MICHELIN PILOT SPORT EV

255/49R19 104W XL





THE INTERNATIONAL EPD® SYSTEM

Environmental Product Declaration

In accordance with ISO 14025:2010

EPD® REGISTRATION NUMBER: S-P-03971

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Michelin is proud to communicate its first Environnemental Product Declaration (EPD), in accordance with the International EPD® System, for a MICHELIN Pilot Sport-family tire, the new **MICHELIN PILOT SPORT EV** (255/49R19 104W XL) launched in 2021.

The EPD is based on verified life cycle analysis (LCA) data. It summarizes and communicates transparent and comparable information about the environmental impact of the product at each phase of its life cycle, to inform our customers and other interested parties.

Following the EPD for **MICHELIN e-PRIMACY** released in 2020, this document demonstrates the Michelin group's strong commitment to put the reduction of environmental impacts at the heart of its sustainable growth strategy.











OUR PURPOSE

OFFERING EVERYONE A BETTER WAY FORWARD

Because we believe that mobility is essential for human development, we are innovating passionately to make it safer, more efficient and more environmentally friendly.

Our priority and firm commitment is to offer our customers uncompromising quality.

Because we believe that all of us deserve personal fulfillment, we want to enable everyone to do his or her best, and to make our differences a valuable asset.

Proud of our values of respect for customers, people, shareholders, the environment and facts, we are sharing the adventure of better mobility for everyone.



Tomorrow, everything at Michelin will be sustainable.

Florent Menegaux, Chief Executive Officer











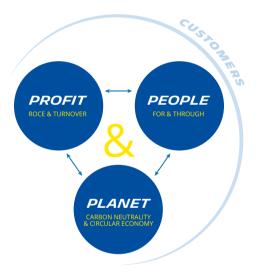
MICHELIN ALL-SUSTAINABLE APPROACH

Our vision of the future is founded first and foremost on the realities of today and tomorrow.

Our growth is based on fostering the **right balance**, as expressed in our future-facing **All-Sustainable** approach, between:

- Development and personal fulfillment of all PEOPLE inside and outside the company
- Economic development PROFIT
- Protection of the planet and its inhabitants PLANET

Leveraging our unrivaled capabilities, we innovate to help humanity conquer new frontiers for a better life in motion.



All-Sustainable is both a daily imperative and a compass for the future.











MICHELIN AT A GLANCE

Sustainable mobility enabler

For more than a century, Michelin has constantly innovated to improve the mobility of people and goods. Today, the Group is the leader in tire technology for every form of mobility, delivering services that improve their efficiency and solutions that make travel easier and more fulfilling. Michelin enjoys unrivaled expertise in flexible composites and their applications, which it markets, in addition to tires, to a broad range of customers and industries.



R&D **6,000**people
in **9** countries

PRODUCTION

facilities in **26** countries

TEALERSHIP 7.600proprietary or franchised centers in **30** countries











SUSTAINABILITY IS PART OF MICHELIN'S HISTORY OF INNOVATION

1946

1987

1992

2000

2001

2003

2012

The radial tire: safer, longer lasting – offering up to four times higher mileage than a conventional tire – and more economical. Michelin's extensive research resulted in this major technological breakthrough. The first radial car tire MICHELIN X was released in 1949, followed by truck (1952), earthmover (1959), aircraft (1981) and motorcycle (1987) tires with radial technology.

The "green" tire: a breakthrough in tire energy efficiency with increased safety and longevity. Michelin's innovation of adding silica to the rubber mix led to the launch of the first generation of tires in the MICHELIN Energy™ line.

The new generation wide base truck tire: increased payloads and lower fuel consumption. Michelin replaced traditional twin truck tires with its MICHELIN X-One™ single truck tire.

Tires as a service: improving safety, energy efficiency, longevity, while optimizing fleet management and reducing costs. From per-kilometer tire maintenance in the 1940s to the creation of Michelin Fleet Solutions in 2001 to the current Services & Solutions offer, Michelin delivers sustainable benefits to fleets.

The low-impact agriculture tractor tire: reduced soil compaction and rutting, better efficiency, higher farm yields. The MICHELIN Ultraflex™ technology's sidewall flexion enables the tractor to operate with lower tire pressure which in turn protects soils.

Tires made for electric mobility: safety combined with energy efficiency. The MICHELIN Energy™E-V tire was the first tire specifically designed for electric vehicles to receive the A rating for both wet braking and energy efficiency on the European label.













SUSTAINABILITY MEANS BUILDING A CIRCULAR ECONOMY

2014

Well before Michelin baptized its approach to the circular economy in 2014, it was already applying the 4R principles of reducing, reusing, recycling and renewing tire design, manufacturing, logistics, services for tires in use and end-of-life recovery.

Transitioning from a linear economic model based on "take-make-dispose" to a circular economy in which waste and pollution are designed out, products and materials are kept in use and natural systems are regenerated is imperative for responsibly using the Earth's limited resources.

The 4R framework guides our innovations and research, our environmental policy for operations, as well as our partnerships and involvement in sustainable mobility ecosystems



^{*}Michelin embraces this circular economy concept as articulated by the Ellen MacArthur Foundation. https://www.ellenmacarthurfoundation.org/circular-economy/concept













2014

An incubator for innovation that dovetails with Michelin's "All Sustainable" approach

- As a founding partner of Formula E, Michelin sees electric vehicle racing as a means to accelerate the development of new technologies for the benefit of sustainable mobility for all.
- Since the inaugural FIA Formula E Championship in 2014-2015, Michelin has developed three distinct generations of its tire for the competition's all-electric single-seaters. Over this time, its performance, consistency and versatility have all been improved, while its rolling resistance has been reduced by almost 20 percent, and nine kilograms have been shaved off the weight of a set of four tires. Michelin Motorsport's engineers have achieved all this while meeting increasingly challenging specifications as the cars became more and more powerful and more demanding on tires. The use of lighter, more efficient tires that cover complete race days confirms Michelin's commitment to protecting the environment. The technological improvements introduced in the course of Formula E's first six seasons have enabled the French firm to accelerate the development of the MICHELIN Pilot Sport EV road tire.













SUSTAINABILITY MEANS PERFORMANCE MADE TO LAST

2017

Our ongoing efforts to reduce carbon emissions naturally extend to the customer experience, with tires that are increasingly durable, safe and energy efficient. By extending the life of its products, Michelin is proving that tires can and must offer very high performance until the tread wear indicators appear. If drivers used their tires until the legal tread depth of 1.6 mm, this would avoid wasting up to 400 million tires and emitting up to 35 million tons of CO₂ each year.*

Long-lasting tires: a great value for consumers



Save time & money by keeping excellent tire mileage until the legal wear limit (1.6mm or 2/32nds) Replacing fewer tires means saving resources and reducing waste

Reduce fuel consumption as tire energy efficiency increases with mileage

^{*}Worldwide estimations based on data from the EY report "Planned obsolescence is not inevitable", June 2017, and an internal study "Worldwide calculations_2016-09-27"











SUSTAINABILITY IS GUIDING OUR INNOVATION AND DESIGN PROCESS WELL INTO THE FUTURE



VISION Concept Tire

It all started with design thinking around sustainable mobility. From a collaborative, user-centric process drawing on a diversity of expertise the Vision tire was born.

Combining technologies and services, Vision is a light, highly robust airless tire-wheel combination made from recycled and bio-sourced materials that last the life of the vehicle. The tread can be recharged on demand using a 3D printer, and connectivity enables the driver to receive advance warning of a potential problem.

Protected by 19 patents, Vision's innovations are inspiring our R&D teams across the organization, guiding advanced research on sustainable materials, light-weight designs and connectivity to build sustainable performance into future tire lines.

100% SUSTAINABLE MATERIALS

RECHARGEABLE TREAD















DELIVERING ON THE SUSTAINABLE VISION

2019



Drawing on the sustainable features of the VISION concept, Uptis* is a prototype airless passenger car tire featuring ground-breaking improvements in architecture and composite materials which enable it to bear the car's weight at road-going speeds. Developed with General Motors, Uptis eliminates any risk of flats and blowouts, while making pressure checks obsolete. These advantages improve driving safety, reduce down time for repairs and optimize the productivity of vehicle fleets. Moreover, Uptis is adapted to the emerging forms of mobilities, whether electric, shared, autonomous or other.

Environmental benefits: Uptis eliminates the need for a spare tire and therefore the need to produce one, avoiding all the inputs – raw materials, energy, water – and the outputs – waste, CO₂ and other emissions, wastewater. Widely deploying Uptis innovations would result in extraordinary environmental savings: approximately 200 million tires worldwide are scrapped prematurely every year as a result of punctures, damage from road hazards or uneven wear from improper air pressure.

From prototype to reality: The first on-road application of Uptis is planned for 2024.

*Unique nuncture-proof tire system

Uptis development is supported through:



















SUSTAINABILITY MEANS REDUCING THE LIFE CYCLE IMPACTS OF OUR PRODUCTS AND SERVICES

Across the value chain Michelin is:

- Reducing CO₂ emissions to achieve its targets validated by SBTi*
- Taking multiple actions under its biodiversity commitments
- Integrating life cycle assessment into the tire design process



We are developing a range of sustainable materials solutions, including micronized rubber powders from scrap tires and bio-sourced butadiene and resins



As one of the world's leading users of natural rubber, Michelin was the first tire manufacturer to pursue a sustainable sourcing strategy built on the principles of zero deforestation, land conservation and respect for supplier communities.



Michelin actively supports resource recovery and recycling systems for end-of-life tires with its stakeholders and industry partners around the world.

MANUFACTURING

the environmental impact of manufacturing through its environmental management system and performance targets.



Michelin applies multiple levers to reduce its carbon footprint for transporting semi-finished and finished products.

USE OF PRODUCTS AND SERVICES

REPRESENTS 63 TO 96% OF LIFE CYCLE IMPACTS

Michelin's innovations mean longer distances and higher performance with fewer materials and a smaller carbon footprint. Our services and solutions optimize tire use.

*Depending on type of vehicle and environmental impact category.



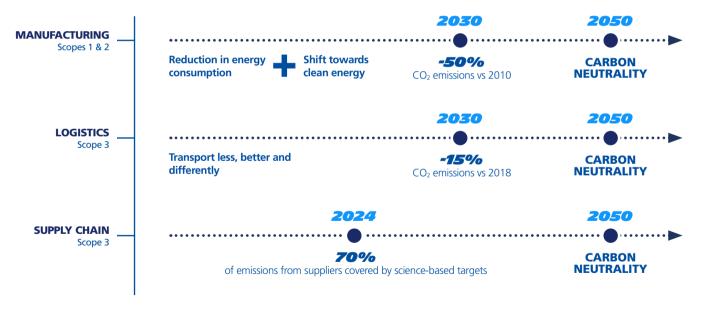








ON THE PATH TO REACH CARBON NEUTRALITY















EN ROUTE TO REACH FULL CIRCULARITY OF PRODUCTS









with 40% of sustainable raw materials in 2030, 100% in 2050













SUSTAINABILITY MEANS REDUCING THE LIFE CYCLE IMPACTS OF OUR PRODUCTS AND SERVICES

2021 -

The **MICHELIN PILOT SPORT EV** tire was optimized in an eco-design process involving the evaluation of environmental impacts across the stages of the tire's life cycle, in comparison to the equivalent tire range.

Several types of environmental impacts were evaluated in this life cycle assessment (LCA):

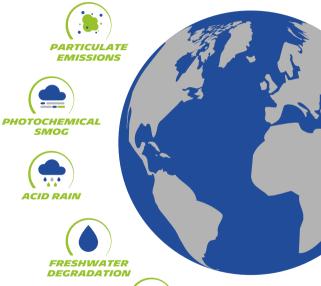
- direct impacts to global warming and to ecosystem and human health
- indirect impacts from the use and reuse of resources.

What we learned from the LCA:

The LCA enabled a better understanding of how the tire's design and performance impact the environment.

The R&D team optimized the tire's performance, particularly regarding energy efficiency (rolling resistance) and longevity, to minimize the environmental impacts, notably the contribution to global warming and use of resources.





















Electrified road control made to last



Additional 60 km of range for High Performance Flectric Vehicles (7)



Performant handling even at high speed (2) thanks to 15% more of cornering stiffness (1) Excellent grip and safety on wet: new & worn (3-4)



Pioneer in the alliance of sustainable mobility and high performance - MICHELIN Pilot Sport EV is a long-lasting and eco-designed Sport tire (5-6)



Approx. 20% reduction (8) in perceived noise level inside the car



⁽³⁾ MICHELIN Pilot Sport EV is rated "B" on the Wet Grip Item of the European labelling scale.







(a) Fuel efficiency class. (b) Wet grip class.

(c) External rolling noise class and measured value in decibel (dB).



⁽⁴⁾ New and Worn (worn means worn on machine (buffed) to the depth of Tread Wear Indicator according to European regulation for Tread wear indicator ECE R30r03f), on 255/45 R19 MICHELIN Pilot Sport EV,

For an Electric Vehicle of a mass 2151kg, with an autonomy of 540km, this gap of 2.1kg/t drives to a gain of autonomy of more than 60km, or more 10% of the initial range.

Internal noise measurement, done in 2016 on size 245/45 R19 on KIA Cadenza. Noise level measured on the range "170-230Hz". Results may vary according to vehicle, tire range and size, speed and road conditions.











MICHELIN PILOT SPORT EV

A long-lasting and eco-designed sport tire

ElectricGrip Compound

Inspired by Michelin's experience of tire development for Formula E championship, the center part of the tread pattern has high stiffness rubber compound, providing maximum grip for efficient EV torque

MICHELIN Acoustic Technology

A custom-designed polyurethane foam solution muffles noise resonance which allows the drivers and passengers to benefit fully from hands-free communication devices while lessening driver fatigue on long drives. Acoustic technology even dampens interior noise when driving on changing road conditions.



GreenPower Compound

High efficiency rubber compound on the shoulders reduces energy consumption for longer ranges and delivers long-lasting mileage despite the heavier weight of High Performance Electric Vehicles.

MaxTouch Construction

Maximize the tire's contact with the road and evenly distribute the forces of acceleration, braking and cornering – delivering longer tread life without sacrificing performance.

Slim belt

Thinner top belts with less raw material at equivalent strength, improving battery range for electrical vehicles.





Product







MICHELIN PILOT SPORT EV 255/49R19 104W XL

SYNTHETIC RUBBER

3.07KG (24.5%)

NATURAL RUBBER

2.13KG (17.0%)

STEEL

1.63KG (13.1%)

TEXTILES

0.63KG (5.1%)

SILICA

1.23KG (9.8%)

CARBON BLACK

2.00KG (16.0%)

OTHER MATERIALS*

1.81KG (14.5%)

*Chemicals and additives













CONTENT DECLARATION

EPD type and region of applicability:

Cradle to grave, Europe

Tire designation information:

- Tire size: 255/45R19

- Tire mass: 12.50kg

- Tire sub-categories: Passenger car tire

- Nominal section width: 255mm

- Aspect ratio: 45

- Casing construction: 1 ply polyester

- Rim diameter: 19 inches

Load index: 104Speed rating: W

Retreadability:

No

Rolling resistance coefficient value:

6.7kg/t

Tire category:

Passenger car tire

Functional unit:

1 tire driven 1000km

LCA software:

Simapro release 9.1.1.1

LCI databases:

Ecolnvent 3.6

Plant:

Michelin plant of Shenyang2, China

An EPD® within the same product category but from different programmes may not be comparable.

Calculated impacts are only related to tires within the scope of this PCR and shall not be compared to vehicle performance.











UNDERSTANDING ENVIRONMENTAL PERFORMANCE



Contribution to global warming is measured by the emission of greenhouse gases.

Ecosystem health impacts are measured by:







 Released chemicals that damage the ozone layer and its ability to absorb ultraviolet radiation that is harmful to plant life



 Nutrients that degrade freshwater bodies through the loss of oxygen and acidification in a process called "eutrophication"

Human health impacts are measured by:

Air pollution caused by:







formation of **photochemical ozone**, a major contributor to **smog**



• released chemicals that **damage the ozone** layer and its ability to absorb ultraviolet radiation that is harmful to humans



Use of ressource:



- withdrawal of freshwater
- energy generation from both renewable and non-renewable sources
- depletion of minerals, fossil fuels and other non-living or "abiotic" resources that are non-renewable



Reuse of resources:

- mass of the product remaining at end of life
- ability to reuse the product's components
- recycling of the product by recovering materials and energy



*Product stage: it represents the cradle-to-gate impacts of a tire, including the processes that provide the material and energy inputs into the product system, manufacturing of raw materials into the finished tire, and transport processes up to the factory gate, as well as the processing of any waste arising from the processes.



*Mounting stage: includes the activities from the tire factory to the final user, i.e., successive transport stages.



*Use stage: includes the activities covering the period from the handover of the tire until it reaches its end of life, including the fuel/energy consumption and related emissions attributable to the tire, and particle emissions related to tire and road abrasion.



***End of life stage:** The end of life stage of the tire product starts when it is removed from the vehicle, does not provide any further operational function, and is at the end of the reference service life. It includes the transportation of the tire to the end of life treatment facility and the end of life treatment of tires being landfilled or incinerated without energy recovery.

(*) see UL PCR Tires: UL 10006 version 3.04 for any further details







Environmental performance



Additional information & references



ENVIRONMENTAL IMPACT CATEGORY

			PRODUCT STAGE		O MOUNTING STAGE	USE STAGE	END OF LIFE STAGE		
Europe (ILCD Method)	UNIT	TOTAL	RAW MATERIALS	TRANSPORTATION	MANUFACTURING	DISTRIBUTION	TIRE IN USE	TIRE END OF LIFE TRANSPORTATION	TIRE END OF LIFE TREATMENT
■ Global warming potential	kg CO₂eq	5.70E+00	6.73E-01	4.77E-02	1.41E-01	8.03E-02	4.76E+00	1.08E-04	5.36E-05
Acidification potential	mol H+eq	2.20E-02	4.04E-03	5.37E-04	7.00E-04	1.71E-03	1.51E-02	3.75E-07	5.03E-07
Eutrophication potential (freshwater aquatic)	kg Peq	4.62E-03	2.01E-04	2.42E-07	2.33E-05	6.18E-07	4.39E-03	5.46E-10	2.23E-08
Photochemical ozone formation potential	kg NMVOCeq	1.20E-02	2.45E-03	3.57E-04	4.34E-04	1.23E-03	7.52E-03	3.54E-07	6.16E-07
Ozone depletion potential	kg CFC-11eq	4.95E-07	1.01E-07	8.60E-09	3.77E-09	1.39E-08	3.67E-07	1.99E-11	7.77E-12
Abiotic depletion potential	kg Sbeq	6.66E-05	8.64E-06	1.01E-08	4.33E-08	2.24E-08	5.79E-05	2.59E-11	2.37E-11



INDICATORS DESCRIBING RESOURCE USE

			PRODUCT STAGE			MOUNTING STAGE	USE STAGE III END OF LIFE STAGE		
	UNIT	TOTAL	RAW MATERIALS	TRANSPORTATION	MANUFACTURING	DISTRIBUTION	TIRE IN USE	TIRE END OF LIFE TRANSPORTATION	TIRE END OF LIFE TREATMENT
Total use of RENEWABLE primary energy	MI	1.69E+01	4.83E-01	9.14E-04	1.01E-01	1.47E-03	1.63E+01	2.15E-06	1.64E-05
Total use of NON-RENEWABLE primary energy	MJ	1.05E+02	1.68E+01	7.06E-01	1.54E+00	1.15E+00	8.45E+01	1.63E-03	7.61E-04
Use of fresh water resources	m³	5.73E-01	3.46E-02	1.70E-04	7.98E-03	2.45E-04	5.30E-01	4.33E-07	1.00E-06













INDICATORS DESCRIBING PARTICULATE EMISSIONS

	Unit per FU/DU	TOTAL
Particulate matter (PM10)	kg	8.09E-04
Particulate matter (PM2.5)	kg	2.49E-04



indicators describing waste and resource recovery

	Unit per FU/DU	TOTAL	
Tire end-of-life treatment	kg	2.21E-01	
Components for reuse	kg	0.00E+00	
Materials for recycling	kg	1.17E-01	
Materials for energy recovery	kg	8.43E-02	
Exported energy (materials for energy recovery)	МЈ	2.55E+00	













Environmental performance



EPD PROCESS	CERTIFICATION	CONTACT	LCA AUTHOR	PROGRAMME OPERATOR	
EPD® THE INTERNATIONAL EPD® SYSTEM	B U R E A U VERITAS	MICHELIN	MICHELIN	EPD® THE INTERNATIONAL EPD* SYSTEM	
- Product category rules (PCR): Tires - UL PCR Tires: UL 10006 version 3.04 (November 2017) - PCR review was conducted by: The Technical Committee of the International EPD® System. The PCR review panel may be contacted via info@environdec.com Independent verification of the declaration and data, according to ISO 14025:2010 □ EPD® Process Certification (internal) □ EPD® Verification (external)	- Third party verifier: Damien PRUNEL, LCA & Ecodesign consultant LCIE BUREAU VERITAS 33, Avenue du Général Leclerc 92260 Fontenay aux Roses - FRANCE damien.prunel@bureauveritas.com - Accredited by: Recognized individual verifiers, approved by the International EPD® System.	Manufacture Française des Pneumatiques MICHELIN 23, Place des Carmes Dechaux 63040 Clermont-Ferrand Cedex 09 FRANCE For additional information related to the activities of the Michelin Group: www.michelin.com In regards to this environmental declaration, please contact: Nicolas Beaumont, Sustainable Development and Mobility department, nicolas.beaumont@michelin.com	Vincent Debost vincent.debost@michelin.com	EPD® International AB info@environdec.com The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com	



