

# **Global Airless Tires Market Assessment, By Material [Rubber, Plastic], By Type [Radial Tires, Bias Tires], By Rim Size [Less than 15 inches, 15-20 inches, 21-25 inches, 26-30 inches, 31-35 inches, more than 35 inches], By Vehicle Type [Passenger Vehicles, Commercial Vehicles, Three Wheelers, Two Wheelers, Others], By Sales Channel [Direct, Channel], By Region [Asia Pacific, Europe, North America, South America, Middle East and Africa], Opportunities and Forecast, 2022-2030F**

<https://marketpublishers.com/r/GEEAB6EF6B26EN.html>

Date: March 2025

Pages: 247

Price: US\$ 4,500.00 (Single User License)

ID: GEEAB6EF6B26EN

## **Abstracts**

The global airless tires market was valued at USD 101.2 million in 2022 and is expected to reach USD 163.7 million in 2030, with a CAGR of 6.2% for the forecast period between 2023 and 2030. The tire industry is crucial for the automotive sector and transportation infrastructure, with airless tires being groundbreaking. These tires, known as non-pneumatic or air-free tires, function without inflation, unlike traditional tires that rely on air pressure for support and cushioning.

According to a comprehensive global 'scrapyard survey,' approximately one billion end-of-life tires are discarded yearly. Out of which, roughly 20% become scrap for distinct reasons. It includes 12% of tires disposed of due to flats and rapid pressure loss and an additional 8% that are considered unusable due to irregular wear caused by improper tire pressure. It equates to a significant total of 200 million discarded tires, weighing a staggering 2 million tons. Airless tires present a unique design that eliminates the risk of punctures and blowouts, making them reliable across various applications such as off-

road vehicles, construction equipment, military vehicles, and consumer automobiles. They offer improved safety and reduced downtime due to tire-related issues.

The airless tire industry consistently advances technology to improve tire durability, performance, and energy efficiency. With vehicles emphasizing environmental concerns, tire technology is evolving towards eco-friendly and fuel-efficient innovations. Airless tires highlight the industry's dedication to progress, meeting the evolving needs of various sectors. Ongoing research and development can revolutionize transportation and mobility by offering a safer, sustainable, and maintenance-free alternative to traditional pneumatic tires.

### Growing Focus on Sustainability Accelerates Airless Tire Development

Airless tire development is linked to materials, manufacturing processes, and design principles advancements. Innovative engineering and materials, including high-strength polymers and composite materials with recycled or bio-based components, have eliminated the need for traditional inflation. It reduces dependence on virgin resources and minimizes the carbon footprint associated with tire manufacturing.

Airless tires actively contribute to sustainability in several ways. Their durability and resistance to punctures lead to fewer tires prematurely ending up in landfills due to wear or damage. Furthermore, many materials in airless tires can be recycled or repurposed, reducing their environmental impact. Moreover, eliminating the need for tire inflation minimizes the energy consumption associated with tire maintenance, aligning with sustainability objectives.

In 2022, Michelin's introduction of road-approved tires featuring 45% and 58% sustainable materials marked a significant stride towards sustainability. These tires exemplify Michelin's commitment to environmental consciousness by incorporating substantial proportions of sustainable materials. Michelin's overarching pledge to employ 100% sustainable materials in all its tires by 2050 underscores its progress in reducing environmental impact. It reaffirms its determination to produce eco-friendly and sustainable tire solutions.

### Innovative Manufacturing Methods Propel the Rise of Airless Tires

Technological advancements in 3D printing and additive manufacturing have transformed the development of airless tires. These innovations enable precise and

customizable tire designs that significantly enhance performance and sustainability. The flexibility of materials, including sustainable options like recycled materials and bio-based compounds, reduces the carbon footprint traditionally associated with tire production. Moreover, 3D printing has streamlined the manufacturing processes of airless tires, making them efficient and accessible across various industries and applications. It facilitates rapid prototyping and customization, which is especially valuable for industries requiring specialized tire solutions.

As an illustrative example, Michelin's Uptis is slated for launch in 2024 under the VISION concept. It will empower drivers to 3D print tire treads, tailoring them according to their driving habits and seasonal conditions. Although specific details about additive manufacturing technologies employed and their extent remain undisclosed, Uptis combines an aluminum wheel with a flexible load-bearing structure crafted from glass fiber-reinforced plastic (GFRP). The design ensures that Uptis maintains its high-performance standards synonymous with Michelin tires.

### Government Regulations for Airless Tires

Government regulations, including tires, are crucial for ensuring automotive technologies' safety, functionality, and compliance. Introducing airless tires has led to global regulatory bodies adapting and establishing specific guidelines.

No federal laws or regulations explicitly addressing airless tires exist in the United States. However, the National Highway Traffic Safety Administration (NHTSA) is actively reviewing its regulations to determine how they can be modernized to accommodate these innovative tires. Some individual states have taken the initiative to formulate their laws and regulations pertaining to airless tires. For instance, California and Virginia have legalized the usage of airless tires on passenger vehicles, while Florida allows their utilization across all vehicle types.

In the United Kingdom and Germany, airless tires are recognized as permissible for use on public roads, accompanied by technical requirements to ensure their safe operation. A pivotal standard related to airless tires is the Federal Motor Vehicle Safety Standard (FMVSS) No. 129, a U.S. federal guideline stipulating minimum performance criteria for new non-pneumatic tires in passenger cars. Furthermore, industry standards like SAE J2530:2021 delineate performance prerequisites for airless tires in passenger vehicles.

### Increasing Off-Terrain Vehicle Popularity Drives Airless Tire Growth

The increasing popularity of off-road vehicles has emerged as a key driver propelling the growth of the airless tire market. Off-road vehicles, including all-terrain vehicles (ATVs), utility task vehicles (UTVs), and military vehicles, have experienced a substantial surge in demand due to their versatility and rugged performance capabilities. The trend has significantly influenced the tire industry, with airless tires gaining preference among off-road enthusiasts.

Airless tires are ideal for off-terrain vehicles due to their robust construction, puncture-proof features, and exceptional traction, stability, and durability. They eliminate the risk of flats and punctures in challenging environments like rocky terrains, muddy trails, and desert sands, ensuring uninterrupted off-roading experiences and minimizing tire-related issues. Their innovative design and materials enhance their grip on uneven surfaces, ensuring a safer and more thrilling off-roading experience. The growing popularity of off-terrain vehicles has prompted tire manufacturers to invest significantly in research and development, focusing on continually enhancing airless tire technology. Its commitment to innovation has further accelerated the adoption of airless tires within the off-road vehicle community.

### Economic and Performance Factors Impede Airless Tire Advancements

While offering specific advantages, airless tires have limitations that require enhancements for broader suitability. A notable drawback is that once airless tires are produced, they cannot be customized to accommodate various vehicle configurations, necessitating the replacement of the complete set. However, they offset this limitation by offering exceptional lateral stiffness, resulting in highly responsive handling compared to pneumatic tires.

Moreover, the manufacturing process for airless tires differs entirely from the traditional focus on pneumatic tires within the tire industry. This shift may increase production costs, potentially affecting their affordability. Additionally, airless tires exhibit vibrations and generate significant heat, impacting ride comfort and longevity, especially at high speeds. Addressing these issues is crucial for enhancing comfort during long-distance travel. Original equipment manufacturers are actively engaged in research and development efforts to improve the performance of airless tires. Innovations like Toyobo's PELPRENE tires, which use a thermoplastic polyester elastomer material with exceptional impact energy absorption properties, demonstrate progress in creating airless tires suitable for safety-focused applications.

### Impact of COVID-19

The COVID-19 pandemic significantly impacted the airless tire market, with supply chain disruptions and manufacturing challenges causing delays in production and distribution. Despite reduced consumer spending, the pandemic has highlighted the importance of safety and reliability in sectors like logistic, military, and agriculture, attracting increased interest in airless tire technology. The pandemic has accelerated the adoption of e-commerce and last-mile delivery services, boosting demand for vehicles like delivery trucks and industrial equipment. Airless tires, known for their durability and puncture resistance, have become more attractive options. Companies like Toyo Tire are now focusing on sustainable tire solutions, with a notable shift towards airless tire technology to meet sustainability goals and reduce environmental impact.

### Impact of Russia-Ukraine War

The Russia-Ukraine conflict has significantly impacted the global airless tires market, causing supply chain disruptions and manufacturing delays. The geopolitical tensions and economic sanctions on Russia have created uncertainty, affecting investor confidence and trade relations. The uncertainty may lead to hesitancy among companies to invest in the market. The conflict emphasizes diversifying supply chains and reducing reliance on unstable regions. It could drive companies to explore alternative manufacturing and sourcing options, potentially reshaping the market's dynamics. For example, Finnish tire manufacturer Nokian Tyres initially produced 80% of its tires in Russia due to cost-effective energy. Still, they shifted its focus due to political stability and security concerns after substantial financial losses.

### Key Players Landscape and Outlook

The expansion of electric and autonomous vehicles significantly drives the growth of the airless tire market. Autonomous vehicles, including self-driving cars, delivery robots, and drones, require durable tires with minimal maintenance needs. Airless tires are ideal as they eliminate the risk of punctures and blowouts, ensuring uninterrupted and safe operations for autonomous vehicles. Companies like Bridgestone and Idemitsu Kosan Co. in Japan are conducting tests on airless tires, exploring the potential of resin spokes on innovative and non-inflatable tires.

The proliferation of passenger shuttle fleets has also expanded the airless tire market. Shuttle services operating in urban areas or at airports require tires capable of enduring frequent stops and starts, and airless tires meet these requirements by offering

durability and reduced maintenance. Michelin Tires, for instance, developed airless Tweel tires originally for construction and agricultural equipment and later adapted the technology for passenger vehicles with the creation of UPTIS.

Moreover, the surging popularity of off-road terrain vehicles like All-Terrain Vehicles (ATVs) for recreational and utility purposes has fueled the adoption of airless tires. In these demanding environments, airless tires excel by providing exceptional traction, stability, and puncture resistance. Consequently, the off-road vehicle segment has witnessed a significant uptick in adopting airless tires.

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