



4550 Jackson Street Denver, CO 80216
FAX (303) 355-3516 / (800) 447-8326
Internet - <http://www.steamway.com>

1996 Technical Bulletins

For More Information, Contact Steam Way International at (303) 355-3566

TB9647 - November 1996

TRUCK MOUNT VACUUM SYSTEMS

3.0? 4.0? 3.5? 4.5? 5.0? 3.7? 4.7? 1000.3?

Confused by the numbers game? Don't feel alone. When it comes to evaluating the different vacuum recovery systems on truck mounts, many times machine specifications are more confusing than helpful when it comes to the capacity of the vacuum system. Before we come down too hard on the marketing departments within the industry though, it may well be the fault of people who are obsessed with number games as to why all these numbers have come into existence. Understanding vacuum recovery systems on truck mounts is an essential tool in evaluating which truck mount is best for your business, and many of our industry's most fervently held "beliefs" about vacuum blowers are just plain off-base. So when evaluating vacuum blowers, we're going to start with the basics. Once you understand the basics, you'll begin to see why one truck mount with a number 3 blower can have a very different vacuum capacity than another truck mount with a number 3 blower. That's why the marketing folks have done what they have, because which number 3 blower you use and how it is engineered and used within the different truck mounts can have a huge impact.

When engineers evaluate our vacuum recovery systems, the first thing we have to do is get our terminology on the same page with them. Positive displacement vacuum blowers are what are almost always used in truck mounts for vacuum recovery. Most cleaners call them blowers. If you think about it though, they are not being used as blowers in our applications, they are being used as vacuum pumps. Whether you or I call them blowers or pumps may not really make a difference, just as long as we are all using the same terminology.

Vacuum systems for truck mount units are governed by four major variables: 1) airflow; 2) air lift; 3) the speed the air is flowing; and 4) the friction loss of the air against the vacuum hose. How well a vacuum system performs is a combination of these four factors. So we'll start by gaining a better understanding of just what these terms really mean.

DEFINITIONS

Airflow: The volume of air measured in a given time. Measured in C.F.M. (cubic feet per minute)

Vacuum Lift: Measurement of vacuum force. Measured in inches of mercury or water.

Air Velocity: The speed the air is moving. Measured in F.P.M. (feet per minute)

Friction: The energy lost where the air is in contact with the wall material of the vacuum hose.

AIRFLOW AND LIFT

The best vacuum recovery systems will have a balance of airflow and lift. These two factors have an inverse relationship, when one goes up the other goes down. Many cleaners will only look at airflow numbers (C.F.M.) while others only talk mostly about lift (inches of mercury/water). If you seal off the vacuum hose of a truck mounted vacuum recovery system, your lift reading on your vacuum gauge would be the maximum and your airflow would be zero. In this situation nothing would move in the hose. By removing the seal the lift value would decrease and the airflow would increase. In this situation water would now be carried down the vacuum hose. Finding the best combination of airflow and lift is what defines how well a vacuum system for truck-mounted units performs.

AIR SPEED

The velocity of air through the vacuum hose is usually measured in feet per minute. You need sufficient air speed to capture water and solids (dirt, etc.) at the wand intake and keep this recovered water suspended in the vacuum hose. If you keep airflow (C.F.M.) constant, the larger the inside diameter of the vacuum hose is, the slower the air speed becomes.

CAPACITY LOSSES DUE TO FRICTION

The vacuum pump is effected by many components in the vacuum system. For example, most truck mount manufacturers provide filters to protect the vacuum pump from solids being sucked into the vacuum pump's impellers. If this filter is not of sufficient size it will create restriction (friction) for the air flow. The plumbing (hoses and tubing) on the vacuum system creates friction where the air contacts the wall of the tubing or hose. Also if the plumbing has many turns (elbows) this produces more friction and more vacuum loss. Friction loss has a direct relationship with the velocity of the air. The faster the air is moving in a vacuum hose, the higher the friction loss. If the speed of the air is constant then a 2 inch vacuum hose has less friction loss than a 1.5 inch vacuum hose. The farther away from the machine you use 2" diameter hose, the better.

GENERAL IDEAS

All of factors we have discussed so far have to be combined into a vacuum recovery system that works in the application that it is designed for. For carpet cleaning, most cleaners are looking for a system that will recover the cleaning solutions that a cleaner will put down, and any solid or gaseous (soil, etc.) debris that might be in the carpet.

Many cleaners look only at airflow numbers when comparing vacuum pumps. This can lead to many wrong assumptions. A 350 C.F.M. vacuum pump might be justified in some applications but not prudent in others. For example if a cleaner does mostly residential work a vacuum pump of 250 C.F.M. might provide the best choice. The difference in drying time between the 350 C.F.M. and the 250 C.F.M. could be minimal. The price difference between the units can be substantial. Additionally a vacuum pump that can produce 350 C.F.M. will need more horsepower to run it. This means a larger engine, again adding more cost, because the larger engine costs more and will need more fuel. However, if a cleaner uses a dual wand system, or has many large commercial jobs with longer distances away from the machine, then the larger vacuum pump would be the right choice.

Practical Application

How does the professional cleaner or restorer put all of this information to use? One of the general rules used in the past was that more CFM was good for carpet cleaning and more lift was good for water damage restoration. This is generally true, although since most carpet cleaners do both, you may want not to abandon the balance that can be created to get a particularly high rating on one side or the other. Within our industry, there are vacuum blowers that are all identified as being size 4 blowers, yet some produce more CFM, some produce more lift, and some try to achieve a balance. Yet all of them are still called number 4 blowers. Then when you look at how these blowers are engineered into the truck mount itself, how many rpm's they are run at by the power source, and whether they are belt driven or direct driven, all make an important impact.

What do you as the professional cleaner really need to know? First, more is not necessarily better. It definitely costs more, and eventually you may reach a point of diminishing returns. This is definitely the case with number 5 blowers. Most people who want a number 5 blower profess it is because they want to do dual wand cleaning at long distances away from the equipment. Yet dual wand cleaning is just as much a function as to how the two cleaning technicians work together to make sure both wands have contact with the carpet during cleaning, as it is what size the blower is. Most manufacturers no longer use number 5 blowers because for 99.8% of the ways truck mounts are used in our industry, a number 5 blower is overkill. Very few cleaners end up doing very much dual wand cleaning, so make sure you understand how and when to dual wand before you buy a machine just because it claims to be dual wand compatible. Secondly, understand the vacuum recovery system as a whole rather just the blower. How is it plumbed into the machine? What is its power source? Is it belt driven or direct driven? How many rpm's is the engine turning it? Is the engine designed to last a long time at that rpm speed? Thirdly, understand where the cfm is being measured at. We specify the cfm of our systems at an average carpet cleaning lift under real world conditions, we do not just seal off the vacuum and see how berserk the gauge goes. Almost all truck mount vacuum blowers are equipped with vacuum relief pop-off valves to purposefully keep the blower from operating at too high of a lift level. Finally, make sure your truck mount salesperson can properly explain how the vacuum system works within a particular truck mount you may be evaluating. Knowing the number of the blower is just the beginning.

About the author:

Gregory S. Bloss is the President of Steam Way International, Inc. Steam Way International, Inc. is a leading manufacturer of truck mounted carpet cleaning equipment. Greg can be reached by calling 1-800-447-8326.