

Nitrogen in Tires: The Benefits and Challenges

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When you're cruising along in your vehicle every day, it's what's inside your tires that's carrying you — not the tires themselves. Think of your tires as mere vessels for whatever gas happens to be inflating them, be it the most common form, air, or a less common but increasingly popular substance, high-purity (93 to 95 percent) nitrogen.

Standard compressed air from the gas station or auto repair shop is no longer the be-all and end-all for tire inflation. Race car and airplane tires aren't the only tires regularly filled with high-purity nitrogen anymore, which means you have options when it comes to the type of tires you buy and what you fill them with.

Read on to see why nitrogen-filled tires could help you maximize tire air pressure, reduce tire corrosion and extend tire life.

Nitrogen Versus Regular Air

Knowing the science behind both nitrogen and air from a compressor will help you better understand why nitrogen can be the superior option when it comes to tire inflation.

Typical passenger vehicle tires are usually inflated with air — this air is roughly 78 percent nitrogen (N₂), 21 percent oxygen (O₂) and 1 percent miscellaneous gases. In fact, these percentages are the same as the air we breathe.

High-purity nitrogen is an inert gas that doesn't support moisture, which means it doesn't carry water molecules like normal air. Nitrogen won't have negative effects on metal components, such as the wheel surfaces inside your tire or Tire Pressure Monitoring Systems installed on many vehicles these days. Also, nitrogen molecules are four times larger than oxygen molecules, so they have a much harder time escaping from the microscopic crevices in your tires. These properties alone help make nitrogen an excellent alternative to compressed air for tire inflation.



Nitrogen Extends Tire Life and Prevents Wheel Corrosion

Now that you've been briefed on the science, it's clear why nitrogen can help extend your tire life and prevent wheel corrosion compared with standard compressed air. The key contributing factor? Oxygen.

Although oxygen is typically a good thing — it sustains life for trees, plants, humans and other living things — for nonliving things, it can be extremely destructive. Oxygen is a "fast" active gas that retains moisture, and moisture is never a good thing when it comes to rubber and metal. Oxygen leads to oxidation, a reaction that causes metal to rust and rubber to degrade.

The 21 percent oxygen that's present in compressed air will retain moisture within your tires, which can eventually cause rust, and premature tire aging. This moisture can cause rust anywhere metal is present, such as your tire's steel reinforcing belts and steel wheels, as well as the components within your Tire Pressure Monitoring System sensors. Moisture can also cause polymer and elastomer degradation anywhere rubber is present, such as your tires.

Your safest option for ideal inflation is high-purity nitrogen. It's a dry, oxygen-free gas that doesn't support moisture inside your tires, so it will never be the cause of rust, corrosion or premature tire aging.

Nitrogen Maximizes Tire Pressure

Most vehicles today come standard with some sort of tire pressure monitoring system — perhaps you've seen its warning light come on in the cold winter months when your tires are most susceptible to big swings in temperature.

Although nitrogen won't completely keep you from needing to add some pressure to your tires during the colder months, it will maximize your overall tire pressure in general. In fact, nitrogen-filled tires will remain at their recommended operating pressure far longer than standard air-filled tires. Nitrogen molecules are much larger than oxygen molecules, making it harder for them to escape through your rubber tire walls. If you have standard air-filled tires, which, again, contain 21 percent oxygen, your tires will lose one to three PSI (pounds per square inch) per month due to its tiny molecules permeating the rubber — that's three to four times faster than nitrogen.

If you take the time to fill your tires with high-purity nitrogen, your tires will retain their optimal air pressure for much longer, ultimately saving you headaches in the future.

How and Where to Fill Tires with Nitrogen

Okay, so you've decided to treat your tires to high-purity nitrogen and ditch standard air from the gas station compressor. How do you effectively empty the air of your tires to replace them with nitrogen without warping and destroying them? Where is nitrogen even available to fill tires?

You don't need to be an Indy car driver to gain access to a nitrogen generator and filling system. Many tire stores, repair shops and automotive dealerships in your area have the systems and service equipment providers necessary to purge air from your tires and replace it with nitrogen. The cost of filling tires with nitrogen can range from 3 to 10 dollars per tire, depending on tire size, tire pressure, and any labor charges and fees where you have it done.

Before you go through the process of adding nitrogen to your tires, it's important to make sure that service providers at the location you're visiting never use a vacuum to remove the existing oxygen — this could severely warp your tires, making them unsafe to drive on.

In order to fill your existing, inflated tires with nitrogen, they'll first need to be emptied of most of the air they're currently holding — down to 3 PSI. Nitrogen-filled tires are never 100 percent pure nitrogen, but most nitrogen service equipment providers recommend aiming for anywhere from 93 to 95 percent in purity for best results. It's pretty typical for your tires to go through multiple purge-fill cycles to achieve the desired nitrogen purity level.

Nitrogen Tires for Safer Driving and Cleaner Air

As if extended tire life, less tire corrosion and maximized air pressure weren't enough — you may want to consider nitrogen-filled tires for the environment and safety's sake.

Quickly permeating air makes for underinflated tires, and underinflated tires contribute to more than 8.5 million wasted gallons of gasoline every single day. Add that to the 250,000 automobile accidents every year that are caused by underinflated tires, and you have just a couple of other reasons why nitrogen filled tires might just be worth the short servicing time and small investment after all.

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