 77 (T)	75 / 77 (T)
		Special use tyre that is classified as tyre for use in severe snow conditions	75 / 77 (T)	75 / 77 (T)

Source: Authors compilation from AIS 142 and UN R117

Note: (T) stands for Traction tyres

Wet Grip Adhesion

Indian regulations adopted the series 02 limits progressively to meet the wet grip (WG) requirements in all classes of tyres. Consequently, the amended AIS 142 is totally aligned to WG stage 3 of R117. Further, Indian standards meet the testing requirements and limits for all tyre classes to evaluate the wet grip index of 2016 requirements which were to be implemented by 2022 except for the icy conditions and the special

use tyres which are designed for specific conditions, primarily off-road use across all the tyre classes.

Table 6: Comparison of Indian and EU standards – Wet Grip Index for all tyre classes

Tyre Class	Category of use		AIS 142	Proposed UN R117.04
C1	Normal tyre		≥ 1.1	≥ 1.2
			≥ 1.1	≥ 1.2
	Snow tyre	Snow tyre for use in severe snow conditions For speed category greater than 160km/h	≥ 1.0	≥1.1
		Snow tyre for use in severe snow conditions For speed category not greater than 160km/h	≥ 0.9	≥1.0
		Ice grip tyres	Not defined	≥1.0
	Special use tyre		Not defined	≥1.1
Special use tyre that is classified as tyre for use in severe snow conditions		Not defined	≥1.0	
C2	Normal tyre		≥ 0.95 / ≥ 0.85 (T)	≥1.10 / ≥1.00 (T)
			≥ 0.95 / ≥ 0.85 (T)	≥1.10 / ≥1.00 (T)
	Snow tyre	Snow tyre for use in severe snow conditions	≥ 0.85 / ≥ 0.85 (T)	≥1.10 / ≥1.00 (T)
			≥ 0.85 / ≥ 0.85 (T)	≥1.10 / ≥1.00 (T)
	Special use tyre	Special use tyre that is classified as tyre for use in severe snow conditions	Not defined	≥1.10 / ≥1.00 (T)
C3	Normal tyre		≥ 0.80 / ≥ 0.65 (T)	≥0.95 / ≥0.80 (T)
			≥ 0.65 / ≥ 0.65 (T)	≥0.80 / ≥0.80 (T)
	Snow tyre	Snow tyre for use in severe snow conditions	≥ 0.65 / ≥ 0.65 (T)	≥0.80 / ≥0.80 (T)
			≥ 0.65 / ≥ 0.65 (T)	≥0.80 / ≥0.80 (T)
	Special use tyre	Special use tyre that is classified as tyre for use in severe snow conditions	Not defined	≥0.80 / ≥0.80 (T)

Source: Authors compilation from AIS 142 and UN R117

Note: (T) stands for Traction tyres

More recently since WG is a safety parameter the current revision (draft 3 AIS 142) is considering in toto adaption of WGI into R117.04. Table 6 summarises the comparison between existing and proposed regulations.

Rolling Resistance

Table 7 below shows that the rolling resistance limits are higher than the latest requirements under UN R117. Secondly, while the UN R117 limits are same regardless of tyre construction type, the AIS 142 limits have been specified based on tyre construction and rim size. Considering the availability of both bias and radial type of tyre in the Indian market, the regulatory authorities and the tyre industry used the structured data on tyre construction types accounting for the structural design differences as well as India specific conditions (e.g speed etc) to arrive at the Rolling Resistance coefficients (RRc) limits in all categories of tyres. Consequently, the limits were specified for the C1 radial PCR tyres with < 14" and Bias tyres in C2 and C3 category of tyres. The limits were also higher for radial tyres due to Indian conditions and smaller diameter. Such classification between bias and radial in the C2 and C3 category was applied only to the rolling resistance limits.

Table 7: Comparison of EU and Indian Regulations – Rolling Resistance (max N / kN) for all tyre class

Tyre class			AIS 142	Proposed UN R117.04
C1		< 14 inch	12	10.0 – 9.0
		≥ 14 inch	10.5	
	Special use tyres		Not defined	10.0
C2	Radial	≤ 14 inch	12.0	8.5 – 9.0(T)
		> 14 inch	11.5	
	Bias	≤ 14 inch	13.5	
		> 14 inch	13.0	
C3	Radial		7.0	6.0 – 6.5
	Bias		9.5	

Source: Authors compilation from AIS 142 and UN R117

Notes: (T) stands for traction tyres. UN R117 specifies the limits based on load capacity index, nominal aspect ratio and speed levels.

Summarizing the comparison between Indian and European regulations, while the alignment is achieved with respect to the rolling sound and wet grip index, the rolling resistance requirements differ primarily due to the India specific conditions such as low rim diameter and use of bias tyres in C2 and C3 classes. Furthermore, while India's actual average transportation speeds and statutory vehicle homologation speeds (via IDC/MIDC cycles) are significantly lower than EU's, tyre rolling noise tests follow higher European-standard speeds (e.g., 80 km/h pass-by). These requirements are specifically considered during the formulation of Indian standards to align with UN R117. ¹⁹

Before we draw our observations on the potential impact of the imposition of UN R117, if these regulations are the best regulations for the tyre industry, then it is important to understand the compliance of these regulations across the world. Next section, presents the status across selective countries in the world.

UNECE R117 ADOPTION ACROSS THE WORLD

To analyse the state of regulations across the world economies, we select a sample of countries based on the presence of automotive industry over the last two decades. These countries represent world's leading markets in terms of automobile consumption as well as automotive production. Our sample can be distinguished across developed countries with world's oldest automotive manufacturing technologies, countries which have joined the production over last twenty years as well as the countries without any local manufacturing but have high demand for vehicles and automotive components. To understand the adoption statistics of UN R117 across these countries and their respective stages if chosen to comply, the table 8 presents the state of minimum requirements on the three parameters across selective countries from various regions. We also

¹⁹ Section 3.a.(i) in 52nd CMVR-TSC meeting

report if the country is a contracting party to the two UN Agreements which have shaped the harmonisation of automotive industry standards. This information helps us to draw understanding of the bargaining power the countries may have in the development of the UN R117 regulation.

Table 8: UN R117 Adoption Across World Regions

Region	Country	Contracting party		Minimum requirements on noise, wet grip and rolling resistance (year of implementation)
		1958	1998	
Africa	South Africa	√	√	UN R117.02 (S2WR2 C1/C2/C3) (OE)
	Egypt	√		
	Morocco			National regulation (SW C1) (OE) → (S1WR1 C1/C2/C3 under development)
Gulf	Iran			UN R117.02 (S2WR2 C1/C2/C3) (OE/REP)
	Saudi Arabia			National regulation (WR2 C1/C2/C3) (OE/REP)
America	Canada		√	National regulation
	Mexico			National regulation
	USA*		√	National regulation
	Colombia			UN R117.02 (S2WR2 C1/C2/C3 Y2027) (OE/REP)
	Brazil			National regulation (S1WR1 C1/C2/C3) (OE/REP)
ASEAN	China*		√	National regulation → (WR2 C1/C2/C3 Y2026) (OE/REP)
	India*		√	National regulation alignment of UN R117.02 (S2WR2 C1/C2/C3) (OE/REP)
	Thailand	√		National regulation alignment of R117.02 (S2WR2 C1/C2/C3) (OE/REP)
	Philippines	√		UN R117.04 (S2W2R3B C1,C2/C3 Y2026)
	Taiwan			National regulation (S2WR2 C1/C2 Y2026)
	Japan*	√	√	UN R117.02 (S2WR2 C1/C2/C3) (OE)→ UN R117.04 (S2W2R3B C1 Y2027, C2/C3 Y2028) (OE)
	South Korea*	√	√	National regulation (WR2 C1/C2/C3) (OE/REP) →(S2WR2 C1 Y2026, C2 Y2028, C3 Y2029) (OE/REP)
	Malaysia	√		UN R117.02 (S2WR2 C1/C2/C3) (OE)

Central Asia	Russia	√	√	UN R117.02 (S2WR1 C1, S2R1 C2/C3) (OE/REP)
	Uzbekistan	√	√	UN R117.01 (SW C1) (OE)
Europe	Germany*	√	√	UN R117.02 (S2WR2 C1/C2/C3) (OE/REP) → UN R117.04 (S2W2R3B C1 Y2026, C2/C3 Y2028) (OE/REP)
	UK	√	√	UN R117.02 (S2WR2 C1/C2/C3) (OE/REP)
	Italy*	√	√	UN R117.02 (S2WR2 C1/C2/C3) (OE/REP) → UN R117.04 (S2W2R3B C1 Y2026, C2/C3 Y2028) (OE/REP)
	Spain	√	√	UN R117.02 (S2WR2 C1/C2/C3) (OE/REP) → UN R117.04 (S2W2R3B C1 Y2026, C2/C3 Y2028) (OE/REP)
	France*	√	√	UN R117.02 (S2WR2 C1/C2/C3) (OE/REP) → UN R117.04 (S2W2R3B C1 Y2026, C2/C3 Y2028) (OE/REP)
	Turkey	√	√	UN R117.02 (S2WR2 C1/C2/C3) (OE/REP) → UN R117.04 (S2W2R3B C1 Y2026, C2/C3 Y2028) (OE/REP)
Oceania	Australia	√	√	National Regulation
	New Zealand	√	√	National Regulation

Source: Authors compilation

Notes: *indicates if the parent company of any of the leading global tyre companies is registered.

In the next section we present the observations drawn from the study of industry structure and the evolution of the regulations that are evolving to push tyre industry to harmonize with global standards.

OBSERVATIONS ON GLOBAL ACCEPTANCE OF UN R117

- ▶ The UN R117 Regulations were developed based on the pre-conditions existing in the majority of the European countries which consist of dominance of radial tyres, better roads, different and homogeneous climate conditions and less difficult terrains than in India
- ▶ It is also noteworthy that though the R117 Regulations are about tyres in general and do not make any mention about Bias or Radial, given that the vehicles run on their roads are predominately Radial, for all practical purposes the regulations are made for Radial tyres only.

- ▶ Among the countries which have historically been part of the working parties to develop the regulation are the ones with tyre technology like France, Germany and Italy where a common regulation is driven with similar objectives like European Union to facilitate trade among their region.
- ▶ Even though R117 is applied via 1958 Agreement, not all Contracting Parties apply the UN regulation uniformly across all tyre classes. For example, while Japan has adopted the R117 fully, South Korea, Australia, Canada and Norway utilize type approvals for compliance with R117, and ASEAN countries like Philippines and Malaysia adopt it partially through regional harmonization.²⁰
- ▶ Countries like India, Brazil and China have made significant efforts to harmonize their industry standards with the EU regulations by modifying their national regulations to continue support their unique product mix (bias and radial) and country specific conditions.
- ▶ Local production of bias tyres in markets also streamlines supply chains, cutting import costs, delivery times, and enhancing price competitiveness. This factor strongly drives demand of bias tyres. In regions like India, Southeast Asia, Africa, and Latin America, where fleet operators prioritize affordable, durable options for heavy-duty and mixed-service use. Such proximity not only ensures cost savings but also improves availability and adaptability to local fleet needs.
- ▶ Developed countries like USA, Canada, Australia and New Zealand does not recognize the type approvals granted under the UN system. Instead, they have maintained their national regulations without harmonising with EU regulations. These countries operate a "self-certification" system under their national standards. Manufacturers self-certify that their products meet the safety and environmental standards.
- ▶ Use of bias tyres in the commercial segment has led to national regulations based on the construction of tyres unlike the EU regulation.

²⁰ Even though Philippines is a contracting party to 1958 UN agreement, R117 remains voluntary via ECE markings. No mandatory rolling resistance, wet grip, or noise limits exist for C2C3 bias/radial tyres under PNS framework. While Norway closely aligns with R117 on test methods it specifies higher limits for bias tyres than radial tyres.

For example, US regulation (Federal Motor Vehicle Safety Standards (FMVSS)) formally recognizes and regulates new pneumatic bias-ply tires. Even though the US regulations use unified limits for both radial and bias but acknowledge construction differences in these tyres in test procedures. The focus of FMVSS is on structural integrity, speed and load tests contrasting with R117's focus on efficiency/safety labelling. Similarly, China's tyre regulations and standards address bias tires distinctly, acknowledging differences in construction and use, and managing them alongside newer radial tire regulations aligned with UN R117 with separate provisions tailored to market needs. Brazil's INMETRO Ordinance No. 379 incorporates specific provisions for bias and bias-belted tires within its regulatory framework.

Finally, to draw a pattern in the adoption of UN R117 across the world we look at the domestic demand of tyres. In countries like Italy, Spain, Germany and rest of the Europe the demand is shifted towards radial tyres in all vehicle classes. Therefore, the regulations which are aligned with the radial tyres will not impact the domestic production and exports. However, the APAC region, Latin America, South Africa are expected to have a growth in Truck and Bus bias tyre market (C3) is expected to grow due to ongoing development, and domestic demand due to increased logistics and freight movements. ²¹

IMPLICATIONS OF IMPOSING UN R117 IN INDIAN CONTEXT

- ▶ Imposing these regulations which are developed for Radial tyres in India without making any distinction between Bias and Radial tyres would put the Indian tyre industry at a significant risk of operation.
- ▶ The suitable standards should be implemented in a phased manner so as not to put the tyre industry at a significant loss of output and

²¹ For example, a recent market survey shows that heavy trucks dominated the Brazil market, with a value of USD 1190.16 Million and is projected to grow at a CAGR of 5.05%. LCV is a second largest market, with a value of USD 676.50 Million and is projected to grow at a CAGR of 3.64% during the forecast period. (VMR 2024).

employment. Any abrupt change runs the risk of adversely affecting 60 to 70 percent of the operations of the tyre industry with downstream effects on small service providers as well as providers of major intermediate inputs that go into tyre production mainly the nylon. It may be worthwhile to note that when the European regulations were evolving care was taken that the upgradation of these standards did not lead to more than 10% of the disruption in the industry at a point of time and hence the optimal regulation finally evolved over a number of years.

- ▶ We also note that any shift from bias to radial will also involve significant increase in the imports of the specific type of steel wire with specialty alloy coatings that is used in the manufacturing of the radial tyre, which is not currently produced in adequate quantities in India thereby somehow acting against the national interest of Atmanirbhar Bharat (GoI 2020) to promote an indigenous and sustainable ecosystem to support manufacturing.
- ▶ Further, there will be a virtual stop in the exports of bias tyres from India which currently has the third largest share in world bias tyre export market especially in emerging economies of Asia, Africa, and Latin America, where bias tyres dominate due to cost advantages, durability on rough terrain, and suitability for overloaded vehicles. Bias tyres' superior strength and load-bearing capacity make them the preferred choice in regions with expanding logistics and freight sectors. As global trade grows and infrastructure projects proliferate, demand for commercial vehicles—and thus bias tyres—increases significantly, especially in these markets where India has a global presence. Therefore, India will lose out significantly in the export market for bias tyres which will be taken up by other countries if bias tyre industry disappears from India. By our estimate, the country will lose approximately Rs. 2000 crore of export revenue in the year 2026.
- ▶ Recent efforts to harmonize AIS-142 with the beneficial provisions of UN R117 should proceed through extensive consultations with tyre industry stakeholders, incorporating India-specific preconditions alongside the sector's key concerns and impending costs of adaptation.

- ▶ European market is import driven as the domestic production of bias tyres in the commercial segment has declined significantly. Therefore, stricter and uniform regulations will serve as a protection against the dumping of poor imports. At the same time, since the testing and regulations are designed for radial tyres this will open up opportunities in India for their technological exports in radial tyres in these segments. This is not the case with developing countries like India, China, Indonesia or Thailand²² where the domestic demand for bias tyres still persists due to cost advantages and requirement of working capital for small businesses. Imposition of UN R117 in these countries will give more boost to imports rather than exports to meet the domestic demand in commercial vehicle segment.²³
- ▶ The fact that many countries (notably the US, Canada, China) are yet to adopt the UN R117 regulations and instead have set their own standards for Bias and Radial makes a case that the India too can have its own standards that are best suited for its own conditions. Therefore, doing so will not make India stand out as the only country which is not aligned fully with the European standards.
- ▶ EU studies show harmonisation lowers admin and operational costs when cultural/economic contexts align. However, such uniformity kills incentives for firms to adapt production or launch products via lenient jurisdictions. Divergent rules let emerging economies tailor standards to local needs (often arising from cultural/institutional aspects), spurring innovation and diplomatic leverage. One-size-fits-all approach for regulatory integration risks long-term rigidity, undermining sovereign priorities and global trade dynamism.
- ▶ At the policy front, the government and automotive industry has developed a collective vision plan "Automotive Mission Plan (AMP) 2026"

²² China automotive standards in commercial tyres specifies higher limits of RRc for bias tyres (GB 9744-2024); SNI 06-3215.3-2012 for Indonesia does not specify limits for RRc, WG and noise limits like AIS 142 or R117 (SNI 01-3215.3-2012). Similar to India, Thailand too aligns with Stage 2 limits (TIS2324-2564).

²³ This was observed by SIAM (2014), in respect of adoption of 1958 agreement that it will give more boost to imports rather than exports due to high demand owing to the development of the country.

to propel the Indian Automotive Industry and its components and ancillaries to be the “Engine of the Make in India Programme”. Specifically, the Plan envisioned that by year 2026 the vehicles, auto components and tractor industry should reach over 12 percent of GDP over next ten years in terms of size, contribution to India's development, global foot print, technological maturity, competitiveness and institutional structure and capabilities. Unavailability of domestic product range will further slowdown the government’s AMP towards the Viksit Bharat 1947 goal (NITI Aayog 2024). Decline in automotive industry GDP will push the country behind in achieving our Viksit Bharat 1947 goal by many years.

- ▶ According to Basic Road Statistics 2019-20 from MoRTH, national highways make up only 2.09% of India's total road network, while rural roads account for 66%. Commercial vehicles on these rural and unpaved terrains prefer bias tyres for their cost-effectiveness, retreadability, and ease of repair. Enforcing bias tyre rolling resistance to global (radial) standards risk light weighting that could compromise safety amid diverse road conditions. As highways and expressways expand nationwide, tyre preferences should evolve more organically than via mandates.

CONCLUSION

This section summarizes the challenges and costs that may arise if UN R117 is adopting as it is given India’s unique market structure and customer requirements. Based on this the section concludes with a possible path forward towards balancing the costs with the benefits of harmonisation.

Adoption Challenges

Adopting UN R117 standards could expand market access and cross-border trade for Indian firms but demands substantial investment in compliance and production upgrades. Recent proposals to implement UN R117 in India overlook structural differences in preconditions and

market dynamics that shaped EU regulations, where radial tyres dominate passenger (C1) and commercial (C2/C3) segments due to emissions, noise, and safety mandates. In contrast, bias tyres persist in India's C3 (45% market share) and C2 (>65% market share) in replacement market segments for their cost-effectiveness, terrain adaptability, and puncture resistance, suiting mixed-service, rural, and poor-infrastructure operations.

Economic and Social Impacts

Imposing UN R117 would impose heavy compliance costs, jeopardizing domestic bias tyre manufacturing, employment, value added, exports, and government revenue, while hindering long-term development goals. Radial segments face minimal disruption, but bias tyres—key to logistics and freight industry output and downstream ecosystems— will be severely affected. These costs include direct, indirect as well as induced costs in the circular economy of tyre manufacturing. Policymakers should make a decision after quantifying these economic and social costs. Estimation of these costs will help the government to decide on the maximum impact that can be absorbed without compromising with the long term development goals.

Possible path forward

Rather than wholesale EU adoption, pursuing bias-specific global harmonization akin to UN R117, elevating standards progressively without eroding consumer-suited products could be explored. Retaining flexibility for India-tailored certification, drawing from international best practices adapted to local industry and socio-economy with stakeholder inputs to balance growth and safety can be set as objective. India has already taken a significant step towards recognising the need for rolling resistance, wet grip and rolling noise limits by introducing the AIS 142. Stakeholder participation can help these construction specific standards to evolve further by prioritising structural integrity of the products rather than forcing them out of the market. Investments in testing

infrastructure, such as NATRiP, merit evaluation given extended timelines under non-EU conditions and potential real-world compliance gaps from test method changes. Besides newer parameters being added to R117 like Wet Grip on Wet Terrain (WGWT) and Tyre Rolling Resistance on Wet Pavement (TRWP) need sophisticated test infrastructure, which needs to be properly established and evaluated in India after EU concludes the test methodology to be adopted, and ability to meet the objectives, while undergoing Conformity of Production (CoP) after implementation.

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