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Tire Inflation Facts

Old myths about clean air needs and availabilities die hard, but here are some **truths**

- Wet air dramatically increases tire cord deterioration.
- The worst air source is probably the “25 cents for 60 seconds” service station stanchion (lots of use and little if any air quality control). That generates lots of trapped moisture that you are pumping forward into your tires where it has no choice but to oxidize your steel belts in an oxygen-rich set of on-going high-low temperature cycles.
- A seldom used, but dedicated portable compressor is probably next worst. It is less destructive only because it gets used less and traps less total moisture and airborne contaminants. It can be improved, but not unless you use a good to high quality coalescing and air drying filter system (usually half as much to nearly as expensive as the portable compressor was).
- Next, most auto tire service centers do not keep their air systems serviced nor do they know or care if their air is dry. Ask to see their chillers, coalescing filters, desiccant filters and see what they say/will allow you to see. Are they clean, serviced and dated?
- Truck tire service centers may be better, but not necessarily.
- Your on-board coach air system produces the driest, highest quality air (as long as you keep your air dryer(s) serviced). Installing an Air Chuck on the Governor
- Even better is to use a gas that does not entrain moisture (Nitrogen or Carbon Dioxide) for both the initial and subsequent fills. The atmospheric pressure air in the “just mounted” tire may be “dirty” to start with, but much of it is displaced before the pressure starts to build (rim seated) and then all of high pressure gas is subsequently of high purity and totally free of moisture.
- Compressed nitrogen requires more STORAGE volume than liquid Carbon Dioxide and thus the Power Tank option that off-roaders, powersports and race car crews use. From my experience, a CO2 tank will provide the “initial” fill for 8 to 10 coach tires and then continue to provide makeup air adjustments for well over a year before a $40 refill becomes necessary. The 27 Lb. (total weight) Power Tank foot print is less than 1 ft. by 1 ft.

Make it a habit to use only dry air (or gases) to inflate your tires. One can get away with less air quality on an automobile, but an intermittently used, heavy motorcoach pushes the limits of tire ratings much harder. From my experience, heavily loaded trailer tires are even more difficult to care for since the tire quality is lower and the tire design margins are even more challenged.

Myth: CO2 Leaks Out

CO2 does not behave any differently in automobile and truck tires than dry air or Nitrogen does. The “CO2 leaking” myth comes from the butyl rubber used in many bicycle inner tubes. CO2 in bicycle inner tubes behaves differently because the CO2 is soluble in the Butyl rubber used to make the tubes durable in the bicycle application. CO2 permeates the full thickness of the Butyl rubber, swells the rubber and the CO2 somewhat rapidly diffuses through the rubber. So the little CO2 cartridges that bicyclists carry to rapidly inflate their road repairs or just harden up their tires, will last only a few days before the tire is low in pressure. The rubber in DOT tires is not CO2 permeable.

Myth: The need for "filling three times"

When initially filling with Nitrogen or CO2, much (most?) of the original atmospheric air is swept or displaced from the tire before the bead rim catches and the tire starts to pressurize. To be conservative, let's say that 50 % of the

original atmospheric air (by volume) remains, however. Then from the gas laws, when the tire is fully inflated at 88 psig (6 atmospheres of pressure) less than one 12th of the volume (8%) may be comprised of original atmospheric air, with whatever moisture (relative humidity) the air actually contained that day.

If one takes a more realistic 10% of the original atmospheric air remaining when the bead catches and an endpoint of 100 psig (6.8 atmospheres), then less than one 68th of the volume (1.5%) is comprised of original atmospheric air. It's easy to see that a water-based bead lubricant “slathered” on (and into) a tire could easily contribute to more moisture being in a tire than the entrained moisture in the atmospheric air remaining in a tire if it has been initially filled with Nitrogen or CO2. I'm sure that's partly why Michelin advocates their water-less bead lubricant formula. Many of us use that for good reasons.

Final Thoughts

Most of the moisture in tires comes from “non-dryer” compressors concentrating the moisture entrained/existing in a standard atmosphere, as they compress the air to 6 or 8 atmospheres of pressure. In an industrial plant, the moisture coming out of a dryer (chiller) downstream of a compressor on a warm summer day is a steady flow of water. That's a different scale I know, but it will make you a believer in the moisture that needs to be extracted from compressed air.

BTW, Nitrogen is less costly to separate from air, but is more bulky to store (in gaseous form), thus it works for tire dealers but is less practical to carry on a vehicle. Liquid CO2 is more costly to produce but is highly convenient to store in liquid form in a small 10 or 15 lb. size cylinder on a vehicle. Thus the Power Tank popularity.

by Neal Pillsbury