The Fan Company
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Technical Report

Interpreting a Manufacturer's Data Specification Sheet

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Purpose

The purpose of this document is to highlight how summary comparisons of multiple fan manufacture's product specifications can lead to erroneous conclusions in fan selection.

Conclusion

There is no industry standard methodology defined for fan product specifications. Without such a standard, manufacturers have the flexibility to define performance criteria of their product using different assumptions. Different assumptions between fan manufacturers product specifications may portray one fan as technically superior when functionally the fans are equivalent. These different assumptions can also, in some cases, portray a technically inferior product to be technically superior. The product designer, responsible for fan selection needs to have full understanding of the fan manufacturer's product specifications so that proper fan selection is ensured.

Data Specification Sheet

Whether a customer is concerned with acoustical noise, air flow CFM, or operating power a fans performance built of the same form factor size can vary from one manufacturer to the next. There are many reasons for these differences and a few examples are impeller and housing geometry, motor windings, magnet, PWB performance, general manufacturing tolerances, and component quality. To distinguish between each fan manufacturers will typically provide a Static Pressure vs. Air Flow Graph (PQ Curve). Other system graphs can include a current vs. RPM, noise vs. RPM, and PWM duty cycle vs. RPM graphs.

In order to simplify the technical performance of a particular fan or blower manufacturers will provide Data Specification Sheets. These sheets are used to summarize the overall blower and fan performance and are found in manufacturers catalogs and web sites. Typically listed in these sheets are the operational voltage and temperature range, speed, air flow, noise, static pressure, power, and current.

However, one must be cautious when viewing the Data Specification Sheets. There are numerous methods in which fan and blower data from various manufacturers can be presented. In the table below is a typical example of a fan data sheet (Model X).

Model	Air Flow (CFM)	Static Pressure (in H20)	Operating Nominal Voltage	Voltage Range	Operating Current (mA)	Fan Speed (RPM)	Acoustic (dBA)	Operating Temperature Range (C)
X	9.3	0.036	12	8-13.8 V	22	2050	31.0	0 to 70

Table 1. Data Specification Sheet for Model X operating at 12 volts.

Looking at Table 1 all of these readings were performed at an operational voltage of 12 volts. But not all systems are run at 12 volts. Some systems will run at the minimum voltage to conserve power. Other systems will run at higher voltages to increase fan or blower speed when extreme heat must be dissipated and power usage is less of a concern. Typically when the power is lowered the noise and current of the device will drop and

when power is increased the device will generate an increase in air flow and static pressure to overcome system resistance.

PQ Curve

Now we will generate a PQ curve for Model X and we will run it within its operational range at 8 V, 12 V, and 13.8 V. This will change the speed of the fan (RPM), current, noise, maximum static pressure, and air flow of Model X. Because the fan geometry and components did not change the performance curve will be similar in shape, but will move up and down on the PQ curve graph. See Figure 2 below.

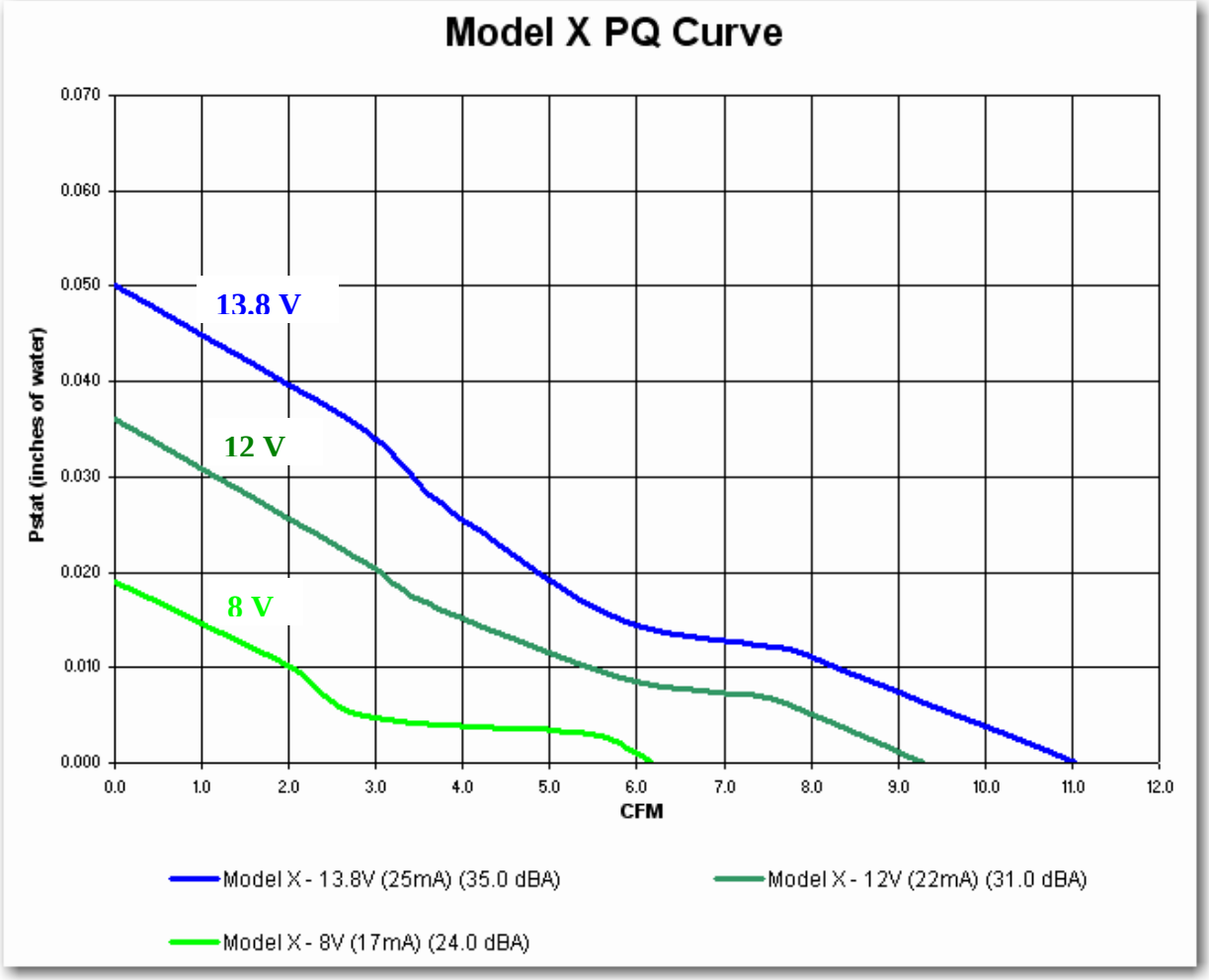

Figure 2. PQ Curve for Model X operating at 8, 12, and 13.8 volts.

In Figure 2 the current and noise readings were provided for reference at each operational point. This is where a Data Specification Sheet can vary from how one manufacturer to another presents their fan or blower data. One manufacturer can measure performance at a lower operational point while another manufacturer can have a very similar performing device, but measure the characteristics from a different operational range. This will vary all of the device output characteristics as seen in the Figure 2.

Data Specification Sheet Variances

Below in Table 2 the fan's data sheet contains measurements from the lower power setting for current and noise. Table 3 illustrates the fans measurements of airflow, static pressure, and speed at the maximum operational point of 13.8 V. All of the data was generated from Model X and displayed differently in each Data Specification Sheet.

Model	Air Flow (CFM)	Static Pressure (in H20)	Operating Nominal Voltage	Voltage Range	Minimum Current (mA)	Fan Speed (RPM)	Acoustic (dBA)	Operating Temperature Range (C)
X	9.3	0.036	12	8-13.8 V	17	2050	24.0	0 to 70

Table 2. Data Specification Sheet for Model X showing power and noise readings from 8 V.

Model	Maximum Air Flow (CFM)	Maximum Static Pressure (in H20)	Operating Nominal Voltage	Voltage Range	Operating Current (mA)	Fan Speed (RPM)	Acoustic (dBA)	Operating Temperature Range (C)
X	11.0	0.050	12	8-13.8 V	22	2400	31.0	0 to 70

Table 3. Data Specification Sheet for Model X with CFM, Static Pressure, and RPM readings from 13.8 V.

As one notices immediately from comparing Table 1 to Table 3 is that the air flow and speed have increased by 17-18% and the static pressure has increased 38%, since the measurements were taken at a higher voltage. Also, looking at Table 2 the current and noise have dropped by 25-30% over Table 1 because the readings were gathered at a lower power setting. This makes it difficult to accurately compare devices of the same form factor from different manufacturers.

Conclusion in Review

In conclusion when reviewing fan or blower Data Specification Sheets pay attention when comparing one manufacturer to another. Because there is no industry standard manufacturers have the opportunity to present their products performance using different measuring criteria and therefore will present data in alternative methods. Pay close attention to words such as "Maximum, Minimum, and Nominal" when reviewing the data sheets. If there is a critical parameter that your system design requires then review carefully the details of the data sheet and its values to ensure that you are choosing the correct fan or blower. Always work with your supplier and know for the operational voltage where the system impedance lies on the fan or blowers PQ curve. JMC's Engineering team is available to assist in interpreting the details of any Data Specification Sheet, calculating system impedance, and answering concerns that you may require.