Energy savings calculation for doors

TECH CORNER

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Editor's note:
Determining energy savings can be tricky if you don't factor in all the variables, gather the correct data, and utilize the appropriate DASMA resources. DASMA Technical Director Dave Monsour discusses the calculation process in this issue's Tech Corner.

For years, the DASMA office has received inquiries from various sources regarding energy savings topics. Recently, a representative of the U.S. Navy asked how the use of insulated vehicle access doors can affect energy use and costs for their buildings. This is an important question, and the answer consists of many elements.

Heat sources: radiation, convection, and conduction

Convection and conduction are quantified via U-factor and air infiltration values. Radiation comes into play via Solar Heat Gain Coefficient (SHGC) on glazed doors. All three factors are important in assessing energy savings. SHGC can often be ignored because the original and replacement products are solid or only lightly glazed.

Other forms of energy: electric operation

Heat passing through doors costs money, but so does the electricity used to operate the doors. How old or new a door is can affect horsepower and thus run time, so the age of the door should be considered as well. Although this is a minor factor, it allows the analysis to be comprehensive.

U-factor: simple

Energy savings based on U-factor is straightforward once you've gathered the necessary information — including the number of doors to be replaced, door width and height, U-factor, geographical location, and local energy cost per kilowatt-hour.

Geographical location is important because each location has unique energy needs. A small improvement in U-factor for a door in a more extreme climate such as Bismarck, N.D., can have the same effect as a large improvement in U-factor in a more moderate climate such as Sacramento, Calif.

Technical Research Document (TRD 4001a), which is only available to DASMA members, provides quick and thorough assessments of energy savings for any side-by-side door comparison.

Air infiltration: more complex

Air leakage is a more complex element to examine because there are two basic types: air leakage through a closed door, which is a tested value; and air exchange due to normal air movement between outside and inside air during door operation.

Calculating energy savings due to comparative air leakage requires knowledge of the following: U-factor items previously mentioned, tested air leakage, average opening speed, average hold-open time, average closing speed, and cycles per day.

DASMA resources

DASMA has produced a Technical Research Document (TRD 4001a) that includes all of the above elements with accurate data based on the ASHRAE Handbook of Fundamentals for 33 cities spread across the United States and Canada. The resource, which is only available to DASMA members, provides quick and thorough assessments of energy savings for any side-by-side door comparison. In addition, many individual DASMA member companies have developed their own similar calculation tools.

Contact us

If you have questions about this topic or suggestions for future content, please email Dave Monsour at dasma@dasma.com. ■