Louver Design Considerations

Think about size and shape when choosing a louver

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After selecting a louver model that best fits an application, system designers need to consider certain characteristics when sizing the louvers. In this article, characteristics that affect water penetration, pressure drop, and louver installation will be examined. By using the following suggestions, designers will maximize louver performance and ensure that louvers are equipped to meet the needs of their specific application.

First, consider sizing louvers to minimize water penetration. In the first part of this series, published in January, the difference in airflow capacity between standard and wind-driven-rain-resistant louvers was examined. Although wind-driven-rain louvers can significantly reduce or even eliminate water penetration, standard louvers often are used. To keep rain from penetrating standard louvers in storm situations, size the louvers so their operating free-area velocity is less than the maximum "beginning point of water penetration" defined in an Air Movement and Control Association (AMCA) "still-air" water-penetration test. This will allow for the effect of wind. While there is no industry standard for this safety factor, most experienced designers reduce the tested AMCA velocity by 15 to 25 percent, depending on the application conditions. The benefit of using wind-driven-rain louvers is that they are tested under wind-driven-rain conditions and can be designed for their maximum published velocities.

Another sizing consideration is the effect of bird or insect screens on louver pressure drop. All screens add pressure drop, but some designs are more restrictive than others. Wire-mesh screens typically generate less drop than expanded metal screens in comparable opening sizes. For example, a ½-in.-mesh-by-0.063-in.-wire screen (approximately 75-percent free area) adds roughly 5 percent to a louver's pressure drop. Compare that to a ¾-in.-by-0.051-in. expanded metal screen (approximately 70-percent free area), which will add roughly 15-percent pressure drop to a louver. The pressure drop added by either of these screens is not enough to require a change in louver size, in most cases. However, if pressure drop is a ruling factor in louver sizing, screen choice may be important. For insect screens, a commonly used size is 18-16-mesh-by-0.011 in.-diameter-wire screen (roughly 65-percent free area), which adds approximately 18 percent to louver free area.

PHOTO A. Specially shaped louvers.

Louvers are available in a variety of round, triangular, and trapezoidal shapes (Photo A). However, these special configurations do not provide the same performance as rectangular shapes. Two main considerations for these special louvers are design velocity and free area. Shaped louvers often do not prevent water penetration as well as rectangular units with the same blade style. This is true particularly with drainable louvers because their blade-gutter/frame-downspout system simply does not work as well in non-rectangular configurations. To lessen the potential of water carryover, it is good practice to reduce the velocity through shaped louvers. Design the operational free-area velocity of these louvers to be at least 25 to 30 percent below the maximum AMCA test velocity. Special shapes also negatively affect the free-area-vs. louver-face-area percentage. They often have less open area at their tops and bottoms, making their percentage of free area vs. face area less than that of rectangular louvers of comparable size. For example, a common 4-ft square louver that has 54-percent free area will provide only 50-percent free area in a 4-ft-diameter round shape. Always consider that shaped louvers have a lower free-area percentage than comparably sized square or rectangular units.

Designers can simplify contractors' lives by sizing louvers in dimensions that require the fewest sections. Louvers that are larger than their maximum single-section sizes are shipped to a job site in multiple sections. A contractor must splice the sections together in the field to make the overall assembly. Splicing sections adds time to the installation process, so contractors usually prefer to handle the least number of sections possible. Louver manufacturers also sometimes add a charge for multiple-section louvers to cover their splice hardware. Refer to manufacturers' published literature for maximum single-section-size and multiple-section information for louvers. Sometimes, shifting just a fraction of an inch from the width to the height, or vice versa, will make the difference between a

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single- and a multiple-section unit. This can reduce both the cost of the louver and the labor to install it.

Stationary-blade louvers may be provided with rear-mounted blade supports to reinforce blades for wind loads (Figure 1). When properly anchored to a building, blade supports ensure minimal deflection of louver components under windy conditions. They sometimes are referred to as hidden vertical blade supports and are required on some louvers 4-ft wide and larger. Some models may have stronger blades that span 5 or 6 ft before supports are required. Blade supports enable louvers to be made in larger single sections with less-visible mullions. They most often are angled or in channel shapes ranging from 1 to 6 in. deep, depending on the height of the louver and its design wind load. The taller the louver and/or the higher the wind load, the deeper the supports become. It is important to remember that blade supports may add several inches to a louver's depth. This can create interference if items are located close to the back of a louver. To avoid interference, designers can specify that louvers be fabricated with visible mullions to eliminate rear blade supports. Check with the architect to verify that visible mullions are acceptable in their visual scheme. Manufacturers' literature or sales representatives can help designers with additional information regarding blade supports.

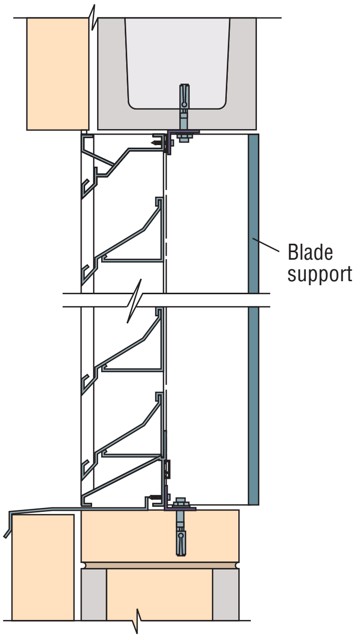

FIGURE 1. A section view of a louver with blade support.

Louver design does not stop at model selection. By considering the items discussed in this article, designers can minimize water penetration, maximize louver efficiency, and lower the cost of installation.

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