



Tech Tip # 107

Elevation Impact on Dehumidification

Keywords: Elevation, Blower Sizing, ACFM, SCFM

Introduction

Elevation has an impact on the performance of dehumidifiers at levels 2,000 feet above sea level or higher. Desert Aire has based its performance calculations and air volume sizing at sea level therefore extra steps must be taken to ensure that these units function properly at higher altitudes.

Background & Definitions

“CFM” is actually not a very good term. Unless you are at standard conditions and at sea level there may be confusion as to what the actual air volume or mass is flowing through a dehumidifier or duct. SCFM (standard cubic ft/min) and ACFM (actual cubic ft/min) are more specific terms when dealing with conditions not at the standard. Altitude is a major factor in the definitions. For example, the table below demonstrates the difference at two elevations:

	SCFM	ASFM
Sea level	10,000	10,000
5,000 ft	10,000	11,600

Desert Aire performance figures and balancing instructions are based around SCFM. This corrects high altitude flow rate to be equivalent in mass to that at sea level. The mass is most important to us as it presents an airside load more consistent for the unit regardless of the installed elevation. The capacity of the system will also be significantly similar for any installation when using SCFM. If the units were installed such that ACFM was specified to be the same value as standard, the capacity and suction pressure would be lower, and thus the capacity would be lower.

The balancing instructions we give for unit setup are essentially no different for units at high altitude. The coil pressure drop is specified to confirm air flow rate. When this is achieved the unit is balanced for the specified SCFM since the pressure drop is primarily a function of mass.

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Fan Motor Sizing

As far as the fans and motors are concerned, those selecting must be very careful to insure that all values are clearly defined as to which method (actual vs. standard) are being reported. Many fan manufacturers only test at sea level and calculate differences in mass to present their fan curves for different altitudes. In these cases the fan manufacturers are speaking of ACFM in their programming. The RPM will increase but the motor BHP will be less since there is less mass flow. If the flow rate is corrected for mass (SCFM), the RPM will be higher and the BHP will increase.

Most engineers size the duct using ACFM air volume values. Therefore, in order for Desert Aire to correctly select the fan, motor and sheave, we must convert the external static pressure (ESP) of the job to

Conversion

SCFM x _____ = ACFM

ACFM x _____ = SCFM