

By taking the amount of voltage available at the outlet and multiplying that by the vacuum's amps rating, you can determine its input power, or watts. **Watts** are a measurement of how much electricity is being used by the vacuum at the wall. Consider that light bulbs are rated by watts – the 100W bulb uses more power and is brighter than the 40W bulb. ProTeam vacuums operate within a range of 680 to 1320 watts, with backpacks coming in between 744 and 1188 watts.

Manufacturers vary in the power specifications they provide. Here are two simple formulas for determining power ratings:

$$\text{Watts} = \text{Volts} \times \text{Amps}$$

$$\text{Amps} = \text{Watts}/\text{Volts}$$

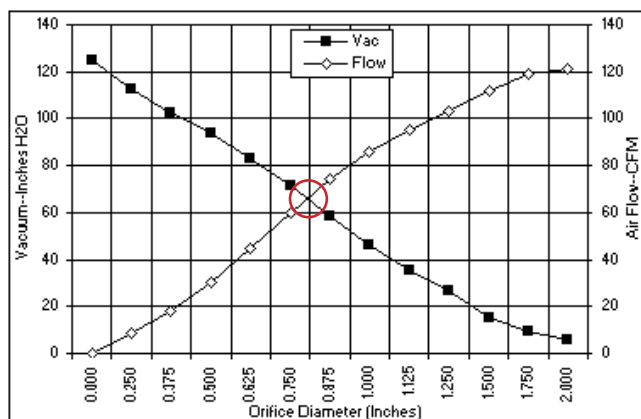
Moving Air

With electricity providing the kinetic energy, the goal is to build a pressure differential. For suction to happen there must be higher pressure in the room and the lowest possible pressure inside the machine.

There are several ways suction is reflected in power specifications. One is **airflow** – the maximum volume of air the vacuum can drive - measured in cubic feet per minute (CFM). Vacuums generally rate between 95 and 150 CFM. Another is **static lift**, or the force behind the flow. Measured in inches, this specification describes the vacuum's maximum ability to lift and move dirt from a surface. In the lab, this number is determined by how many inches of water the vacuum cleaner can lift through a tube. Lift is what keeps the air flow at its peak when on the floor. Look for numbers ranging from 60 to 100 inches.

Numbers provided for these specifications reflect the vacuum's highest power performance capabilities. Over the course of a cleaning shift, lift and flow changes based on a wide range of factors. Are you cleaning carpet or hard floors? How many levels of filtration are there? Is the filter becoming full? What is the diameter of the hose attachment being used? As an industry generally has advertised motor specs as a standardized way to compare product. A much more realistic approach would be how well vacuum cleaners perform as a whole system.

The graph below demonstrates the inverse relationship between airflow and lift. When one is at its maximum, the other is at its minimum. The highlighted area where the two lines cross is the focus of much of the engineering and design in a ProTeam vacuum cleaner. This indicates where the vacuum is performing, on average, throughout a day of cleaning.



[Graph info – black line is lift, white line is flow, the red circle highlights where vacuum designers need to optimize performance – in the area that reflects most realistic conditions the vacuum is in]