

“How to select a portable vacuum collection system for commercial air duct cleaning”

Topics include:

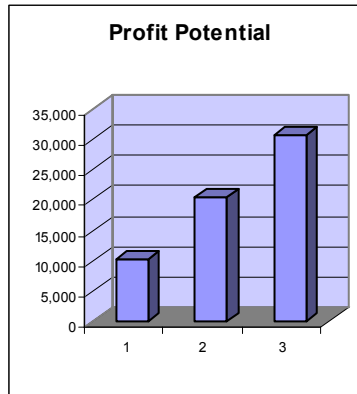
- Why is this important?
- Productivity equals profits.
- “I’ll just use my residential unit, it’s good enough.”
- Understanding fan performance.
- “Free air” versus “Measured cfm”
- Variable frequency drive.
- Filtration.
- Operating cost.
- The perfect collector for commercial air duct cleaning.
- Dare to compare.
- Why is this important again?



Blueprint for Success

Why is this important?

Selecting a portable vacuum collection system for your commercial air duct cleaning business can have a major impact on your productivity and your operating costs. Two key factors in determining your success!



Productivity equals profit!

Approximately 95% of the cost of air duct cleaning is your labor cost! Studies have shown that just a 5% increase in productivity can increase your profits by 10-15%. Increasing productivity will have the biggest positive impact on your business because:

- Higher productivity means that you can complete projects faster which increases your profit on each project.
- Higher productivity means you will have more time to do additional revenue producing projects.
- Higher productivity means that you will have a competitive advantage when bidding against your competitors because you can complete the project in less time. Your bid will be less than your competitors so you should win more projects.

The chart shows the additional profit potential of a 5% increase in productivity with one (1) two-person crew, (2) two-person crews and (3) two-person crews.

A 5% improvement in productivity can increase your profits by 10-15%. The right portable vacuum collection system can provide that 5% improvement in productivity.

“I’ll just use my residential unit, it’s good enough”

It is good enough if you want to isolate and clean short runs because they don’t have the performance (suction) needed to do the larger and longer runs found on commercial projects. It is good enough if you want to stop several times a day to cleanout the unit and change pre-filters because of the small collection capacity of residential units. It is good enough if you are satisfied with low productivity.

Residential units are

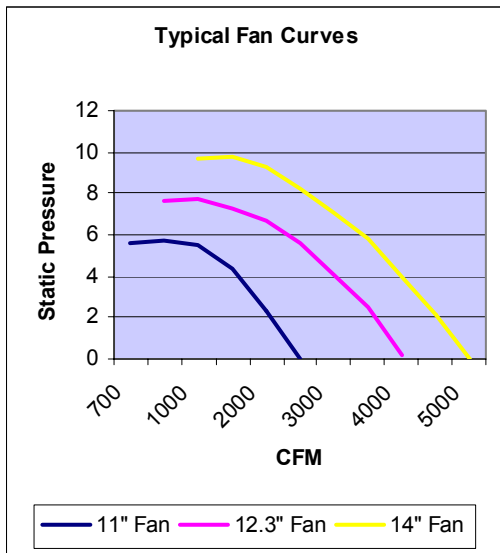
designed for residential air duct cleaning. They are smaller for the portability needed to move around the house. They have just enough performance (suction) and collection capacity to handle the normal amount of dirt and debris found in residential systems.

Using a residential collector for commercial work is like digging a ditch with a kids shovel instead of an adult shovel. You can do it but it will take a lot more time!

Understanding fan performance

Most electric portable units use a backward inclined airfoil fan. In the typical fan curve chart you will see the fan curves of three fans from one of the fan manufacturers. A fan curve is a measurement of fan performance in a lab setting. It shows the relationship between cfm and static pressure. As you travel down the fan curve you can see that the static pressure decreases and the cfm increases. You can also see that the larger the fan diameter the higher the cfm and static pressure.

How to select a vacuum collection system for commercial



All of these fans have a maximum rpm of approximately 3,500 rpm. Most electric motors used in electric portable collectors also have a maximum rpm of approximately 3,500 rpm. These fans work well with these motors. Collectors designed for commercial projects have the following combinations of fans and motors:

- Two 1.5 hp motors with two 11" fans
- Two 1.5 hp motors with two 12.3" fan and variable frequency drive.
- One 2 hp motor with 14" fan and variable frequency drive.
- One 5 hp motor with 14" fan and variable frequency drive.

These different combinations coupled with the type of filtration system will result in different

levels of performance.

“Free air” verses “Measured cfm”

“Free air” is a term some manufacturers use to describe the performance of the unit. This is just not true. If you look at the fan curve chart again the:

- 11" diameter fan is typically called a 2,500 cfm free air fan,
- 12.3" fan is typically called a 3,500 cfm free air fan
- 14" fan is typically called a 5,000 cfm free air fan.

These numbers however do not translate into the performance of the unit because that fan in the fan curve is not in a cabinet and no filters are in place. A better number to look at is “Measured cfm.”

Measured cfm is a measurement of the cfm (typically at the inlet) of the unit when the fan is in a cabinet with all the filters in place.

Don't settle for a “free air” number that really doesn't mean much, ask the collector manufacturer for the “measured cfm” number.

Variable frequency drive

Some manufactures offer variable frequency drive (vfd) to get more performance out of the

collector. Vfd allows the motor/fan to increase rpm as the collector collects dirt and debris.

As a collector without vfd collects dirt, that dirt is captured by the pre-filters. As the pre-filters get loaded with dirt, air is restricted. This restricted or lower air flow causes the motor/fan rpm to slow down. Under these conditions the fan will move only as much air as it can receive through the filters. The performance (suction) of units without vfd goes down pretty rapidly.

Units with vfd are able to regain this lost performance (suction) by increasing the rpm of the motor/fan as the collector collects the dirt. The vfd is programmed to maintain a certain static pressure level or motor amp draw.

Large fan size and vfd together create a powerful team that generates and maintains much higher levels of suction throughout the cleaning process.

How to select a vacuum collection system for commercial air duct cleaning

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Filtration

The goal of filtration systems is to:

- Protect the environment.
- Collect and hold the dirt.
- Provide the least amount of air flow resistance possible.

There are two types of filtration on vacuum collection systems: pre-filters and final HEPA filters. Together they collect and contain the dirt, debris and contamination that the unit collects.

Pre-filters:

There are different types of pre-filters. Units with three stages of filtration have two pre-filters and one HEPA filter. The two pre-filters include a screen or a cloth bag as the first stage and a pleated bag filter as the second stage.

If you have collected a pound of dirt, most of that that pound will be captured by the first stage. This first stage typically gets loaded quite rapidly and effectively chokes off the air flow to the other stages which reduces motor fan rpm and performance (suction).

Other units have two stages of filtration. The pre-filters are flow through bags and then the final HEPA filter. As these units collect the pound of dirt the large particles fall through the flow through bags

minimizing the air flow restriction which minimizes performance (suction) loss.

Flow through sock type pre-filters offer less air resistance resulting in better performance (suction).

HEPA Filters

Most people think that all HEPA filters are pretty much the same but not all HEPA filters are created equal.

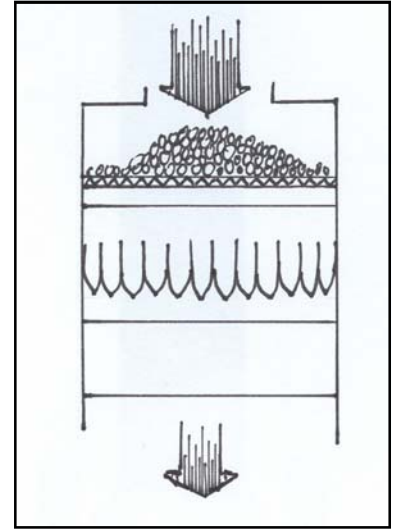
The most common HEPA filters used in portable vacuum collection systems are:

1. 24" x 24" x 6".
2. 24" x 24" x 12".
3. 24" x 24" x 12" high capacity.

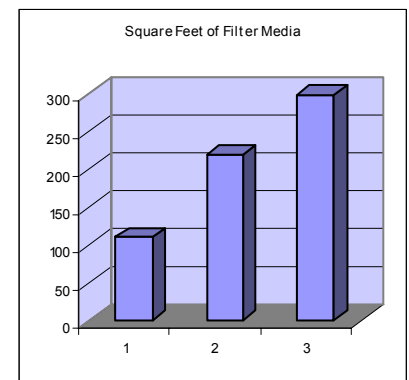
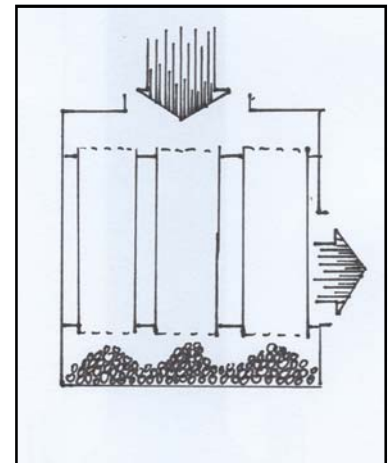
The smaller HEPA filter has the least square feet of filter media (least dirt holding capacity) and the highest air resistance while the high capacity HEPA has the greatest square feet of filter media (most dirt holding capacity) and the least amount of air resistance.

For commercial air duct cleaning the high capacity HEPA filters are best. They hold the most dirt so it will last longer reducing your operating cost and they have the least amount of air restriction which helps to maximize performance (suction).

Three stage filtration pre-filters diagram



Flow through sock type pre-filters diagram



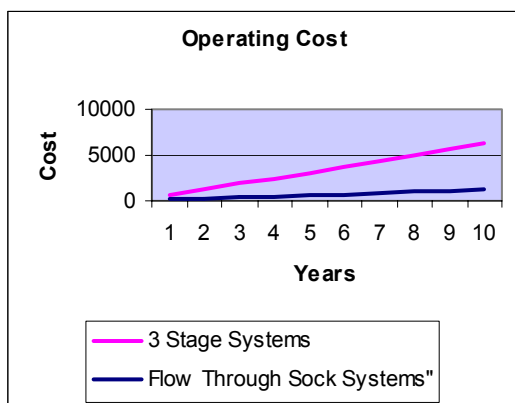
Operating cost

The biggest expense of operating a portable vacuum collection system is the cost to replace the pre-filters and final HEPA filters. Individually these items may not seem like much plus you probably build these expenses into your project cost when bidding. Anything extra you add to your bid does make you less competitive.

The filter replacement cost of vacuum collection systems with the three stage filtration systems can be anywhere from \$500.00 to \$1,000.00 per year depending on usage. Over a 10-year life span which is normal for the higher quality collectors this can mean \$5,000 to \$10,000 dollars of filter replacement cost.

The filter replacement cost of vacuum collection systems with flow through cleanable pre-filters and high capacity HEPA filters can be as low as \$730

How to select a vacuum collection system for commercial air duct cleaning



for 10 years. That's a significant difference.

Operating expenses are typically overlooked when considering a collector purchase but it should be an important consideration considering its financial impact.

The perfect collector for commercial air duct cleaning!

A perfect collector for commercial air duct cleaning would deliver:

- Highest performance (suction) so you can isolate and clean large and long duct runs on each hook-up. This unit would use the largest diameter fan and variable frequency drive.
- Large collection capacity so you do not have to stop working to clean out the unit to regain lost suction.
- Operate on 110 volt circuits so you don't have to deal with 220 volt pigtailed and electricians.
- Cleanable pre-filters to minimize operating cost.
- Large pre-filter surface area to minimize the air flow restrictions as you collect dirt/debris.
- Long lasting "high capacity" HEPA filters to minimize operating cost and minimize air flow restrictions.
- Portability to easily

move around on commercial projects.

- Reasonable price that reflects the features and benefits the unit offers.

The perfect collector for commercial air duct cleaning needs to have all of these features. It would do no good for example for a collector to have great suction without good collection capacity. Without the good collection capacity you can't make use of the great suction capability

Dare to compare:

The best way to be sure that you are selecting the best portable vacuum collection system for your commercial air duct cleaning business is to compare different systems side by side. A side by side comparison will tell you a lot about the two units!

Vac Systems International offer a "Dare to Compare" program where we will do a side by side comparison for you. Just tell us what system you are thinking about and we will send you a side by side comparison with the appropriate VSI system.

Why is this important again?

Selecting a portable vacuum collection system for your commercial air duct cleaning business can have a major impact on your productivity and your operating costs, which leads to increased revenues and profits.

Thank you for the time you spent reviewing the Blueprint for Success— How to select a portable vacuum collection system for commercial duct cleaning. We hope it has been useful. Our goal is to help you succeed. If you have any questions about this publication or any aspect of air duct cleaning please contact:

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“Blueprint for Success” is a series of articles and publications developed by Vac Systems International to help you succeed as an air duct cleaning contractor. In addition to this publication they include:

- Residential Planning Guide.
- Commercial Planning Guide.
- Selecting the Right Cleaning Tool for the Job
- How to Select a Portable Vacuum Collection System for Residential Air Duct Cleaning Guide.
- “Profit follows productivity” article.
- “The air duct cleaning opportunity for HVAC Contractors” article.