November 1, 2019

Honorable James C. Owens
Acting Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue S.E.
West Building
Washington, DC 20590

Petition for Rulemaking to Clarify Scope of FMVSS Nos. 109, 110, 129, 139 and Part 574

In accordance with 49 U.S.C. § 30162, 49 CFR Part 552, and other applicable authority, Michelin North America, Inc. ("Michelin") hereby petitions the National Highway Traffic Safety Administration ("NHTSA") to initiate a rulemaking proceeding to clarify the scope of the existing Federal Motor Vehicle Safety Standards ("FMVSS") that apply to pneumatic tires and non-pneumatic spare tires for vehicles with a gross vehicle weight rating ("GVWR") of less than 4,536 kilograms (10,000 pounds) (hereinafter "passenger vehicles").

Specifically, this Petition requests NHTSA to issue technical amendments to FMVSS Nos. 110 and 129 and 49 CFR § 574.5 to clarify that FMVSS Nos. 109, 110, 129, and 139 apply only to passenger vehicles that are equipped with pneumatic tires or non-pneumatic spare tires for highway service. As explained fully herein, the requested amendments are needed to clarify that there is no FMVSS that applies to passenger vehicles equipped with non-pneumatic (airless) tires for highway service. This regulatory clarification would remove unintended regulatory barriers to enhanced safety and innovation.

I. Summary

In 1946, Michelin invented the radial tire structure, a transformative advancement from bias ply tire technology that is more resistant to most types of failure modes, more pleasant to drive, and more economical. Non-pneumatic tire solutions have the potential to be the next transformative advancement in tire technology by eliminating the risks of flat tires and blowouts due to punctures or road hazards, and by eliminating irregular wear or other performance due to under inflation or over inflation. Michelin has developed a state of the art non-pneumatic tire solution, the Unique Puncture-Proof Tire System ("Uptis"), to provide airless tire and wheel assembly performance on par with conventional pneumatic tires along with the added safety, maintenance and environmental benefits associated with non-pneumatic technology.

This Petition requests NHTSA to initiate a rulemaking to issue technical amendments to FMVSS Nos. 110 and 129 and 49 CFR § 574.5 to clarify that there is no FMVSS that applies to passenger vehicles equipped with non-pneumatic tires for highway service. As discussed herein, NHTSA has traditionally deferred the development of an FMVSS for new or innovative motor vehicle equipment technology until after the technology has entered commerce. This regulatory approach has yielded enormous safety benefits by providing flexibility for manufacturers to develop new and innovative technologies that enhance safety, while also allowing NHTSA time to study and test these technologies prior to setting performance and testing standards through an FMVSS.

NHTSA's approach to developing new FMVSS is consistent with the regulatory flexibility and broad enforcement jurisdiction established under the National Traffic and Motor Vehicle Safety Act ("Safety Act"). As the Agency recently explained, "NHTSA's statutory enforcement authority is sufficiently general and flexible to keep pace with [] innovation … This enforcement authority applies notwithstanding the presence or absence of an FMVSS for any particular type of advanced equipment or technology."[1] Given NHTSA's broad enforcement authority under the Safety Act, unnecessary regulatory barriers in the existing FMVSS for passenger vehicle tires should not prevent the important safety enhancements offered by non-pneumatic tires from reaching consumers.

In 2003, NHTSA estimated that 414 fatalities, 10,275 non-fatal injuries, and 78,392 vehicle crashes occurred annually due to flat tires or blowouts. Improper inflation pressure of pneumatic tires contributes to excessive heat buildup, increased mechanical stresses and strains, and increased material fatigue. As a result, improper inflation pressure may cause blowouts or rapid tire failure, skidding or loss of control, hydroplaning, or increased stopping distance. In a 2012 study, NHTSA determined that tires which are underinflated by 25 percent or more are 3 times more likely to be cited as a "critical event" in the pre-crash phase that contributes to a tire-related crash.

Because non-pneumatic tires do not rely on inflation pressure as an operating parameter, these risks associated with underinflation or over inflation are eliminated. Further, non-pneumatic tire technology offers other important benefits, including reduced maintenance and improved tire load carrying capacity (variation due to inflation pressure is removed), more consistent rolling resistance and improved fuel economy, and reduced scrap tire waste due to longer tire life and elimination of early removal due to pressure loss.

For these reasons, the enhanced safety benefits of non-pneumatic tire technology should not be delayed until after a new FMVSS has been developed. Doing so would substantially delay the deployment of non-pneumatic tire technology, resulting in unnecessary risks to motor vehicle safety. Accordingly, the clarification sought by this Petition would remove regulatory barriers to enhanced safety and innovation.

[1] "NHTSA Enforcement Guidance Bulletin 2016-02: Safety-Related Defects and Automated Safety Technology," 81 Fed. Reg. 65705 (Sept. 23, 2016).

II. Introduction

a. Michelin is a Tire and Mobility Industry Leader

Michelin manufactures and sells tires for automobiles, airplanes, farm equipment, heavy duty trucks, motorcycles, and bicycles. We operate 19 plants located in 8 States and Nova Scotia and employ over 22,000 people in North America.[2] The Company has earned a long-standing reputation for building innovative premium tires. Michelin also offers a full range of innovative services and solutions that help make mobility safer, more efficient, and more environmentally friendly. Michelin's Research and Development ("R&D") Company in North America employs over 1,060 engineers and other staff who have been responsible for bringing some of the finest products in the world to market, including the first 80,000-mile passenger tire for American-made vehicles.[3]

Michelin has wholly owned subsidiaries that are providing innovative technologies, services and solutions. NexTraq, a Michelin Group company, is a part of Michelin's Global Services and Solutions business line.[4] A key part of Michelin's international telematics offerings, the group boasts over 2,000 employees, serving more than 70,000 customers, with hundreds of thousands of vehicles utilizing telematics solutions, worldwide. Lehigh Technologies is a specialty chemical company that is part of the High Technology Materials Business Unit of Michelin.[5] Lehigh is the leader in the market place for Micronized Rubber Powders (MRP), a sustainable raw material that reduces feedstock costs by up to 50% and delivers performance without compromise across a wide range of markets.

b. Michelin is a Leader in Research and Development of Innovative New Tire and Mobility Solutions

i. Michelin's History of Innovation

Michelin is driven by what is best for the consumer and innovating to bring new solutions for better mobility to the market is in our DNA. Michelin's teams are constantly working to develop the products and services of the future — for safer, more accessible, cleaner and more connected mobility that consumes less energy and fewer resources. Michelin has a long history as a leader in sustainable mobility.

In 1946, Michelin invented the radial tire structure, the most important revolution in the history of tires. The radial construction replaced diagonal plies with steel belts located on top of

[2] Michelin operates 15 plants in the U.S., located in Greenville, SC; Spartanburg, SC; Lexington, SC; Sandy Springs, SC; Starr, SC; Duncan, SC; Covington, GA; Norwood, NC; Dothan, AL; Tuscaloosa, AL; Louisville, KY; Fort Wayne, IN; Kansas City, MO; Ardmore, OK.

[3] On October 7, 2019, Michelin was awarded the 2019 SmartWay Excellence Award, the Environmental Protection Agency's highest recognition for leadership in freight, supply chain, energy and environmental performance. More information is available at https://www.michelinmedia.com/pages/blog/detail/article/c0/a908/.

[4] More information is available at https://www.nextraq.com/.

[5] More information is available at http://lehightechnologies.com/.

plies placed 90° to the tire's median axis. This provided more flexibility between the tread area and sidewall, reducing heat buildup, providing better grip and longer wear life. The sides remained flexible, but their load-bearing capacity increased which improved driving comfort. Deformations were reduced limiting energy loss and therefore fuel consumption. Radial tires were a transformative advancement in tire technology as they were more resistant to most types of failure modes, more pleasant to drive, and more economical than bias ply tires. Michelin's tradition of innovation has continued through numerous innovative tire solutions since the introduction of radial tires.[6]

ii. Research and Development of Non-Pneumatic Tire Solutions

Non-pneumatic (airless) tire solutions have the potential to be the next transformative advancement in tire technology. The Michelin Uptis is an airless mobility solution for passenger vehicles, which eliminates the risk of flat tires and blowouts that result from punctures or road hazards. This breakthrough airless technology also eliminates the need for preventive maintenance checks and electronic monitoring for air pressure. Because these benefits eliminate the risk of a rapid air loss (or blowout) and greatly reduce the risk of irregular wear, airless technology has the potential to reduce the volume of tires that are scrapped each year by approximately twenty percent (20%).[7]

Michelin has been working with non-pneumatic technology solutions for nearly 15 years with the first commercial offer coming in 2012 for light construction equipment.[8] Since that time Michelin has gained experience with non-pneumatic technology, continued to innovate and expanded the market offers for non-automotive applications. Today, in addition to light construction equipment and skid steer loaders, Michelin TWEEL® Technologies offers TWEEL airless produces for lawn care equipment, golf carts, low speed vehicles, ATVs and UTVs.

In order for Michelin's airless technology to progress from non-automotive to automotive applications, significant technological advancements were required. Among other parameters, Michelin addressed the overall performance balance of highway speed capability, rolling resistance, mass, comfort and noise. Uptis represents Michelin's state of the art technology to provide airless tire and wheel assembly performance on par with conventional pneumatic tires along with the added safety, maintenance and environmental benefits associated with airless technology. To achieve this level of performance, Uptis required innovative solutions in materials and product design. Compared to TWEEL off-road products, Uptis has integrated a new shear beam design consisting of advanced fiber reinforcement material encased in low hysteresis

[6] *See* Appendix 1, Michelin's History of Innovation.
[7] More information regarding Michelin's Uptis solution is available at https://michelinmedia.com/michelin-uptis/.
[8] Michelin engineers have developed a number of prototypes for non-pneumatic solutions, including the TWEEL® Airless Radial Tire, which was first showcased in 2005 at the North American International Auto Show in Detroit, Michigan. The commercial launch of the X® TWEEL® SSL for skid steer loaders was in July 2012. More information regarding Michelin's TWEEL solutions is available at https://www.michelintweel.com/.

composite rubber. In addition, Uptis evolves from TWEEL's polyurethane spokes to a new fatigue resistant, high deformation composite design.

Uptis represents a major advancement toward achieving Michelin's VISION concept, which was presented at the Movin'On Summit in 2017 as an illustration of Michelin's strategy for research and development in sustainable mobility. The VISION concept introduced four main pillars of innovation: airless, connected, 3D-printed and 100% sustainable (entirely renewable or bio sourced materials).[9]

III. Evaluation of Petition for Rulemaking

a. The Safety Act Ensures Motor Vehicle Safety Even if NHTSA Has Not Yet Promulgated an Applicable FMVSS

Under the Safety Act, NHTSA has been charged by Congress to protect the driving public against unreasonable risks of harm caused by the design, construction, or performance of motor vehicles or motor vehicle equipment. To accomplish this, the Safety Act establishes two primary compliance instruments to ensure motor vehicle safety: (1) the FMVSS and the manufacturers' obligation to certify motor vehicles or motor vehicle equipment to these standards; and (2) the manufacturers' obligation to identify and remedy defects in motor vehicles or motor vehicle equipment that present an unreasonable risk of death or injury due to an accident.

First, subject to certain limited exceptions, once an FMVSS has taken effect for a motor vehicle or item of motor vehicle equipment, no person may manufacture or sell vehicles or equipment that are subject to an applicable FMVSS unless they meet or exceed the standard set by NHTSA and are covered by a manufacturer's certification.[10] If a manufacturer discovers that its vehicles or vehicle equipment fail to comply with an applicable standard, it must initiate a notification of noncompliance.[11]

Second, if a motor vehicle or item of motor vehicle equipment contains a defect that creates an unreasonable risk to motor vehicle safety regardless of whether there is an applicable FMVSS,[12] the manufacturer must initiate a recall to address the defect.[13] Manufacturers have a continuing obligation to proactively identify and mitigate safety risks due to defects, which may include any

[9] Michelin introduced VISION, its concept tire, at Movin'On 2017. The VISION concept tire would be airless, connected, rechargeable, customizable and organic. More information regarding VISION is available at https://michelinmedia.com/michelin-vision-concept-tire/.
[10] 49 U.S.C. §§ 30112(a)(1), 30115.
[11] 49 U.S.C. § 30118.
[12] Under the Safety Act, motor vehicle safety means "the performance of a motor vehicle or motor vehicle equipment in a way that protects the public against unreasonable risk of accidents occurring because of the design, construction, or performance of a motor vehicle, and against unreasonable risk of death or injury in an accident and includes nonoperational safety of a motor vehicle." 49 U.S.C. § 30102(a)(9).
[13] 49 U.S.C. §§ 30116, 30118, 30120.

defect in performance, construction, a component, or material of a motor vehicle or motor vehicle equipment.[14]

While the FMVSS applicable to passenger cars cover a broad range of motor vehicle components and equipment, not every element of a motor vehicle is covered by an FMVSS. Nevertheless, these components and equipment are still subject to robust oversight and enforcement under the Safety Act because of manufacturers' express duty to identify and remedy any defects that relate to motor vehicle safety. Further, regardless of whether there is an applicable FMVSS, NHTSA has the same authority to test, inspect, and investigate motor vehicles and equipment, and to order a manufacturer to initiate a recall or to initiate an enforcement action against the manufacturer if the Agency identifies a defect related to motor vehicle safety.[15]

The subject of this petition is non-pneumatic tires for highway service on passenger vehicles, including Michelin's Uptis tire. Non-pneumatic tire technology has tremendous potential to enhance motor vehicle safety by eliminating risks associated with improper tire pressure, which may cause blowouts, skidding or loss of control, or increased stopping distance. Granting this petition would clarify that no FMVSS is applicable to these tires and a manufacturer would not be required under the Safety Act to certify compliance with any FMVSS. However, non-pneumatic tires for highway service on passenger vehicles would still be subject to a tire manufacturer's compliance obligation not to introduce into commerce any motor vehicle equipment containing a defect that creates an unreasonable risk to motor vehicle safety.[16] Further, NHTSA's full investigative and enforcement authority under the Safety Act would also apply to Uptis even in the absence of an applicable FMVSS.

b. New and Innovative Motor Vehicle Equipment Technologies have Traditionally been Introduced into Commerce Prior to Promulgation of an Applicable FMVSS

Traditionally, NHTSA has not developed an FMVSS for a new or innovative motor vehicle or motor vehicle equipment technology until after the technology has entered commerce. This regulatory approach has resulted in enormous safety benefits by providing regulatory flexibility for manufacturers to develop new and innovative technologies that enhance safety, while also allowing NHTSA time to study and test these technologies prior to setting performance and testing standards through an FMVSS.

In 2016, NHTSA summarized its regulatory approach to new and innovative motor vehicles and equipment in the context of automated safety technologies, as follows:

> Traditionally, only after a new technology is developed and proven does the Agency establish new safety standards. This approach has yielded enormous safety

[14] 49 U.S.C. § 30102(a)(3).
[15] 49 U.S.C. §§ 30118(b), 30163(a).
[16] 49 U.S.C. §§ 30118, 30120.

> benefits, but one limitation of this approach is that it takes time. Strong safety regulations and standards are a vital piece of NHTSA's safety mission … [However] [t]his Guidance serves in part as a reminder that even before such rulemaking occurs, NHTSA currently has enforcement authority to address safety risks as they arise."
>
> . . .
>
> NHTSA's statutory enforcement authority is sufficiently general and flexible to keep pace with [] innovation … This enforcement authority applies notwithstanding the presence or absence of an FMVSS for any particular type of advanced equipment or technology.[17]

Numerous examples of NHTSA's regulatory approach to innovative and new technologies can be found throughout the FMVSS under Part 571. For example, passenger vehicles sold into commerce were equipped with back-up cameras before NHTSA established a standard under FMVSS No. 111, vehicles were equipped with antilock brakes before NHTSA established a standard under FMVSS No. 135, and vehicles were equipped with electronic stability control before NHTSA established a standard under FMVSS No. 126. As referenced above, in 2016 NHTSA confirmed that it would continue to follow the same regulatory approach to facilitate the advancement of automated driving systems ("ADS").[18]

Technology	Market Introduction	Regulation Published	Technology Mandatory
Anti-Lock Braking Systems (ABS)	Late 1970's	2007	2008: 55% vehicles produced 2009: 75% vehicles produced 2010: 95% vehicles produced 2011: 100% vehicles produced
Electronic Stability Control (ESC)	Mid 1990's	2007	2008: 55% vehicles produced 2009: 75% vehicles produced 2010: 95% vehicles produced 2011: 100% vehicles produced
Tire Pressure Monitoring System (TPMS)	Early 1990's	2002	2005 – 2006: 20% of vehicles 2006 – 2007: 70% of vehicles >2007: 100% of vehicles produced
Back-up Camera	Early 2000's	2014	2018

Notes:

1. *Regulations mandating implementation and phase-in schedule generally include the regulatory performance requirements.*
2. *Examples exist of vehicles appearing in the market before the listed market introduction date but without a sustainable application.*

[17] "NHTSA Enforcement Guidance Bulletin 2016-02: Safety-Related Defects and Automated Safety Technology," 81 Fed. Reg. 65705 (Sept. 23, 2016).

[18] 81 Fed. Reg. 65705 (Sept. 23, 2016) ("Strong safety regulations and standards are a vital piece of NHTSA's safety mission and the Agency will engage in rulemaking related to automated safety technologies in the future. This Guidance serves in part as a reminder that even before such rulemaking occurs, NHTSA currently has enforcement authority to address safety risks as they arise.").

In much the same way, Michelin anticipates that non-pneumatic technology will enter the market through OEM application on vehicles that would especially benefit from the safety and maintenance advantages of the technology. Based on the historical results of other automotive innovations the expansion of application will grow as:

- Public awareness of the technology increases;
- The technology demonstrates the promised safety and maintenance advantages; and
- The industry responds with additional solutions and increased capacity to meet the market demand.

As seen in the examples of ABS, ECS, TPMS and vision systems the technology evolved based on field experience and customer feedback. This drives continuous evolution of system designs as new product and material innovations are developed to meet market expectations. Accordingly, the development of regulatory performance requirements should follow the evolution of design and the level of market adaptation. In many cases, as demonstrated by the examples of ABS, ECS, TPMS and vision systems, the regulatory deployment followed market introduction by more than ten years.

Importantly, NHTSA has also historically enabled tire manufacturers to develop and market innovative new tire technologies, including introduction of the first radial tires. Prior to FMVSS No. 139, NHTSA's passenger vehicle tire standard, FMVSS No. 109, had been effective since it was first issued in 1967. At that time, nearly all passenger vehicle tires in the U.S. were of bias ply construction. Michelin developed and introduced the first radial tires in the 1950s. Because radial tires are less susceptible to most types of failures, their rapid commercial adoption resulted in significant improvements in tire performance and safety compared with bias ply tires. By the time that NHTSA promulgated FMVSS No. 139 in 2003[19] to apply specifically to radial tires, they represented more than 95% of passenger tires used and sold in both the U.S. and Europe.[20]

c. NHTSA Should Apply Its Time-Tested Regulatory Process to Non-Pneumatic Tires

NHTSA's approach to developing new FMVSS is consistent with the regulatory flexibility provided under the Safety Act and has incentivized tremendous safety benefits through the deployment of numerous motor vehicle innovations. Like radial tires, non-pneumatic tires such

[19] NHTSA acted pursuant to a Congressional directive under the Transportation Recall Enhancement, Accountability, and Documentation ("TREAD") Act, Pub. Law 106-414, Sec. 10, 114 Stat. 1805-06. 68 Fed. Reg. 38116 (June 26, 2003).

[20] Michelin recognizes that FMVSS No. 139 focused on specific safety performance improvements without eliminating unnecessary testing requirements associated with legacy bias ply tires certified under FMVSS No. 109. In this regard, Michelin supports the comments submitted by the U.S. Tire Manufacturers Association ("USTMA"), Docket No. DOT-OST-2017-0069, wherein the USTMA recommended removal of the bead unseating resistance test under FMVSS 139 S6.6, tire strength (plunger energy) test under FMVSS 139 S6.5, and tire endurance (chunking of tread blocks as a damage condition) under FMVSS 139 S6.3.2(a).

as Michelin's Uptis tire represent the next critical advancement in tire safety and performance, and NHTSA should continue to facilitate the deployment of these important motor vehicle equipment innovations.

In 2003, NHTSA estimated that 414 fatalities, 10,275 non-fatal injuries, and 78,392 vehicle crashes occurred annually due to flat tires or blowouts.[21] As a result of these inflation-related concerns, NHTSA established a new FMVSS No. 138 to require tire pressure monitoring systems ("TPMS") to be installed on motor vehicles. In the rulemaking adopting the standards for TPMS, NHTSA recognized that under-inflated tires can contribute to blowouts or other tire failures, skidding and/or a loss of control of a vehicle, increase in a vehicle's stopping distance, and hydroplaning on wet surfaces.[22] In the final rule establishing FMVSS No. 138 for TPMS, NHTSA estimated that the reduced risk of under-inflated tires would (a) prevent 46 fatalities and prevent or reduce the severity of 4,345 injuries per year due to skidding or loss of control; (b) prevent 39 fatalities and prevent or reduce the severity of 3,410 injuries per year due to vehicle stopping distance; and (c) prevent 39 fatalities and prevent or reduce the severity of 967 injuries due to blowouts or flat tires.[23] Non-pneumatic tire technology offers even greater safety potential because it eliminates the risks associated with under-inflation, as well as the risk that a driver will not respond appropriately to a TPMS telltale.

In 2012, NHTSA published an updated report analyzing tire-related factors in the pre-crash phase based on data collected through the National Motor Vehicle Causation Crash Survey ("NMVCCS") from 2005 to 2007.[24] According to the report, roughly 9 percent of crashes that occur at the national level are "tire-related crashes." Among the key findings of the NHTSA report, the Agency determined based on the NMVCCS data that tires that are underinflated by 25 percent or more are 3 times more likely to be cited as a "critical event" that contributes to a vehicle accident during the pre-crash phase. Further, the percentage of vehicles experiencing tire-related problems (such as blowout, loss of tread, or other problems) is significantly higher among vehicles that rolled over during a crash when compared to vehicles that did not. As discussed below, non-pneumatic tires eliminate the risks associated with under-inflation and blowouts.

Non-pneumatic tire technology offers important motor vehicle safety benefits by eliminating certain risks associated with the design of pneumatic tires. For pneumatic tires, improper inflation pressure contributes to excessive heat buildup, larger mechanical stresses and strains, and fatigue. These are key factors that lead to safety concerns and other tire performance degradations, including uneven tread wear, loss of fuel economy and poor vehicle handling.

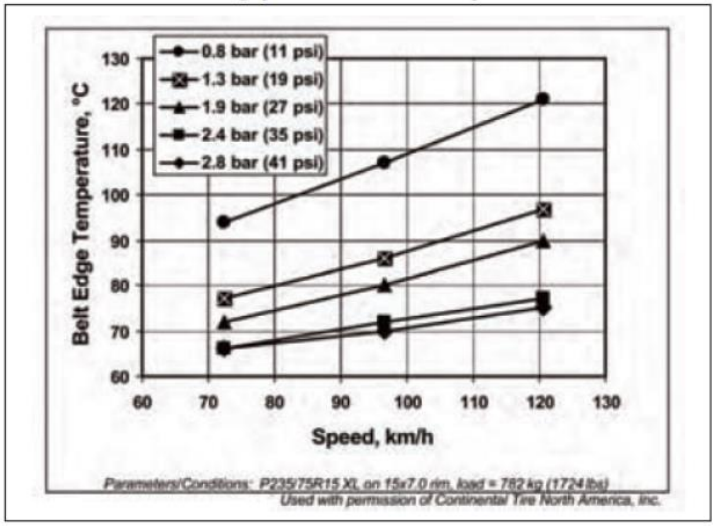
[21] NHTSA (June 2003), "Final Regulatory Evaluation FMVSS No. 139," NHTSA-2003-15400-0002.
[22] 67 Fed. Reg. 38704, 38714 (June 5, 2002) (Federal Motor Vehicle Safety Standards, Tire Pressure Monitoring Systems; Controls and Displays).
[23] *Id.* at 38739-40 (statistics based on four-tire, 25% under-inflation TPMS compliance option).
[24] NHTSA (April 2012), "Tire-Related Factors in the Pre-Crash Phase," (Report No. DOT HS 811 617).

As explained above, NHTSA has recognized the following risks associated with improper inflation pressure of pneumatic tires:[25]

- Blowout or rapid tire failure;
- Skidding or loss of control;
- Hydroplaning; and
- Increased stopping distance.

Blowouts or rapid tire failure

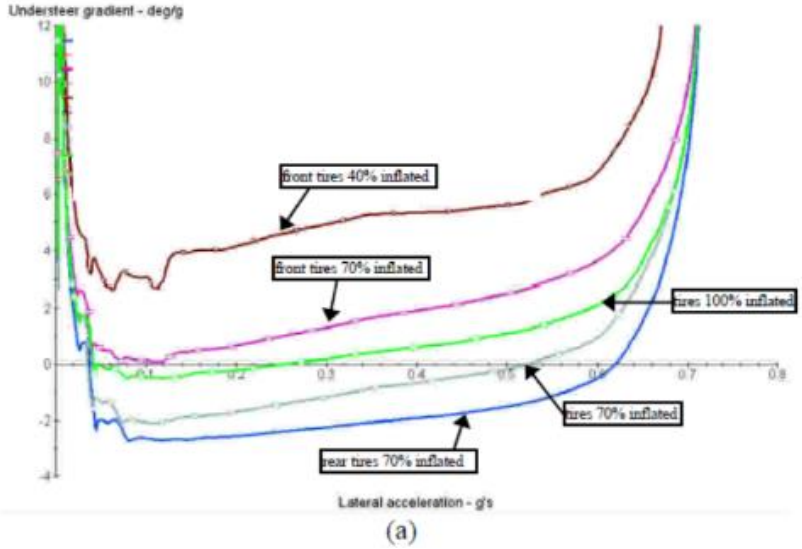
Blowouts and rapid tire failure can be separated into two areas of failure: long term endurance failure and high-speed endurance failure. In cases with long term endurance, the primary factors are accelerated rubber fatigue and high operating temperatures. Underinflated pneumatic tires, which are over deflected, will solicit both increased structural fatigue and higher temperatures due to increased stress-strain amplitudes under cyclic loading. In the case of high-speed endurance, the under inflated pneumatic tire will experience increased occurrence of standing waves, producing a rapid rise in temperature, which ultimately leads to thermal reversion and breakdown of load carrying capacity and the structural integrity of the tire.[26]



[25] A. Gent; J. Walter; National Highway Traffic Safety Administration; "The Pneumatic Tire", Chapter 15, page 26, 2006 edition.
[26] A. Gent; J. Walter; National Highway Traffic Safety Administration," The Pneumatic Tire", 2006 edition, page 618-625.

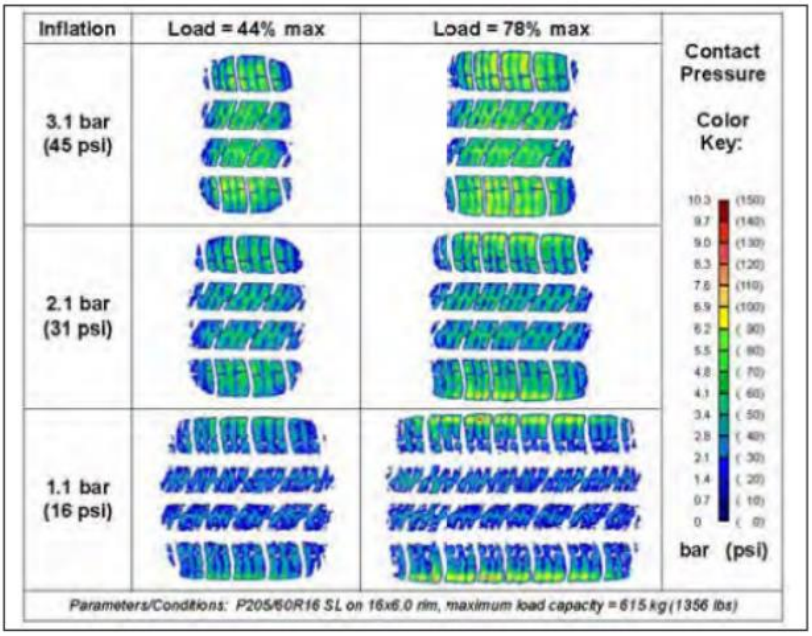
Skidding or loss of control

Underinflation of pneumatic tires has a direct effect on the vehicle's handling characteristics. Underinflation in front axle tires results in understeer tendencies and underinflation in rear axle under-inflation results in oversteer tendencies. Neither situation is typically anticipated by the driver, thus resulting in potential loss of steering control.[27]



(a)

In addition, with lower inflation pressure, especially at loads approaching or exceeding maximum load carrying capacity, the pneumatic tire's tread tends to lose contact pressure in the center groove locations; essentially due to a buckling of the tread and belt structure.[28]



Hydroplaning

Hydroplaning occurs when the vehicle reaches a speed where the viscous water pressure on the road surface is higher than the opposing tire-ground interface pressure in the contact patch. This

[27] M. Reiter and J. Wagner, "Automated Automotive Tire Inflation System – Effect of Tire Pressure on Vehicle Handling", 6th IFAC Symposium Advances in Automotive Control, Munich, Germany, July 12-14, 2010.
[28] A. Gent; J. Walter; National Highway Traffic Safety Administration," The Pneumatic Tire", 2006 edition, page 620.

condition results in the pneumatic tire's tread/belt package lifting away from the road surface and riding on the water above the road. There is a direct correlation between the hydroplaning speed and the inflation pressure of the pneumatic tire, as described by $V_P = 10 \sqrt{P}$.[29] Consequently, an underinflated pneumatic tire will hydroplane sooner (i.e., at a lower speed) than a properly inflated tire.

Increased stopping distance

It has been shown in literature that vehicle stopping distance is influenced by pneumatic tire inflation pressure (reduced inflation pressure results in longer stopping distances).[30, 31]

Because non-pneumatic tires do not rely on inflation pressure as an operating parameter, these risks associated with underinflation or over inflation are eliminated. Further, non-pneumatic tire technology offers other important enhanced benefits, including:

- Rapid air loss or blowout during pneumatic tire operation is eliminated and replaced by a protracted failure mode (breaking of one or more spokes) that provides enhanced safety and warning.
- Reduced maintenance and improved performance for vehicle fleets because the risks of puncture and loss of pressure are eliminated. In addition, the non-pneumatic tire load carrying capacity would be continuous (because variation due to inflation pressure is removed).
- Improved capability and reduced maintenance for 24/7 motor vehicle usage (automated vehicles, ride-sharing).
- Maintaining intended rolling resistance (lower inflation pressure for pneumatic tires results in higher fuel consumption and higher carbon monoxide emissions).

An important step between internal development and market realization is field testing. Product exposure to real world applications in a variety of usage and climate conditions is essential to prove-out any tire technology. It is for this reason that Michelin has engaged with states to launch fleet testing of Uptis. This phase of product development is essential to confirm the product performance. Appendix II contains more detailed information on product testing of Michelin's Uptis.

[29] W. Horne, "Tire Hydroplaning and Its Effects on Tire Traction", NASA Langley Research Center, Presented at the 46th Annual Meeting, Committee on Surface Properties – Vehicle Interaction, 1968. V_P = hydroplaning speed in mph and P is pneumatic tire inflation pressure in psi.

[30] Höpping, K. (1); Augsburg, K. (1); Hutengs, K. (1); Dherbomez, G. (2); Wang, B. (2); Victorino, A. (2); Charara, A.; "Analysis of the effect of tire inflation pressure on tire road interaction during braking", The Dynamics of Vehicles on Roads and Tracks - Proceedings of the 24th Symposium of the International Association for Vehicle System Dynamics, IAVSD 2015.

[31] Parczewski K., "Effect of tyre inflation pressure on the vehicle dynamics during braking manouvre.", Maintenance and Reliability 2013; 15 (2): 134–139

In order to realize the safety and maintenance benefits promised by non-pneumatic tire technology, it is necessary for key stakeholders to plan and invest in the resources needed to bring this innovation to market. Action and investment by these stakeholders requires assurance of viable solutions including a clear regulatory path. Absent the clarifications to the FMVSS for passenger vehicle tires and Part 574 sought by this petition, the enhanced safety benefits of non-pneumatic tire technology will be substantially delayed.

Taking into consideration Michelin's publicly stated goal of 2024 for market introduction of Uptis, regulatory clarification is needed to support advanced product planning factors including: accumulation of testing and field evaluation data to validate product performance; completion of an OEM tire development program; qualification of material and sub-assembly suppliers; development and qualification of the manufacturing technology; mobilize needed manufacturing capacity; and communication and training for dealers and other field service personnel.

IV. Granting this Petition will Remove Unnecessary Regulatory Barriers to Innovation and Achieve Other Highway Transportation Policies and Objectives

a. NHTSA's Policies and Objectives to Facilitate Innovation and Improve Safety

NHTSA has identified removal of regulatory barriers to innovation as a key Agency priority and this Petition falls squarely within that objective. Further, while this Petition requests NHTSA to initiate a rulemaking, the rule would have a de-regulatory effect by clarifying the appropriate scope of the existing FMVSS for tires.

The Safety Act enables manufacturers to facilitate the advancement of new technologies and safety improvements by establishing the two compliance instruments discussed above (the FMVSS and defect investigations). However, the FMVSS are principally technology-based standards designed to test and certify the motor vehicles and equipment on the road today. If a manufacturer develops an innovative motor vehicle or motor vehicle equipment design, compliance with an existing FMVSS may be very difficult, complicated, or impossible. As a consequence, the FMVSS may act as an unintended regulatory barrier to innovative products that were not contemplated when the existing standards were promulgated by NHTSA. NHTSA recognized the importance of responding to changing circumstances in a recent advanced notice of proposed rulemaking addressing standards for rear visibility:

> Part of NHTSA's responsibility in carrying out its safety mission is not only to develop and set new safety standards for new motor vehicles and motor vehicle equipment, but also to modify existing standards as appropriate to respond to changing circumstances such as the introduction of new technologies.[32]

[32] 84 Fed. Reg. 54533, 54534 (October 10, 2019).

This Petition seeks to clarify that the existing FMVSS for tires only establish standards for the tire technologies on the road today. Because FMVSS No. 110 requires all passenger vehicles to be equipped with pneumatic tires under FMVSS 139 or 109, or non-pneumatic spare tires under FMVSS No. 129, tire manufacturers have little to no flexibility to innovate using non-pneumatic tires under the current regulations. In practice, this standard requires all new passenger vehicles to be equipped with pneumatic radial tires that meet the requirements of FMVSS No. 139. **Accordingly, this Petition requests NHTSA to remove this unnecessary regulatory barrier that effectively prohibits passenger vehicles from being equipped with non-pneumatic tires for highway service, thus blocking an important safety technology that did not yet exist when NHTSA promulgated FMVSS Nos. 109, 110 and 139.**

NHTSA has devoted substantial resources to addressing regulatory barriers to automated driving systems, and the Agency's current unified regulatory agenda includes an advanced notice of proposed rulemaking intended to "remov[e] regulatory barriers for innovative motor vehicle technologies."[33] In particular, this forthcoming proposal will seek comments on removing or modifying requirements under the existing FMVSS and other vehicle regulations that impose regulatory barriers to the introduction of innovative motor vehicle technologies.[34] Again, this Petition meets those Agency objectives.

In addition to removing unnecessary regulatory barrier to innovation, NHTSA's unified regulatory agenda currently includes five (5) proposed rulemakings to address the FMVSS or other regulations for tires.[35] Michelin supports these efforts, but respectfully requests NHTSA to prioritize action on this Petition as it will facilitate innovative tire technology with substantial safety potential and only seeks clarifying amendments to the existing FMVSS to tires.[36] As discussed above, non-pneumatic tires offer tremendous safety advantages for the driving public. Most importantly, non-pneumatic tires eliminate the risk that improper inflation pressure will result in blowouts, skidding or loss of control, or increased stopping distance. As noted above, in 2003 NHTSA estimated that 414 fatalities, 10,275 non-fatal injuries, and 78,392 vehicle crashes occurred annually due to flat tires or blowouts.[37]

[33] NHTSA, "Removing Regulatory Barriers for Innovative Motor Vehicle Technologies," RIN 2127-AM05.
[34] *Id.*
[35] NHTSA, "Federal Motor Vehicle Safety Standards; Technical Corrections and Clarifications Related to Tires and Rims," RIN 2127-AL87; NHTSA, "Tire Fuel Efficiency Consumer Information--Part 2," RIN 2127-AL76; NHTSA "Standard Reference Test Tire Change," RIN-2127-AL92; NHTSA, "Amendments to Federal Motor Vehicle Safety Standards for Tires," RIN 2127-AL96; NHTSA "Tire Fuel Efficiency and Wet Traction Minimum Performance Standards," RIN 2127-AM08.
[36] NHTSA, "Understanding NHTSA's Regulatory Tools: Instructions, Practical guidance, and Assistance for Entities Seeking to Employ NHTSA's Regulatory Tools" (In Part D, NHTSA explains that when evaluating petitions for rulemaking under 49 CFR Part 552, "NHTSA must be able to allocate and manage its vehicle safety resources in a way that allows the Agency to focus its efforts on those vehicle technologies having the greatest potential for improving safety at a reasonable cost.").
[37] NHTSA (June 2003), "Final Regulatory Evaluation FMVSS No. 139," NHTSA-2003-15400-0002.

b. The NTSB's Recommendation to Promote Technological Innovation

This petition will also further the recommendations and objectives of the National Transportation Safety Board ("NTSB") for highway safety. In 2014, the National Transportation Safety Board ("NTSB") held a Passenger Vehicle Tire Safety Symposium to address a number of issues impacting tire-related passenger vehicle crashes, including barriers to technological innovation. Based on these discussions, in a 2015 Special Investigation Report, the NTSB recommended the following:

> The NTSB recommends that NHTSA develop, in consultation with automotive and tire industry representatives, a tire safety action plan to reduce or mitigate tire-related crashes by promoting technological innovation and adapting regulations as necessary. [38]

Further, the NTSB's current Strategic Annual Performance Plan similarly acknowledges the importance of awareness and implementation of emerging technologies for improving highway safety.[39] This Petitions seeks to further those aims by improving regulatory flexibility for tire manufacturers to promote technological innovation for non-pneumatic tires.

V. Proposed Amendments to Clarify the Scope of the Existing FMVSS for Light Duty Vehicles (FMVSS 109, 110, 129, 139) and Part 574

The following are the proposed regulatory amendments to clarify the scope of existing safety standards and facilitate the market introduction of new safety enhancing technology:

49 CFR § 571.110 Tire Selection and Rims and Motor Home / Recreation Vehicle Trailer Load Carrying Capacity Information for Motor Vehicles with GVWR of 4,536 Kilograms (10,000 Pounds) or Less

* * * *

S4. Requirements.

S4.1 General

(a) Subject to the exceptions set forth in S4.1(b), if a vehicle~~s~~ is equipped with pneumatic tires for highway service, it shall be equipped with tires that meet the requirements of § 571.139.

(b) Notwithstanding the requirement in S4.1(a),

[38] NTSB, "Special Investigation Report: Selected Issues in Passenger Vehicle Tire Safety," NTSB/SIR-15/02.
[39] NTSB, FY-2019 Annual Strategic Performance Plan (Goal 1: Safety Leader Ship, Objective 1.1: Evolving Technology).

(1) Passenger cars equipped with pneumatic tires may be equipped with pneumatic T–type temporary spare tire assemblies that meet the requirements of § 571.109 or non-pneumatic spare tire assemblies that meet the requirements of § 571.129 and S6 and S8 of this standard. Passenger cars equipped with a non-pneumatic spare tire assembly shall also meet the requirements of S4.3(e), S5, and S7 of this standard.

(2) Trailers equipped with pneumatic tires may be equipped with ST tires, FI tires, or tires with a rim diameter code of 12 or below that meet the requirements of § 571.109 or § 571.119.

* * * *

49 CFR § 571.129 New non-pneumatic spare tires for passenger cars

* * * *

S3 Definitions.

* * *

Non-pneumatic spare tire identification code means an alphanumeric code that is assigned by the manufacturer to identify the tire with regard to its size, application to a specific non-pneumatic rim or wheel center member or application to a specific vehicle.

S4 Requirements.

S4.1 Size and Construction. Each tire shall be designed to fit each non-pneumatic rim or wheel center member specified for its non-pneumatic spare tire identification code designation in a listing in accordance with section S4.4.

S4.2 Performance Requirements

S4.2.1 General. Each tire shall conform to the following:

(a) Its load rating shall be that specified in a submission made by a manufacturer, pursuant to S4.4(a), or in one of the publications described in S4.4(b) for its non-pneumatic spare tire identification code designation.

* * *

S4.2.2.2 Physical Dimensions. For a non-pneumatic tire assembly in which the tire is separable from the non-pneumatic rim or wheel center member, the dimensions,

measured in accordance with S5.1, for that portion of the tire that attaches to that non-pneumatic rim or wheel center member shall satisfy the dimensional specifications contained in the submission made by an individual manufacturer, pursuant to S4.4(a), or in one of the publications described in S4.4(b) for that tire's non-pneumatic spare tire identification code designation.

* * *

S4.4 Non–Pneumatic Spare Tire Identification Code and Non–Pneumatic Rim/Wheel Center Member Matching Information. For purposes of this standard, S8 of 49 CFR 571.110 and S10 of 49 CFR 571.120, each manufacturer of a non-pneumatic spare tire that is not an integral part of a non-pneumatic tire assembly shall ensure that it provides a listing to the public for each non-pneumatic tire that it produces. The listing shall include the non-pneumatic spare tire identification code, tire load rating, dimensional specifications and a diagram of the portion of the tire that attaches to the non-pneumatic rim or wheel center member, and a list of the non-pneumatic rims or wheel center members that may be used with that tire. For each non-pneumatic rim or wheel center member included in such a listing, the information provided shall include a size and type designation for the non-pneumatic rim or wheel center member, and dimensional specifications and a diagram of the non-pneumatic rim or portion of the wheel center member that attaches to the tire. A listing compiled in accordance with paragraph (a) of this section need not include dimensional specifications or a diagram of the non-pneumatic rim or portion of the wheel center member that attaches to the tire if the non-pneumatic rim's or portion of the wheel center member's dimensional specifications and diagram are contained in each listing published in accordance with paragraph (b) of this section. The listing shall be in one of the following forms:

* * *

S5 Test Procedures.

S5.1 Physical Dimensions. After conditioning the tire at room temperature for at least 24 hours, using equipment with minimum measurement capabilities of one-half the smallest tolerance specified in the listing contained in the submission made by a manufacturer pursuant to S4.4(a), or in one of the publications described in S4.4(b) for that tire's non-pneumatic spare tire identification code designation, measure the portion of the tire that attaches to the non-pneumatic rim or the wheel center member. For any inner diameter dimensional specifications, or other dimensional specifications that are uniform or uniformly spaced around some circumference of the tire, these measurements shall be taken at least six points around the tire, or, if specified, at the points specified in the listing contained in the submission made by an individual manufacturer, pursuant to S4.4(a), or

in one of the publications described in S4.4(b) for that tire's non-pneumatic spare tire identification code designation.

* * *

S5.4.2 Test Procedure.

S5.4.2.1 Mount the tire assembly on a test axle and press it against a flat-faced steel test wheel 67.23 inches in diameter and at least as wide as the maximum tire width of the tire to be tested or an approved equivalent test wheel, with the applicable test load specified in the table in S5.4.2.3 for the tire's non-pneumatic spare tire identification code designation.

49 CFR § 574.5 Tire Identification Requirements

* * * *

(b) TIN content requirements –

(1) Plant code. The plant code, consisting of three symbols, must be the first group of the TIN. The plant code represents the identity of the new tire manufacturer or retreader. The plant code is assigned to the manufacturer or retreader by NHTSA upon request. See § 574.6.

(2) Manufacturer's code. The manufacturer's code, consisting of six symbols, is the second group of the TIN for all new tires, but it cannot be used for retreaded tires. The manufacturer's code must be located between the plant code and the date code as shown in Figure 1. For new tires, the manufacturer's code may be used as a descriptive code for the purpose of identifying significant characteristics of the tire or to identify the brand name owner. For a new non-pneumatic spare tire or a non-pneumatic spare tire assembly, the manufacturer's code must identify the non-pneumatic spare tire identification code established for use with non-pneumatic spare tires in S4.4 of Standard No. 129 (49 CFR 571.129). Each manufacturer must maintain a detailed record of each manufacturer's code it uses with the corresponding tire size, tire characteristic, brand name owner, and non-pneumatic spare tire identification code as applicable and their respective meanings, which it must provide to NHTSA upon request.

(3) Date code. The date code, consisting of four numerical symbols, is the final group. The date code must identify the week and year of manufacture. The first and second symbols of the date code must identify the week of the year by using “01” for the first full calendar week in each year, “02” for the second full calendar week, and so on. The calendar

week runs from Sunday through the following Saturday. The final week of each year may include no more than six days of the following year. The third and fourth symbols of the date code must identify the last two digits of the year of manufacture. For example, 0109 means the tire was manufactured in the first full calendar week of 2009, or the week beginning on Sunday, January 4, 2009, and ending on Saturday, January 10, 2009. The date code must be positioned as shown in Figures 1 or 2 for new tires and retreaded tires, respectively.

* * *

(d) Method of marking.

(1) At the option of the manufacturer or retreader, the information contained in paragraph (b)(3) of this section may, instead of being permanently molded, be laser etched into or onto the sidewall in the location specified in Figures 1 or 2, respectively, during the manufacturing process of the tire and not later than 24 hours after the tire is removed from the mold.

(2) The labeling for a non-pneumatic tire or a non-pneumatic tire assembly must be in the manner specified in Figure 1 and positioned on the non-pneumatic tire or non-pneumatic tire assembly such that it is not placed on the tread or the outermost edge of the tire and, in the case of non-pneumatic spare tires, is not obstructed by any portion of the non-pneumatic rim or wheel center member designated for use with that non-pneumatic spare tire in S4.4 of Standard No. 129 (49 CFR 571.129).

* * *

(g) Old TIN content Requirements. The following requirements are applicable to tire manufacturers who were previously assigned two-symbol plant codes by NHTSA and to retreaders. A new tire manufacturer who continues to use a previously assigned two-symbol plant code in place of a new three-symbol plant code and a retreader may optionally comply with this paragraph instead of paragraph (b) of this section until April 13, 2025.

* * *

(2) Second grouping. For new tires, the second group, consisting of no more than two symbols, must be used to identify the tire size. For a non-pneumatic spare tire or non-pneumatic spare tire assembly, the second group, consisting of no more than two symbols, must be used to identify the non-pneumatic spare tire identification code established for use with non-pneumatic spare tires in S4.4 of Standard No. 129 (49 CFR 571.129). For retreaded tires, the second group, consisting of no more than two symbols, must identify the retread matrix in which the tire was processed or a tire size code if a matrix was not

used to process the retreaded tire. Each new tire manufacturer and retreader must maintain a record of each symbol used, with the corresponding matrix or tire size, which it must provide to NHTSA upon request.

VI. Compliance with Tire Industry Standards and Conventions

a. Pneumatic / Non-Pneumatic Regulations – Scope and Application

Safety performance for new pneumatic radial tires used on passenger vehicles is addressed within FMVSS No. 139, with reference to FMVSS No. 109. Per section S1 (Scope and Purpose) and S2 (Application), FMVSS No. 139 specifies tire dimensions, test requirements, labelling requirements and defines load rating for pneumatic radial tires for use on passenger vehicles.

Non-pneumatic tire technology for motor vehicles is a new and innovative technology that is not yet sufficiently mature to be defined by industry standards and regulatory tests. It is well recognized that standards and regulations addressing non-pneumatic tire and wheel assemblies will need to be developed once the technology has matured – as was the case with radial tires. In the interim, to enter the market and accumulate real-world product experience, manufacturers must rely on their engineering expertise, knowledge of their products, knowledge of the markets and anticipated customer usage to ensure the safety of their products. They must also be prepared to work in conjunction with industry standards associations, regulators and motor vehicle manufacturers to ensure the safety of their products. As explained above, tire manufacturers developing non-pneumatic technology are responsible for the safety of their products under the Safety Act even in the absence of an applicable FMVSS.[40]

b. Pneumatic / Non-Pneumatic Regulations - Definitions

FMVSS No. 139 S3 (Definitions) provides definitions related to the pneumatic tire classification, design, performance and other parameter relevant to the safety regulation.

As non-pneumatic tire and wheel assembly technology is emerging, manufacturers may introduce various solutions to achieve the required functionality and performance. These solutions may integrate different components for the tread, support structure and wheel attachment. Definitions will ultimately need to be developed in conjunction with the emergence of different technical solutions. Today, Michelin has defined the basic components of the non-pneumatic as illustrated below:

[40] 49 U.S.C. §§ 30116, 30118, 30120.

c. Pneumatic / Non-Pneumatic Regulations – Tire and Rim Matching

FMVSS No. 139 S4 (Tire and Rim Matching Information) specifies rim matching information for a conventional pneumatic tire. The specification of rim matching is necessary to ensure proper fit at the tire bead and rim interface, as well as to ensure interchangeability of tires and wheels from different manufacturers. The regulation allows two means of defining the tire and rim matching:

a.) Manufacturer's listing of rims that may be used with each tire it produces; or
b.) Referencing a publication produced by a recognized tire and rim industry standards organization: U.S. Tire & Rim Association, European Tyre and Rim Technical Organization, Japan Automobile Tire Manufacturers' Association, Tyre & Rim Association of Australia, Associacao Latino Americana de Pneus e Aros (Brazil) or South African Bureau of Standards.

Considering the maturity of non-pneumatic tire technology, the first work has only begun on the development of an industry standard. The U.S. Tire and Rim Association has commissioned a working group to address non-pneumatic tire standards. The working group is focusing on sizing nomenclature, dimensions and load rating criteria which can be applied for all categories of non-pneumatic assemblies. The results of this standards work may ultimately be used to inform NHTSA's action on a future FMVSS for non-pneumatic tires.

d. Pneumatic / Non-Pneumatic Regulations – Size and Construction

FMVSS No. 139 S5.1 (Size and Construction) addresses the fitment of the tire and the rim with reference to S4.1 (Tire and Rim Matching). Current non-pneumatic solutions are one-piece tire and rim assemblies with the components bonded during the manufacturing process. As such, the airless tire is not demountable, and the safety and performance concerns associated with pneumatic tires for tire and rim mismatching is non-existent. In the future, if non-pneumatic solutions are developed with detachable component that are field serviceable, then a component matching requirement may need to be considered. This point illustrates why NHTSA has traditionally not attempted to promulgate an FMVSS for innovative new motor vehicle equipment until future design variants have been considered and the technology has matured through commercial deployment.

While industry standards have not been finalized for the sizing nomenclature of non-pneumatic passenger car tires, it is necessary to have dimensional equivalence between pneumatics and non-pneumatics for the purposes of interchangeability. Respecting pneumatic tire standards for dimensional boxes will ensure interchangeability and prevent possible interference with the vehicle body, chassis or suspension components. Accordingly, Michelin intends to follow pneumatic tire sizing conventions for its Uptis tire. Appendix III (Confidential) contains more information regarding tire sizing for Michelin's Uptis tire.[41]

e. Pneumatic / Non-Pneumatic Regulations – Performance Requirements

FMVSS No. 139 S5.2 (Performance Requirements) sections (a) – (d) address the following:

a.) Test requirements
b.) Rim matching
c.) Inflation pressure marking
d.) Load rating

Test requirements for non-pneumatic assemblies are addressed below. Rim matching is discussed in the preceding paragraph and inflation pressure marking is not applicable to non-pneumatic tires. The proposed industry standard for sizing and matching will include the industry recognized load index marking in the service description for non-pneumatic size designation

f. Pneumatic / Non-Pneumatic Regulations – Test Sample

FMVSS No. 139 S5.3 (Test Sample) specifies the test sample quantities for the related performance tests. In the interim, sample quantities for non-pneumatic tire and wheel assemblies and the associated tests to be performed will be the responsibility of the manufacturer under the

[41] The information in Appendix III does not form the basis of this Petition, but rather has been submitted voluntarily to aid NHTSA's understanding of future products that Michelin seeks to offer to the driving public to enhance motor vehicle safety and performance.

application of due care process to ensure product safety and performance. Michelin will make test samples of non-pneumatic assemblies available in limited quantity upon request by NHTSA.

g. Pneumatic / Non-Pneumatic Regulations – Treadwear Indicators

FMVSS No. 139 S5.4 (Treadwear Indicators) requires pneumatic tires to have treadwear indicators. As non-pneumatic tires utilize conventional tread designs, the existing treadwear indicator requirement can be easily accommodated. Michelin intends to follow the existing standards under S5.4 for its Uptis tires.

h. Pneumatic / Non-Pneumatic Regulations – Tire Markings

The following table addresses the pneumatic tire markings required by FMVSS No. 139 S5.5 (Tire Markings) and identifies a corresponding non-pneumatic marking, if applicable:

49 CFR 571.139 S5.5	Pneumatic	Non-Pneumatic
a.) DOT Symbol	Required	Not required until an applicable FMVSS is promulgated
b.) Size Designation	Required	Not applicable until industry standard or other recognized sizing convention is developed
c.) Inflation Pressure	Required	Not applicable
d.) Maximum load	Required	Not applicable until industry standard or other recognized sizing convention is developed
e.) Cord Material *	Required	Not applicable
f.) Number of Plies *	Required	Not applicable
g.) Word “Tubeless” *	Required	Not applicable
h.) Word “Radial” *	Required	Not applicable
i.) Alpine Symbol	If applicable based on industry defined snow test	If applicable based on industry defined snow test

* *Indicates markings currently being considered for suppression under the regulatory reduction act*

FMVSS No. 139 S5.5 also addresses location and size of markings. Recognizing the lack of a sidewall surface on non-pneumatic tires, 49 CFR 574.5(a)(3) makes provisions for Tire Identification Number marking in alternate locations on at least one side of the assembly. Similar accommodation will need to be made for the other markings noted in the table above. While it may be feasible to mold the markings on the edge of the tread surface, this location is not well protected from curb scrubbing or other usage conditions which may obliterate the markings. Appendix III (Confidential) includes a marking illustration for Michelin's Uptis.[42] Anticipating the future adoption of an FMVSS for non-pneumatic tires, adaptation of electronic tire identification RFID may provide a reliable solution for non-pneumatic tire markings.

i. Pneumatic / Non-Pneumatic Regulations – Other Standards

FMVSS No. 139 S5.5.1 refers to 49 CFR 574 for the placement of the Tire Identification Number. As stated in the preceding section, Part 574 provides flexibility for the Tire Identification Number to be located in an alternate location on at least one side of the assembly.

S5.5.2 is reserved and has no content.

S5.5.3 requires tires to be labeled with the manufacturer or brand name and manufacturer number as specified in 49 CFR 574. Michelin intends to conform to this existing standard for its Uptis tires.

S5.5.4 through S5.5.6 specify maximum inflation pressure markings, which are not applicable for non-pneumatics.

j. Pneumatic / Non-Pneumatic Regulations – Test Procedures, Conditions and Performance Requirements

FMVSS No. 139 S6.1 through S6.6 define the test procedures, conditions and performance requirements for pneumatic tires. Currently no such tests have been defined for full time use non-pneumatic tires because an FMVSS for full time use non-pneumatic tires has not been promulgated by NHTSA. Prior to developing an FMVSS for these tires, NHTSA should obtain information from a number of stakeholders and sources, including:

- Industry standards for non-pneumatic motor vehicle tires published by industry standards organizations;
- The tire industry defined standard tests for non-pneumatics;
- Field data to support development of regulatory test procedures, conditions, and performance requirements;
- The future variations of technology, product design and materials;

[42] The information in Appendix III does not form the basis of this Petition, but rather has been submitted voluntarily to aid NHTSA's understanding of future products that Michelin seeks to offer to the driving public to enhance motor vehicle safety and performance.

- Variants on the existing design solution that may require different test methodologies; and
- NHTSA's own current emphasis is on regulatory reduction including identification of obsolete tests within the existing pneumatic tire safety standards.

In the interim, while data is accumulated to support the creation of an FMVSS for non-pneumatic tires and wheel assemblies, it is incumbent upon each manufacturer entering this market to comply with the Safety Act by identifying and mitigating any safety risks due to defects, which may include any defect in performance, construction, a component, or material of a motor vehicle or motor vehicle equipment.[43]

The regulatory tests defined in FMVSS No. 139 and other related pneumatic tire safety regulations are intended to simulate real world usage conditions and evaluate the product integrity under these conditions. As non-pneumatics will coexist with pneumatic tires in similar motor vehicle applications it is reasonable to expect non-pneumatics to perform satisfactorily on the applicable pneumatic tire regulatory tests. The following table identifies existing pneumatic tire regulatory tests which may be applicable for non-pneumatics.

49 CFR 571.139 Requirements	Pneumatic	Non-Pneumatic	Comment
S6.1 Dimensions	Y	Y	To be based on future industry standards
S6.2 High Speed Performance	Y	Y	Same load / speed / time conditions
S6.3 Tire Endurance	Y	Y	Same load / speed / time conditions
S6.4 Low Inflation Performance	Y	N/A	Not applicable for non-pneumatic
S6.5 Tire Strength *	Y	N/A	No air loss associated with crown penetration
S6.6 Tubeless Bead Unseating *	Y	N/A	Non-pneumatic is not demountable therefore no bead/rim interface

** S6.5 tire strength and S6.6 bead unseating tests have been recommended to be suppressed in the pneumatic tire regulations in the interest of regulatory reduction.*

Michelin has tested its Uptis tires according to the existing pneumatic tire regulatory tests identified above (S6.1, S6.2, S6.3), and has determined that they meet or exceed the performance characteristics of existing pneumatic radial tire technology. Appendix II includes the test standards and data associated with testing of Michelin's Uptis tire.

Further, Michelin will provide training instruction and documentation on the Uptis along with supplying product literature, service bulletins, consistent with the manner in which it communicates training materials for Michelin's pneumatic tires.

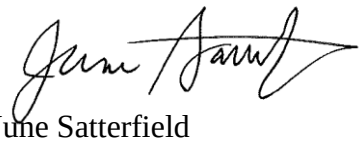
[43] 49 U.S.C. § 30102(a)(3).

VII. Conclusion

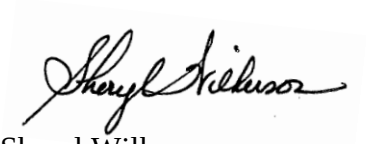
For the reasons explained in this Petition, the requested amendments to the FMVSS and other regulations for tires are needed to clarify that the FMVSS pneumatic tire standards do not apply to passenger vehicles equipped with non-pneumatic tires for highway service. Michelin respectfully requests that NHTSA prioritize prompt action on this Petition because a clarifying rulemaking addressing these issues will facilitate the advancement of new tire technology with substantial safety potential, as well as remove unintended regulatory barriers to innovation by the tire industry.

Michelin appreciates the Agency's consideration of this Petition and would be pleased to provide additional information or clarification regarding any aspect of the Petition. Should you have any questions or require further information, please do not hesitate to contact June Satterfield at (864) 458-4612 or Sheryl Wilkerson at (703) 855-1208.

Respectfully submitted,



June Satterfield
Director, Industry Standards and Government Regulations
Michelin North America, Inc.



Sheryl Wilkerson
Vice President, Government Affairs
Michelin North America, Inc.

Michelin North America, Inc.

One Parkway South
P.O. Box 19001
Greenville, South Carolina 29602-9001
Tel: (864) 458-5000

APPENDIX I

History of Innovation

Michelin has earned a long-standing reputation for building innovative premium tires. Innovation is part of Michelin's DNA, and we embrace the changes that come along with introducing new solutions for better mobility to the market. Michelin has a long history as the leader in our industry in this area. The following are examples of significant technological innovations that have been developed and deployed by Michelin throughout our history –

1891 - First detachable tire with an inner tube for bicycles

1908 - "Twinned" tire for heavy-goods vehicles

1913 - Steel wheel to replace the earlier wooden wheels

1929 - **"Micheline**" tire for rail trains

1930 - **"**Michelin N" first snow tire

1933 - Michelin filed a patent for a tire with a built-in inner tube

1934 - Michelin "STOP" tires introduced siping

1937 - Michelin "METALIC" **first steel casing tire** for trucks

1946 - Michelin filed the patent for radial casing tire. **First radial tire** was released in 1949 under the name of MICHELIN X. Followed by: Truck tires (1952), Earthmovers (1959), Winter XM+S (1964), Agricultural Bib X (1978), Aircraft Air X (1981) and Motorcycle (1987)

1992 - Michelin developed the **first "Green Tire"** utilizing silica technology

1994 - Michelin "ALPIN" with Y-siped technology

2000 - **Michelin X-One** single truck tire

2003 - Michelin Ultraflex technology for agricultural tires

2012 - **TWEEL airless assembly** introduced for non-automotive applications

2014 - Michelin Premier A/S utilizing EverGrip technology **self-regenerating tread**

2015 - Michelin Cross Climate the **first summer tire with winter certification**

2015 - Michelin ACOUSTIC foam filled tire for sound absorption

2015 - Michelin Selfseal puncture protection

2017 - Michelin ACORUS: cushion to protect tire and wheel from road impacts

2017 - **Vision concept** connected airless tire with a 3D rechargeable tread

2017 - Michelin introduces RFID for commercial truck and retread tires

2018 - Track Connect: tire with real-time monitoring of pressure and temperature

APPENDIX II

NON-PNEUMATIC TIRE AND WHEEL ASSEMBLY
REGULATORY PERFORMANCE AND DIMENSIONAL EQUIVALENCE

REGULATORY EQUIVALENCE

FMVSS Performance	FMVSS Test Method	Pneumatic 215/45R17 Requirement	Non-Pneumatic 215/45N17 Test Result
Dimensions Width §571.139 S6.1.2(b)	+7% or 10mm versus recognized tire industry standard or specified by manufacturer in data submission to NHTSA	Design: 213mm Max: 228mm	214mm
High Speed §571.139 S6.2.2	2-hour break-in at 80 kph @ 85% max load; 32 – 38 deg C 90 minutes at intervals of 140, 150, 160 kph	No visual degradation; < 5% air loss	Passed
Endurance §571.139 S6.3.2	4 hrs @ 80% load + 6 hrs @ 90% load + 24 hrs @ 100% load; 120 kph (snow tires 110 kph); 32 – 38 deg C	No visual degradation; < 5% air loss	Passed
Low Inflation Pressure Endurance §571.139 S6.4.2	90 min. at 140 kPa for standard load; 160 kPa for extra load 120 kph (snow tires 110 kph); 32 – 38 deg C	No visual degradation; < 5% air loss	Not Applicable No inflation pressure
Tire Strength §571.139 S6.5	19 mm (3⁄4 inch) diameter cylindrical steel plunger with a hemispherical end forced perpendicularly into the tread rib at the rate of 50 mm (2 inches) per minute	2600 in-lbs	4189 in-lbs
Bead Unseating §571.139 S6.6	Apply a load to the tire's outer sidewall at a rate of 50 mm (2 inches) per minute; location of load block on sidewall is based on wheel diameter	2500 lbs	Not Applicable No demountable bead/rim interface

Notes:

1. Test conditions vary based on tire type, tire size designation and tire load capacity.
2. See relevant section of FMVSS 109 or 139 for full details of test methods and requirements.
3. See relevant section of FMVSS 139 for full description of "no visual degradation". See comment in Regulatory Equivalence section below regarding benign tread chunking.
4. Pneumatic tire strength requirement varies by tire type, inflation pressure and section width.
5. Pneumatic tire bead unseating requirements vary based on section width.

MICHELIN ENDURANCE TEST REPORT

Endurance Header Information

Request Date :	14-Aug-19	Test Name :	Step Load	Test No :	**493746**
Start Date :	23-Aug-19	Test Method :	Endurance	Requester :	
Completion Date :	26-Aug-19	Test Dept :		Req Dept :	
Due Date :	28-Aug-19	Machine :		Project :	UPTIS

Test Parameters

Rim Size :	n/a	Load (kg) :	500	Cell Temp (°C) :	38
Configuration :		Speed (kph) :	120	Pressure (b) :	n/a
RW Diam (m) :	1.7			Pressure Type :	n/a
Step Method File :	Endurance	RW Diam (m):	1.7	Inflation Gas :	n/a

Statistics Information

Statistics Group :	Step Load	Sigma Chapeau :	537	Batches on Report :	1
				Tires on Report :	1

Sets	Batch	Make / Tires / Cuts :	Type / Size / Omega / Flower	Average / Std Dev / BZ	Total: Distance (km) 300 400 500	Distance / Duration (Soaktime)	Load / Time at load / Avg Temp	Serial Num / Observations: Next Location / Ending Press(b) / DOT Code / Mach Post — 1 2 3 4 5 6 7 8 9 10 11 12
1		MI	UPTIS	**4740**		**4740km**	500kg	AABS-3706 EOT None
1	S49570AB	1	215/45N17			**39.5hr**	29.5hr	D0E NA NA A3BF
1		Omega ☐ ___	Flower ☐ ___	BZ ☐ ___			37.75C	----|----|----|----|----|----|----|----|----|----|----|----

Endurance Comments

MICHELIN STEP SPEED TEST REPORT

Step Speed Header Information

Request Date :	14-Aug-2019	Test Name :	FMVSS 139	Test Number :	**493745**
Start Date :	23-Aug-2019	Test Method :	Hi Speed	Requester :	
Completion Date :	23-Aug-2019	Test Dept :		Req Dept :	
Due Date :	28-Aug-2019	Machine :		Project :	UPTIS

Test Parameters

Rim Size :	n/a	Load (kg) :	500	Cell Temp (°C) :	35
Configuration :		Speed (kph) :	140	Pressure (b) :	n/a
Camber (°) :	0	RW Diam (m) :	1.7	Pressure Type :	n/a
				Inflation Gas :	n/a

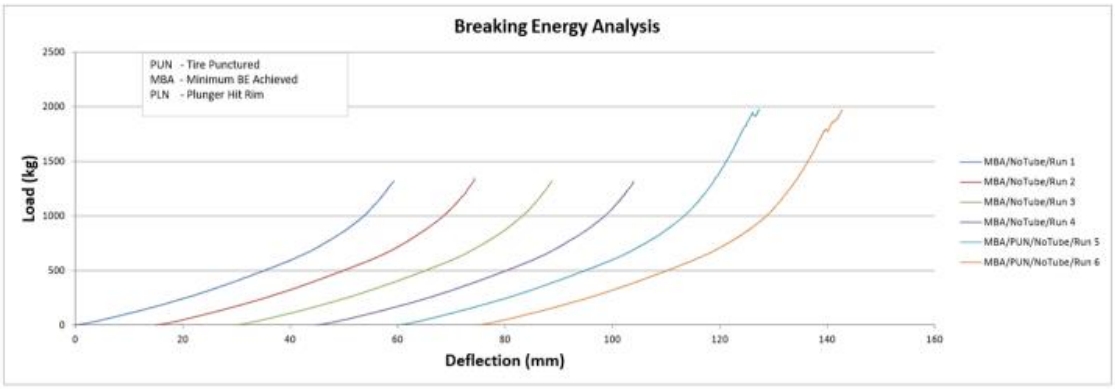
Statistics Information

Statistics Group :	High Speed 30min	Coefficient :	0.5504	Batches on Report :	1
Basis ESR :	170.0	Exp Factor :	0.0045	Tires on Report :	1

Sets	Batch	Make / Tires	Type / Size	Average / Std Dev	Estimated Speed Rating: 165 170	ESR / Time	Min @ kph / Decap	Serial Num / Observations: Next Location / Ending Press(b) / DOT Code / Mach Post — 1 2 3 4 5 6 7 8 9 10 11 12
1		MI	UPTIS	**170.0**		**N/A**	30.0min	AABY-3214 EOT NONE
1	S49570AJ	1	215/45N17			**384.9km**	160kph	D0E N/A A07AF
1		Omega ☐ ___	Flower ☐ ___	BZ ☐ ___		**210min**	☐$^{DOT}_{OPP}$	---|----|----|----|----|----|----|----|----|----|----|----

Step Speed Comments

1) PASS - no observations



Tire 1

MT No:	493744	Zone Tested:		Size: 215/45N17		
Requestor:		Batch: S49570AJ		Type:		
Date:	14-Aug-19	S/N: AABX-0232		Rim Size: N/A		
Plunger Size:	3/4	Make: MI		Pressure: NA		
Run No:	6			Rim Type:		
				BE		
	Max Load (kg)	DEF (mm)	(kg-mm)	(in-lbs)	Bar	
MBA/NoTube/Run 1:	1321.2	59.4	39240	3406	0.000	
MBA/NoTube/Run 2:	1346.6	59.3	39927	3466	0.000	
MBA/NoTube/Run 3:	1315.6	58.7	38613	3351	0.000	
MBA/NoTube/Run 4:	1313.4	58.9	38680	3357	0.000	
MBA/PUN/NoTube/Run 5:	1972.7	67.4	66480	5770	0.000	ON SPOKE
MBA/PUN/NoTube/Run 6:	1966.2	67.8	66654	5785	0.000	BETWEEN SPOKE
Avg:	1539.3	61.9	48266	4189	0.000	
Std Dev:	333.4	4.4	14184	1231	0.000	

Regulatory Equivalence

The above presentation data demonstrates equivalent performance of non-pneumatic tire and wheel assembly in applicable pneumatic tire regulatory tests. Endurance, high speed and breaking energy test results meet or exceed regulatory requirements, thus demonstrating the equivalent performance of a non-pneumatic when exposed to regulatory test conditions deemed appropriate to assess pneumatic tire performance.

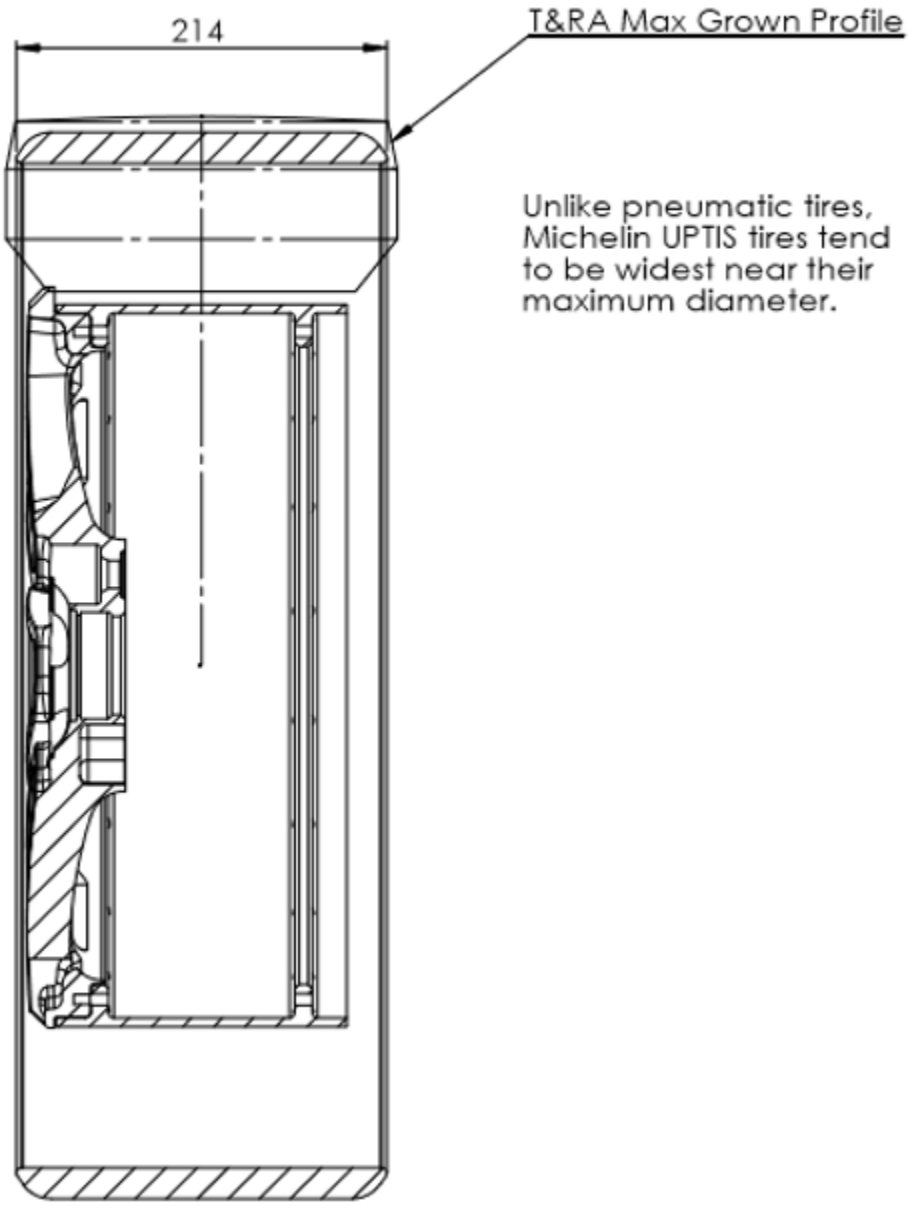
Pneumatic passenger car tire regulatory tests not applicable for non-pneumatic tire and wheel assemblies include low inflation pressure endurance and bead unseating. Clearly, low inflation pressure is not a usage condition experienced by non-pneumatic tires. The absence of a demountable tire bead and rim interface renders the bead unseating test irrelevant.

Regarding the acceptance criteria for §571.139 S6.3 endurance test, the criteria should be aligned with USTMA's December 1, 2017 response to the DOT Regulatory Reform Initiative which identified tread chunking in the endurance test as an unintended, benign condition which is a consequence of the over deflection of the tire on the curved drum surface. Chunking should not be a damage condition used to assess regulatory compliance for the endurance test.

Test results for §571.139 S6.5 tire strength are shown in the above regulatory equivalence table for reference purposes only. Tire strength (breaking energy) is not a proposed test for non-pneumatic tires. In their December 1, 2017 submission to the DOT Regulatory Reform Initiative, the USTMA classified the tire strength test for pneumatic tires as an outdated and obsolete test

method that does not provide a safety benefit for modern tires. USTMA recommended this test be eliminated from current regulations.

DIMENSIONAL EQUIVALENCE



Dimensional Equivalence

The above presentation of data demonstrates equivalent dimensional sizing of non-pneumatic tire and wheel assembly with a conventional pneumatic tire of the same size designation. While industry standards have not been finalized for the sizing nomenclature of non-pneumatic passenger

car tires, it is necessary to have dimensional equivalence between pneumatics and non-pneumatics for the purposes of interchangeability. Respecting pneumatic tire standards for dimensional boxes will ensure interchangeability and prevent possible interference with the vehicle body, chassis or suspension components.

Note: Tire sizing presented on this product design follows T&RA and ETRTO metric sizing convention for pneumatic tires. A tire sizing standard is being considered to describe the geometric box of the non-pneumatic envelope such as:

(Assembly Overall Diameter) x (Tread Width) N (Hub Inner Diameter) (Service Description)

Overall diameter, tread width and hub inner diameter are expressed in metric units, and service description follows industry convention of load index + speed symbol.

APPENDIX III

Confidential Business Information submitted to Chief Counsel of NHTSA pursuant to 49 CFR Part 512

APPENDIX IV

Confidential Business Information submitted to Chief Counsel of NHTSA pursuant to 49 CFR Part 512