How a Nitrogen System Works

Four Types of Nitrogen Systems

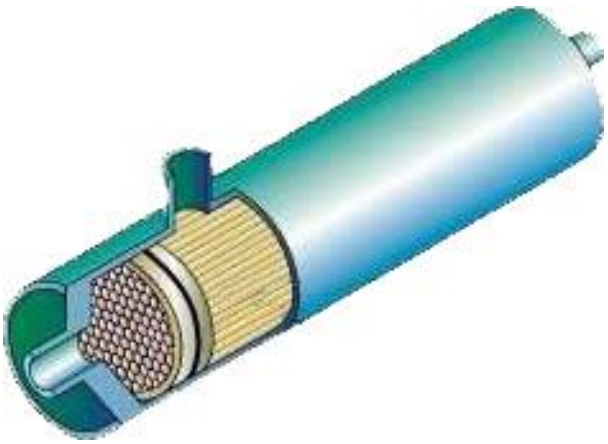
There are four types of nitrogen inflation systems available today; cylinder, membrane, pressure swing adsorption (PSA), and Dewars. The system you choose depends on the size of your business, the number and type of your customers and how committed you are to offering nitrogen to your customers.

Cylinder / Bottle

A nitrogen cylinder system uses pressurized nitrogen cylinders, available from gas supply companies such as Praxair. The cylinder is mounted on an inflation cart that contains an automatic inflator which is usually able to inflate at least 4 tires simultaneously. The inflator will channel nitrogen gas directly from the cylinder into the tires.

If you are only going to fill 1 or 2 cars a day, or are not sold on nitrogen, we recommend you start with a cylinder system. This still requires an investment but it should be under $2,000. You will need to purchase an inflation cart, a cylinder with a regulator, and marketing materials. It is best to keep an extra cylinder on hand so that you don't run out of nitrogen in the middle of filling a customer's tires.

The inflator in most carts also works with a generator so your investment now prepares you for purchasing a generator when your demand increases. If you are filling 3 or more cars a day the cost of the cylinders will make it more economical to invest in a generator.



Membrane

Membrane systems work because nitrogen is a slightly larger molecule than the other components of air. These systems use a semi-permeable membrane that consists of a densely packed bundle of porous tubes. The pores in the tubes are of a size that allows all gases to escape except nitrogen. Compressed air is moved through the membrane and the non-nitrogen gases escape and are vented, producing a constant flow of purified nitrogen.

Membrane systems are by far the most common type in use today for nitrogen tire inflation. They are the best system available if you want low maintenance and plan to service more than 3 cars per day with a nitrogen purity between 95% and 98%. That's why they are the perfect solution for the tire industry.

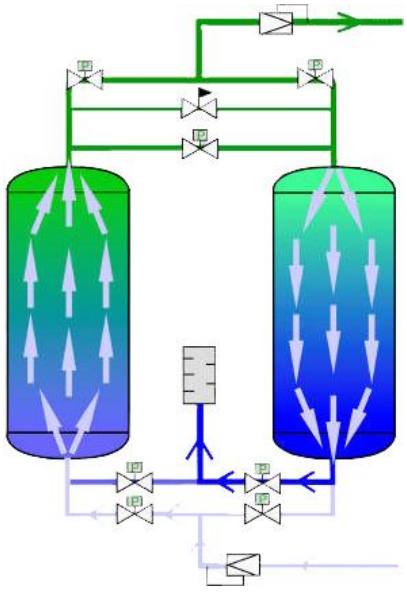
How a Nitrogen System Works

All membranes are not created equal however. Decide which membrane system is right for you based on your climate, compressor and market research.

- Some will work up to 25 years, others much less
- Some can be damaged by water vapor while others can be used as an air dryer
- Some are susceptible to hydrocarbons, some are not
- Some take 2 parts air to make 1 part nitrogen, some can be has high as 4 parts air to make 1 part nitrogen

Pressure Swing Adsorption

Pressure swing adsorption or PSA works because gases under pressure tend to adhere, or adsorb, to the surfaces of certain solids. Different solids will adsorb different gases preferentially. A PSA system consists of two "towers" each containing a carbon molecular sieve. Pressurized air is forced into one of the towers where the carbon sieve adsorbs the non-nitrogen components of air, producing a stream of purified nitrogen. After the carbon sieve is saturated, the pressurized air is diverted to the second tower and the first tower is depressurized which releases the adsorbed gases. This is repeated every few minutes to produce a pulsing flow of nitrogen.



PSA is a technology that has been popular in industrial applications for years. However, it isn't a great fit for automotive applications.

The carbon sieve needs to be packed in a very specific manner to eliminate channeling, dusting, and compaction. These are all factors that can decrease the performance of the system, lowering its ability to produce nitrogen.

John Lucidi, Product Sales Manager of Nitrogen Inflation at Parker Hannifin, states: "Parker Hannifin is one of the world's leading suppliers of PSA nitrogen generation systems. However, due to the regular maintenance requirements associated with PSA systems, we didn't feel that it was a viable solution for the automotive market. Membranes offer a more hands-off, trouble free installation without the regular supervision that PSA systems require."

Ultimately, choosing the system for your shop depends on your needs. Be sure to work with your equipment provider to ensure the system you choose will give you the best functionality and value.