

Thermal Management Fan/Blower Selection (Sizing)

Selection Procedure

The selection graph below will help determine the size of the fan required for your application.

First, based on your application, determine the amount of heat in watts that must be dissipated. Next, refer to the graph and make a fan selection based on the amount of temperature rise over the ambient air temperature that is allowed within the enclosure.

Example

Select a fan to dissipate 300 watts. The maximum ambient temperature where the enclosure is located is 90° F. You want to limit the enclosure temperature to 100° F.

Solution

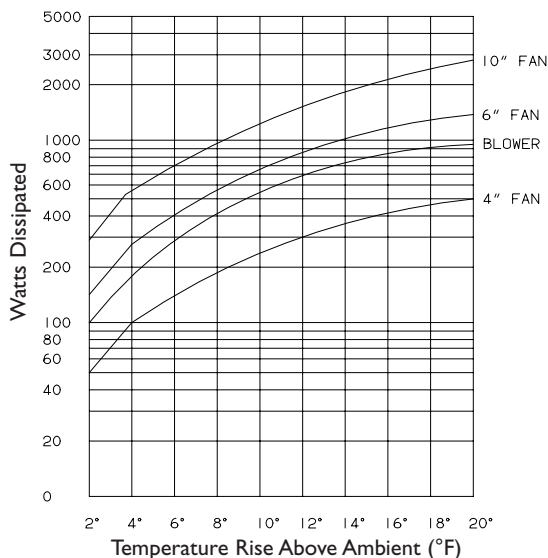
The temperature rise is 10° F (100° F - 90° F). The graph reveals that at 300 watts, the 4-inch fan dissipates 300 watts at a 12° F temperature rise. The 6-inch fan dissipates 300 watts at a 4° F temperature rise. Since you want a maximum rise of 10° F, the 6-inch fan should be selected.

Note: This procedure provides only an approximation for fan selection. More detailed information on this and other considerations, including fan cooling for outdoor applications, is available from Hoffman.

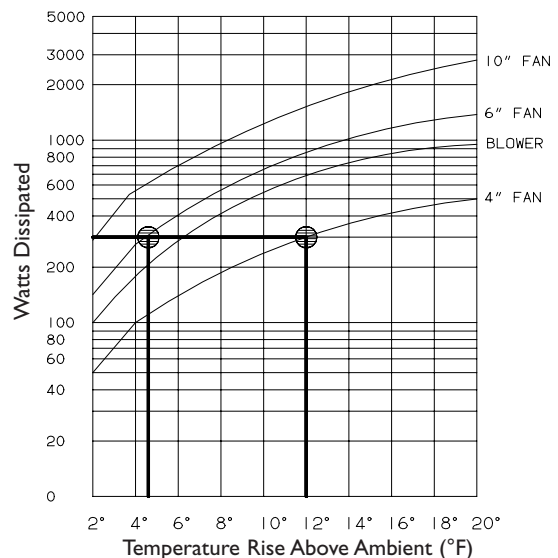
Application Guidelines

- Forced air systems can provide much greater heat transfer rates than those available with natural convection and radiation, therefore internal electronic packages have lower hot spot temperatures with forced air systems. The amount of cooling air flowing through an enclosure determines the temperature rise inside the enclosure due to the heat input. The more air that flows through the enclosure, the lower the temperature rise.
- Fans can be used at the exhaust to draw air through an enclosure, or at the inlet to blow air into the enclosure. Generally, a blowing fan at the air inlet is recommended for the following reasons:
 - A fan at the inlet will raise the internal air pressure within the enclosure, which will help to keep dust and dirt out of an enclosure that is unsealed or opened frequently.
 - A blowing fan at the inlet will produce slightly more turbulence, which improves the heat transfer characteristics within the enclosure.
 - Fan life is prolonged since it is located in the path of the entering cooler air.
- The air inlet to the enclosure should be located as far as possible from the air outlet in order to prevent the airstream from short cycling. In a short cycling condition the air leaving the enclosure through the air outlet re-enters the enclosure through the air inlet. This condition results in a reduction in cooling efficiency. In general, it is recommended that the enclosure air inlet be on the side of the enclosure near the bottom and the air outlet be located on the opposite side and near the top.
- Fans should not be located adjacent to an area that restricts the free flow of cooling air. The use of a plenum in front of the fan is a good practice since it improves fan performance. The air velocity must be allowed to develop in order to effectively overcome the flow resistance. When the fan blades are located at the downstream end of the plenum housing, the air has a longer flow path. This improves the air velocity profile and fan performance.
- The enclosure fan system should have an air outlet area at least equal to the air inlet area.
- The system cooling efficiency changes with altitude because of reduced air density. Air flow through an enclosure should be increased when the air density decreases.
- If more than one fan is used in parallel, in the same enclosure, then both fans should be identical.

Fan and Blower Selection Graph



Example



C2765

Fans and Blowers

» Determine the required fan/blower size (volume airflow):

Step 1

Select the product family which best fits your application:

- **Compact Cooling Fans**
(economical fan with no filter)
- **Cooling Fan Packages**
(economical fan package with low density filter)
- **Type 12 Cooling Fan Package**
- **Filter Fan Packages**
(high-tech fan package with high density filter, for IP54 rating)
- **Blower Package**
(centrifugal blower package with filter for densely packed enclosures)

Step 2

Determine the internal heat load in **WATTS**.

1 Watt = 3.413 BTU/Hr.

Step 3

Determine the **ΔT** (°F)

Step 4

Plot your application using the selection graph to the right.

- Find **WATTS** (internal heat load) on the vertical scale
- Draw a horizontal line across to the intersection point with the diagonal line representing your **ΔT**
- Extend a vertical line down to the horizontal scale to determine your CFM requirement
- Continue the vertical line to identify applicable fan or blower

A sample line is shown in red for a 400 watt heat load and a ΔT of 20° F.

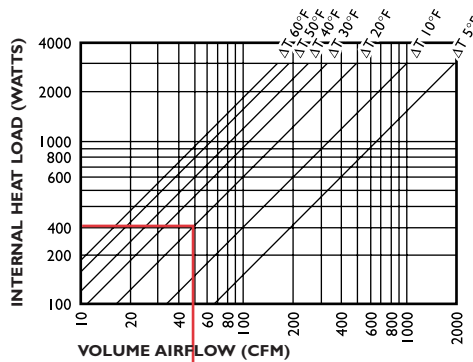
Step 5

Make sure the line intersects the bar which includes the exhaust grille kit(s) from the product family chosen in **Step 1**. Remember, actual air flow going through your enclosure may be less depending on how densely packed your enclosure is.

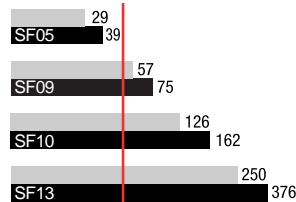
Note: CFM is reduced 10% on 50Hz operation.

Selection and Sizing Software

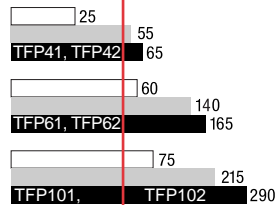
Designed to assist you in determining the most suitable choices of air conditioners, heat exchangers, or fans for your application. **Download a free copy of our selection software by visiting our web site: www.hoffmanonline.com.**



FILTER FAN PACKAGES



COOLING FAN PACKAGES



BLOWER PACKAGE



- TYPE 12
- WITH 1 EXHAUST GRILLE
- WITH 2 EXHAUST GRILLES

Cooling Fan & Blower Selection

CFM	Compact Cooling Fans	Page
55	A-4AXFN	9.34
140	A-6AXFN	9.34
215	A-10AXFN	9.34

CFM	Filter Fan Packages	Page
29	SF-05	9.38
57	SF-09	9.38
126	SF-10	9.38
250	SF-13	9.38

CFM	Cooling Fan Packages	Page
55	T-FP41, T-FP42	9.36
140	T-FP61, T-FP62	9.36
215	T-FP101, T-FP102	9.36

CFM	Blower Package	Page
275	A-DB275	9.40