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Air Components, Inc.

M & P Air Components, Inc. provides Components, Technologies, Guidelines, Sales and Technical Services for Industrial Air and Dry Solids Processes.

Our Goal is to provide Clients with the correct components selection and system design to achieve the best Utilization, Reliability, Safety and Economy for their plant processes.

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Technical Bulletin

Fan Selection – Guidelines

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Fan Speed is an important factor in fan selection. If the speed is too high, catastrophic failure can occur. Fan manufacturers establish a maximum safe speed for all fans.

The rated maximum safe speed is effected by changes in the airstream composition, materials of construction or wheel geometry. As such, it is important to clearly identify any special conditions in order to determine the maximum safe speed for each application.

A practical rule is to select a fan within 7.5 to 15 % of the maximum speed, which allows speed up capacity for future needs. It is best to select the fan speed at least 50 rpm away from the synchronous motor speed.

Airstream Composition, if other than standard atmospheric air, must be considered in fan selection.

Corrosive, abrasive, toxic, flammable, hot or explosive conditions are some of the cases which effect not just the fan type, but also the fan materials of construction, accessories (shaft seals, dampers, welding) and throughput velocities.

If the airstream density deviates more than 5% from standard density, correction must also be made to the fan performance rating. Always clearly identify the airstream composition and concentration.

Outlet Velocities are used in fan selection when the airstream composition is non-standard. Smoke, fumes, abrasives and vapors normally allow lower outlet velocities, while heavier solids such as mist, dust, and larger particulates typically require higher velocities.

High Temperature Fans (300F and up) have special concerns including heat sink, materials strength and materials growth.

Fans exposed to high temperatures should always be kept in rotation until the airstream temperature is safely below 200F. Otherwise, the fan shaft becomes a heat sink and exposes the bearings to heat failure and the shaft to warpage.

Due to the rotational stresses and forces experienced during rotation, it is sometimes necessary to construct the wheel of a higher strength alloy than the housing and other static components.

At 800F and above, consideration should be given to uneven temperature growth causing fan imbalance. Inlet conditions are a particular concern, as an uneven or distorted airstream entering the wheel will cause an uneven temperature loading on the wheel, with a risk of imbalance due to uneven materials growth.

Although all fans should have inlet and outlet flexible connectors, it is critical for high temperature fans in order to control materials growth from the ducting or structure. High temperature fans are designed to control their own temperature growth, but they are not designed to absorb external material growth.

Optimum Point of Operation as stated by AMCA is normally in the middle third section of the fan curve. Peak efficiency will always be in the upper section of the mechanical efficiency curve. To ensure the best fan selection based on efficiency, select the fan based on its mechanical efficiency curve.

Static Pressure Distribution is another factor in fan selection. The inlet side of the fan is below atmospheric pressure (rarefied), while the discharge side of the fan is above atmospheric pressure (compressed). When the inlet or outlet pressure is +/- 20 in wg SP, the airstream density should be corrected, particularly for fans in series or in operation with other sensitive equipment. Always specify the static pressure distribution.

V-Belt Drives are available as constant or adjustable speed. Constant speed drives have a higher mechanical integrity, longer belt life, and lower noise than adjustable speed drives. If adjustable speed drives are required for initial system air balancing, they should be replaced after final balancing with constant speed drives.

Fan Arrangements 1, 3, 4, 7, 8 & 9 normally provide the lowest noise and vibration performance. Arrangements 2 & 10 have weaker drive support structures and are not recommended for critical performance applications.

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