

TOYO TIRE TALK

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Technical Service Department Japan.
Technical tips and information that may
allow you to better serve your customers.



We would appreciate your input, please contact us.
Phone : 0081-72-7759009 , Fax : 0081-72-7759029

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Subject : Nitrogen Gas Inflation

Did you know nitrogen gas has been used to inflate tires for racing cars, industrial and off-the-road vehicles, as well as aircraft, for many years? Safety is the main reason for such usage, because nitrogen gas is inert and, therefore, non-flammable. Thus nitrogen does not support combustion, and thereby reduces the risk of fire in case of an accident.

The main characteristics of nitrogen are as follows :

- Colourless
- Odourless
- Tasteless
- Inert = Non-flammable



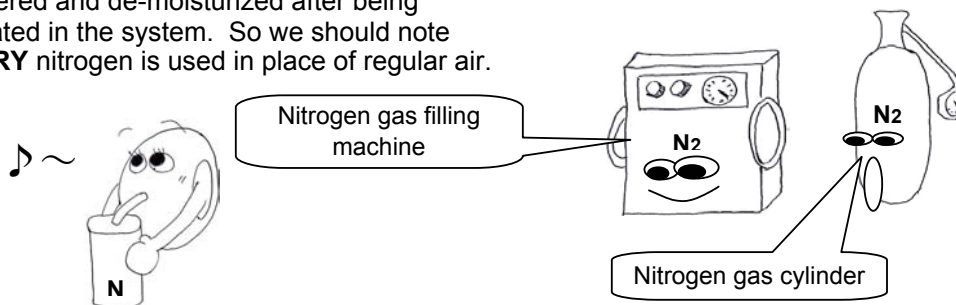
Nowadays, nitrogen gas is widely used in many countries not only in truck/bus tires, but also in passenger car tires. In this issue of TTT, we would like to examine the effect of nitrogen gas tire inflation.

Composition of Air

The table at right has the composition of air. As shown here, nitrogen is one of the main components of air - in fact it makes up almost 80% of air.

Nitrogen	78.09%
Oxygen	20.95%
Argon	0.93%
Others	0.04%

When nitrogen gas is used for tire inflation, it is filtered and de-moisturized after being generated in the system. So we should note that **DRY** nitrogen is used in place of regular air.

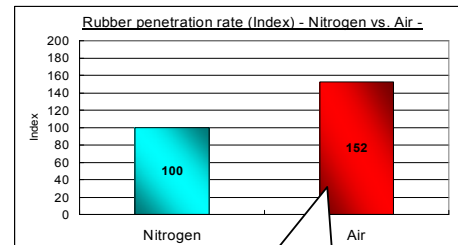
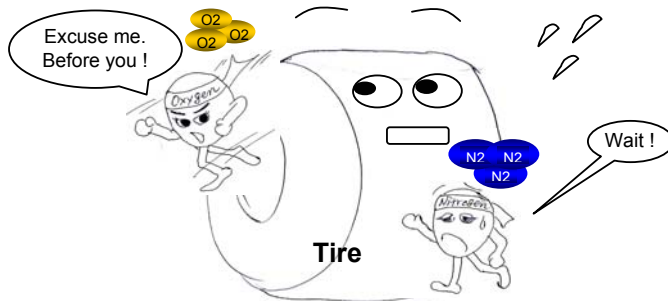


Effect of nitrogen gas use.

Various claims have been made about the effects of nitrogen gas inflation. We will look at them and examine the background. Please see the next page.

Better Fuel Consumption

Nitrogen gas is slower than air to migrate through the tire because of the larger molecular size of nitrogen (refer to the graph at right). This means nitrogen inflation pressure reduces at a much slower rate than regular air (some test results also indicate this). As a result, correct inflation pressure is maintained longer.



Air migrates easier through rubber than nitrogen gas.

It is generally stated that when the inflation pressure decreases 100kpa (15psi) from the recommended pressure, fuel consumption increases by 2%. (In the case of an 11R22.5 14PR tire.)

Improved Tire Life

If the maintenance frequency is the same, there is less pressure loss with nitrogen than with air - correct pressure can be maintained over a longer time period. This improved pressure maintenance will result in reduced tire deflection, and also less irregular wear. (The same result would be expected with air inflation if pressure maintenance is conducted frequently).

Improved Tire Endurance (Recapability), and Less Deterioration of Tire / Wheel

Since a tire with dry nitrogen gas does not contain water vapour or oxygen, the steel used in a tire resists rust or oxidization. The integrity of the innerliner and the steel cord in particular can be maintained for a longer time, resulting in improved durability and retreadability. Furthermore, less reduction in inflation pressure with nitrogen gas contributes to lower heat build-up in the tire.

No water vapour in dry nitrogen also results in the wheel having more resistance to rust developing inside, and the wheels durability is improved.

Improved Tire Running Stability

Using dry nitrogen makes it possible to maintain the tire contact area and shape, as there is less inflation pressure reduction and heat build-up is minimized.

Lower Noise and Improved Ride Comfort

This cannot be verified clearly with actual data, as our analysis shows very little difference between nitrogen gas and regular air.

On the other hand, there are some negative aspects to nitrogen gas inflation.

Cost : Nitrogen is more expensive than air.

Service : There are fewer servicing points available as compared with regular air.

Conclusion

The advantages of nitrogen gas inflation are derived mostly from its impermeability through rubber. This characteristic of nitrogen gas can keep the original inflation pressure for a longer time than air. In addition, the absence of oxygen and water (in the case of dry nitrogen) prevents the tire components, as well as the wheel, from oxidization and rust. Improved integrity of the steel and rubber materials will result in better retreadability. This can be a big benefit, especially for truck/bus tires.

At this point we have little factual data at hand to positively promote nitrogen gas inflation, but there are no negative aspects either, from the standpoint of tire performance.