

The Importance of Sizing Your Compressed Air Filters

So Why Do I Need to Size My Compressed Air Filters?

For starters, what is a compressed air filter? Why do you need one in place on your compressed air system? The answer is quite simple. The air around us is dirty, and compressing it groups all those floating particles together. Removing these particles is essential for the health of your system.

Your filters are designed to be placed in the air stream to collect particulates and moisture. They are ancillary compressed air equipment that removes aerosols, particulates, and vapors. Aerosols are small liquid droplets, particulates are tiny solid particles (like dust, dirt, and rust), and vapors are liquids converted to gas.

Compressed air filters clean compressed air, crazy right? They typically come in three different styles of filtration: General Purpose, Coalescing, and Activated Carbon. Each variation removes different types of contaminants in the air. General Purpose filters are for solid particulates, coalescing removes oil aerosols and water vapor, and the activated carbon removes oil vapor and odor.

Compressed Air Is Dirty

So just how much stuff is in compressed air? Well, when you take one cubic foot of compressed air, it can contain millions of dirt particles, considerable amounts of water and oil, and even heavy metals like lead, cadmium, and mercury. Not filtering out these contaminants can cause long-term damage to components like valves and cylinders.

With this conglomeration of particles and aerosols mixed in the air, you need to remove it before it contaminates valves and seals and reduces the lifespan of these components. If you want to prolong or maintain your products' lifespan, you have to size your filters properly. There are no if's, and's, or but's about it.

Sizing your compressed air filters is no guessing matter but rather a calculated procedure. Making sure you select the correct air filter for your industry or government

standards is essential. Without ensuring compliance, you may risk whether or not your end product will meet your set criteria and if you can even sell it.

How Do I Find My Compressed Air Filter Size?

The size of your compressed air filter is determined by the size and type of particles that are being removed. You want to be able to remove the particles in descending size so that you do not clog up the filter elements. The bigger particles will get caught as the air passes through and smaller and smaller particles make it through.

There are a few things you need to consider when you are looking to buy an air filter. These will be the guiding principles for how you select your compressed air filters.

Extraction Efficiency

Extraction Efficiency is the percentage of dust that is removed or extracted from the air. A filter that is sized to 1 micron, would have a 99.8% extraction efficiency. This means .2% of the particles that size pass through the filter.

Flow Rate

Flow rate is the amount of air that passes through the filter in a given period of time, usually measured as Cubic Feet per Minute (CFM). Your filter size has to match your flow rate, subsequently, if you have a larger flow you are going to need larger compressed air filters. If your flow rate is either too much or too little for your filter it can cause unwanted pressure spikes and drops.

Flow Resistance/ Dust Capacity

Flow resistance is alluding to the buildup of dust and debris in your filter over time. As this builds up more and more dust will accumulate and can cause pressure drops and restrict the flow of your compressed air. Stay on top of this by routinely replacing your filter elements and preventing extreme build up.

These are the main concerns you should have when determining your filtration sizing, beyond that there really isn't much else to keep in mind aside from pressure drops, and all that takes is a simple calculation.

Calculate Your Air Filter Pressure Drop

Firstly, we need to go over what all of the individual variables are so you can understand the why behind the formula and make it just a little bit easier to calculate.

- P= Pressure drop (psid)
- q= Rated flow (SCFM) at standardized conditions (100 psig & 100 °F)
- q1= New actual flow (SCFM)

- P1= actual operating pressure absolute (psia = psig + 14.7)
- T1= actual operating temperature. Measured in Kelvin ($^{\circ}\text{K} = ^{\circ}\text{F} + 459.67$ often rounded up to 460)

Gather your information and plug it in to find your exact pressure drop with your current conditions. Make sure you are getting the best filter for your system.

Stay On Top Of Your Filters

Your filter elements aren't going to last forever, especially if they are doing their job. If you let them go too long the build-up will be out of control and become a hindrance to your system. Replacing your elements is a simple yet easily forgettable task.

Staying on top of your filters requires you having the correct elements to replace yours and having them on hand when you need to switch them out. Always keep at least one spare element on hand, to avoid getting caught without a filter. Preparation prevents unwanted downtime and ensures you can keep production up and running.

Now don't go running off thinking you can get away without changing or replacing your filter elements. Compressed air filters are subject to the ISO 8573 standard; the acceptable quantity of solid particles, water, and oil in the air. General information on pollutants present in compressed air, is provided by these filters.

A Few Things Before You Go

Sizing your compressed air filters requires knowing a bit about your compressed air system and how it operates. Odds are you will have the information you need on hand or be able to find it easily.

Filter elements are rated by size and should be sized according to flow. If you know your filter size and the style of element you need, you're all set. Depending on the degree of filtration your filter element can range in size from 25 Microns to .01 Microns.

So, as long as you make sure your filters are in the right order for size and filtration style to make sure you are not having pressure disparities or restricted air flow. You want your contaminants removed and your air to keep moving, nothing more and nothing less. Too little flow will prevent proper filtration, and we already know what too much can do.

Follow the key points to sizing your filters, account for any abnormalities or variations that could occur and change your air flow. You don't need the specifics, but you do need to have an understanding of the airflow requirements for your compressed air system.