

What Is Tire Rolling Resistance? - Part 3: Changes To Expect When Switching From Worn-Out To New Tires



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New Tires Generate More Rolling Resistance Than Worn Tires

It's been observed that rolling resistance drops by about 20%, as a tread wears from its original molded depth to worn. While this reduction in rolling resistance over time is subtle, a switch from worn tires to a new set increase rolling resistance by a noticeable 20%. The automotive industry estimates a 10% increase in tire rolling resistance equals a 1% to 2% decrease in vehicle fuel efficiency. So, drivers should expect a 2% to 4% decrease in mpg after installing new tires.

New Tires Travel Farther per Revolution Than Worn Tires

Vehicle odometers calculate distance based on a tire's revolutions per mile. Many tires are molded with tread depths of 10/32" to 12/32". As a tire wears, it loses diameter and revolutions per mile increase. As a result, the odometer's accuracy is affected adversely.

To determine the amount of error, Tire Rack drove a 2008 BMW 328Ci on a set of new 205/55R16 tires, and later, on another set of the same tires shaved to a worn-out depth of 2/32". GPS was used to measure a 100-mile distance, traveled in dry conditions at an average speed of 70 mph. The number of miles as indicated by the odometer was then compared to the GPS receiver and highway mile markers. After 100 miles, the vehicle equipped with new 12/32" tires, registered 99.4 miles, while the vehicle equipped with tires shaved to 2/32," indicated 101 miles. As expected, test results showed that an odometer will overstate mileage by about 1.5% on a vehicle equipped with worn-out tires.

Not All Tire Dimensions are Created Equal

To complicate things further; tires branded as identically sized may differ slightly per manufacturer and tire line. Tire Rack has seen the overall diameter of a tire vary by 2/10" from the smallest to the largest. To highlight how this factor matters, O.E. tires were compared with replacement tires in the 185/65R15 size used on the 2008 Toyota Prius. As previously demonstrated, fewer revolutions per mile equaled a greater reported distance. In calculating this slight difference in size on a vehicle's odometer, the Yokohama AVID TRZ was shown to travel .6% farther than the Goodyear Integrity, while the General Altimax RT traveled 1.4% further.

	Diameter	Tread Depth	Tire RPM*
Goodyear Integrity (O.E.)	24.4"	10/32"	855
Yokohama AVID TRZ	24.4"	11/32"	850
General Altimax RT	24.5"	11/32"	843

*Tire revolutions per mile

How do EV Tires Rate in Comparison?

When comparing new and worn EV tires in contrast to ICE (internal combustion engine) tires - vehicle efficiency is the primary factor contributing to how much impact a change in rolling resistance will have. As ICEs are inherently more inefficient, changes in rolling resistance have a much smaller impact on their MPG. Conversely, EVs are significantly more efficient, so an equivalent change in rolling resistance has a much larger impact on range. For instance, a 10% drop in EV range has been observed, versus a 2-4% drop in mpg for ICE vehicles, when switching from worn-out tires to a new set of the same tires.

Conclusion

While the individual differences alone may seem insignificant, when added together, results demonstrate that there is a perceptible difference in mpg or range from new to used, even if the tires and all driving conditions are identical. That said, the tire's primary objective is to deliver driving safety and security on the road and arguably, the safest tire is a new tire!

The key takeaway: Mileage (or range!) may vary.

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