

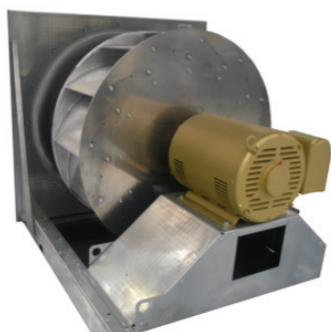
Aero® 39M Air Handlers

Single Direct Drive Plenum Fans

Single direct drive plenum fans are available in Carrier's 39M air handler sizes 03 to 61 with 3 fan wheel diameters available in most sizes.

Why choose direct drive plenum fans?

Direct drive plenum fans provide all of the benefits of plenum fans while eliminating the belt losses that belt driven plenum fans carry (typically 3-5%). With no belts or sheaves, routine maintenance on a direct drive plenum fan is minimal compared to its belt driven counterpart, and belt residue in the airstream is eliminated.



The 39M's large breadth of fan wheel options provides the optimal fan solution

What fan wheel diameter is optimal? While this depends on the specific airflow conditions as well as the desired fan operation, having many fan wheel diameters to choose from will give you the best solution.

Fans in a VAV system will spend the majority of their operation at partial load. The exact percentage of airflow where that partial load is, however, will differ from region to region and even job to job. Figure 1 shows a comparison of a typical VAV fan operation in Houston and Chicago.

As can be seen, operation in Houston spends significant time above 80% of design conditions, while an operation in a climate similar to Chicago spends minimal time above 50%.



Figure 1: Percentage of Design Load Operation in Houston and Chicago

The best way to see the benefits of a large breadth of fan wheel offerings is with a specific example. Figure 2 (next page) shows the 3 different direct drive plenum fan wheel options for a 39M air handler size 12, selected at 6,000 cfm with a minimum expected airflow of 3,000 cfm (shown as the MP on the fan curves) and a minimum static pressure of 1.5 inches. Since VAV systems operate at partial load the majority of the time, a VAV fan should be chosen to maximize efficiency while the fan is operating at partial load. To accomplish this, the operation at partial load should be as close to the maximum static efficiency (MSE) line as possible.

For those systems that will spend the majority of their time at or near 50% load (for example, Chicago) the smallest fan wheel diameter (18.2 inches) has the highest efficiency. For a climate similar to Houston, where the majority of the operation may be spent around 70-80% of design load, the 20 inch wheel provides the best efficiency. The 22.2 inch wheel provides the best efficiency for those systems expected to operate only at full load (constant volume system).



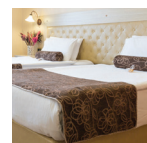
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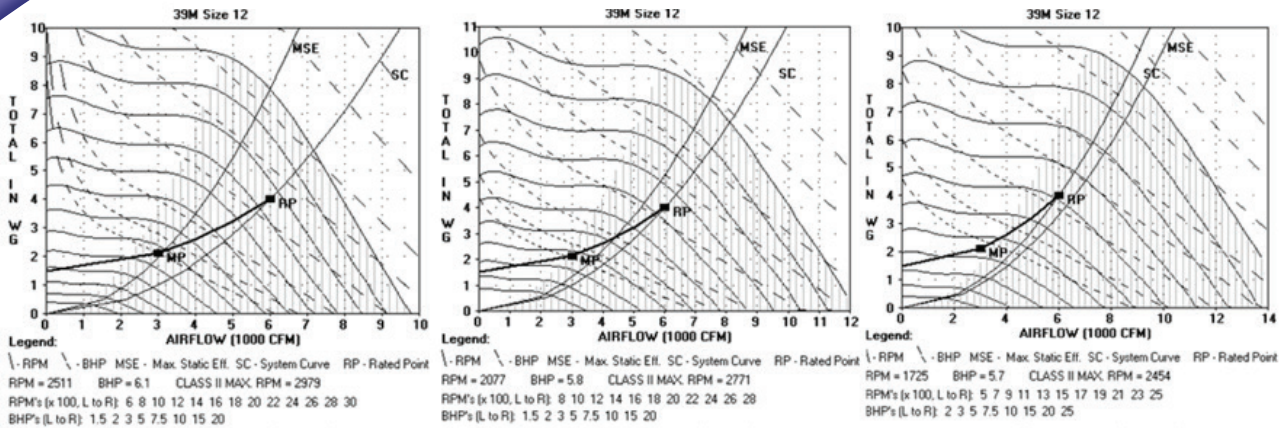
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Figure 2: Direct Drive Plenum Fan Wheel Diameter Options



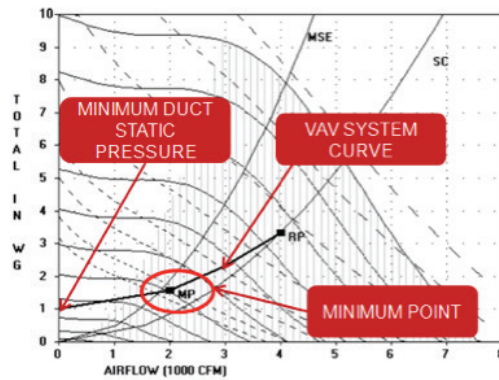
18.2" Fan Wheel
 Smallest wheel — best for VAV application, with highest efficiency at partial load

20" Fan Wheel
 Medium wheel — best for VAV application, with minimal fan turn down, with highest efficiency at ~75% load.

22.2" Fan Wheel
 Largest wheel — best for CV application, with highest efficiency at full load.

Carrier's 39M selection software can provide the ability to properly model VAV fan performance

In a VAV system, the duct static pressure sensor will maintain a minimum duct static pressure to ensure adequate airflow to all zone terminals. This minimum duct static pressure is the point on the vertical axis of the fan curve where the VAV system curve will intersect, and connecting this point to the rated point (RP) will result in the VAV system curve. This VAV system curve is now the true model of fan operation, and may also include a minimum point (MP) to show the expected minimum amount of airflow.



Carrier's 39M air handler selection software can provide fan curves with a VAV system curve to best model a fan's performance in a VAV system.

Summary

The 39M offers a breadth of fan wheel options as well as the ability to properly model VAV fan operation. Carrier's 39M offers you the optimum direct drive plenum fan solution!



Carrier® 39M Air Handler



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