

Tech Talk - Air Door Selection Fundamentals

An air door provides an opposing force in the form of a mass of air at a velocity that offsets blowing winds and flying insects. ASHRAE has design criteria for wind conditions in various cities as well as temperature extremes in both heating and cooling seasons. Information is also available regarding the mass and speed at which insects fly, which helps understand how effective an air curtain can be in preventing the migration of flying bugs into a building through doors, windows or service openings. In addition to wind and insects, air doors are used to effectively minimize or eliminate the migration of dust and odor.

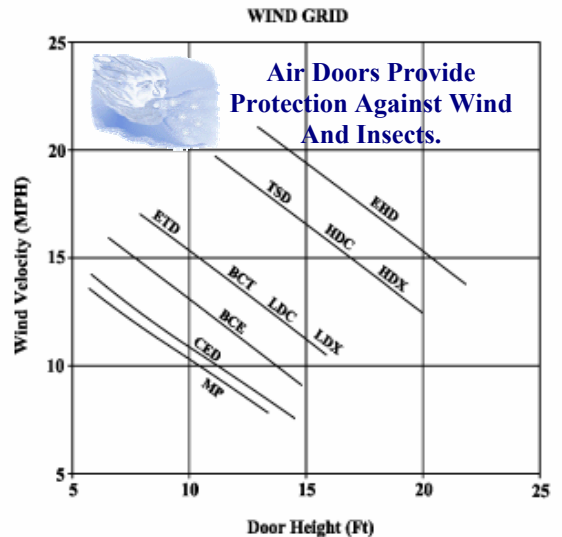
A simplified wind grid selection guide can be used to initially select most air doors. The diagram at right shows some of the Powered Aire models with suggested Wind Velocity Vs. Door Height application criteria. Economic paybacks can be as little as a couple of months in some applications depending on weather and opening usage rates. Refer to the Powered Aire catalog for examples.

The speed at which an insect flies can be used to select the proper air door. Statistical data can be found showing the average flight speeds of various insects.

The list below is provided as a guide:
Aeschnid Dragonfly (15.6 mph); Hornet (12.8 mph);
Hummingbird Hawk Moth (11.1 mph); Horsefly (8.8 mph);
Syrphid Fly (7.8 mph); Bumblebee (6.4 mph); Honeybee (5.7 mph);
Housefly (4.4 mph); Damsel fly (3.3 mph); Scorpion Fly (1.1 mph).



Note: The germs left behind by a housefly can be dangerous and carry serious diseases such as typhoid, tuberculosis, malaria, sleeping sickness, filariasis,



The velocity at any distance from the outlet of the air door nozzle can be calculated by using a formula from ASHRAE.

$$V_x = V_0 / (1.13 KH_0 / X) \text{ Ref: ASHRAE Handbook, 2001}$$

V_x = centerline velocity at distance X from outlet, fpm

V_0 = average initial velocity at discharge, fpm

H_0 = width of jet at outlet, ft

K = centerline velocity constant

X = distance from outlet to measurement of centerline velocity V_x , ft

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Application Consideration

Air doors provide an airstream (air curtain) across the opening and serve as a virtual door to offset infiltration and prevent flying insects from entering the building in a typical office door application.

The air door is more effective in controlling drafts through the door which provides a more comfortable environment for the occupants. Air doors are more effective than alternate product applications such as cabinet heaters because air doors proactively prevent infiltration at the source as opposed to reactively attempting to heat the cold air after it enters the building.

Contact your local Powered Aire representative or the factory to obtain a free payback analysis or selection assistance of an air door for your application.

