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ABSTRACT:
Article is a primer on louver terminology, design considerations, and selection requirements. Factors to consider when selecting louvers:
Air volume and velocity.
Free area.
Pressure drop.
Water penetration.
Dimensions.
Aesthetics.

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Louver Selection Principles

By David Stutzman, AIA, CSI, CCS, SCIP, LEED AP

Summary

Fixed position wall louvers are at the intersection of numerous aesthetic and functional aspects of a building. Their correct design, selection, and installation involves coordination of several design disciplines, and numerous building trades.
This Tech Tips article is a primer on louver terminology, design considerations, and selection requirements.

Discussion

The Louver: A seemingly simple device, a metal-lined hole in the wall that allows air to enter or exit building systems , generally without moving parts; and yet a source of much consternation, and requiring much coordination among design disciplines. So , what is louver selection all about, and what must be considered to properly select one ? The primary considerations are:

Overall Size: The selection process begins by determining how much air must enter and leave the building. Selecting too small a louver will restrict the airflow, increase air flow noise, and may cause water to be drawn in through intake louvers. Selecting too large a louver could require extra structural to support the wall above the opening, and extra bracing to keep the louver in place, not to mention unnecessarily increasing construction costs. Louvers are not generally considered to be attractive building features, so there is also an aesthetic reason to keep them small and out of sight. Nevertheless, it is common practice to slightly oversize a louver so that it fits within the building's design module. For example, in unit masonry construction, a louver may be selected to the nearest 8 inch unit larger than the optimal size. If, in order to fit within a building's module for aesthetic reasons, (such as a 30-foot wide bay), a louver becomes too oversized to function efficiently, blank off panels can be used behind the louvers to result in the correctly sized air path in a much larger louver assembly.

Louver Depth: The thickness of the louver in the direction of airflow. Thinner louvers cause less resistance to airflow, but are not as good at keeping rain out, and are not as sturdy. Thicker louvers are better at keeping rain out, but they restrict airflow, which increases the power consumption of the fan.

Free Area: The open space available for passage of airflow, usually expressed as a percentage of overall face area . Free area is a rough gage of resistance to flow. Traditionally, 50% free area has been used as a rule of thumb, but it is not uncommon to see free area ratios as low as 35% or as high as 60%.
The value selected for a particular project must be the result of balancing the required air flow, overall size, pressure drop, water penetration and manufacturer's product data.

Pressure Drop: A measure of resistance to flow, usually expressed in "Inches Water Gage (in. w.g.) at a flow velocity ." It takes very little pressure to move air. One inch w.g., enough pressure to lift a column of water one inch, as when drinking through a straw, is enough pressure to move air over 1,000 feet through a duct system.

To make air move, you need a source of pressure (a fan) to push the air where you want it to go. As it moves away from the fan, the air rubs against duct walls and bumps into obstructions, such as louver blades, losing energy as it does so, and its pressure drops. Everything the air encounters as it flows causes a pressure drop, even wire bird screen or insect screen.

In order to select system fans, Engineers consider the pressure drop of each component in the duct system. Louvers are generally selected for 0.05 to 0.15 inch w.g. pressure drop at full flow, although storm resistant type louvers may have higher pressure drops.

Free Area and Louver Configuration interact to change pressure drop and impede airflow. See Figure 1.

The HVAC Engineer typically tries to minimize pressure drop because it represents wasted energy .

Water Penetration: Rain will infiltrate a louver if it is blown in by the wind or entrained with air drawn in by the fan. Louvers with larger free area allow more wind driven rain to penetrate. One effective means of protecting against wind driven rain is to locate the louver in a sheltered area, or provide a weather hood to fend off the water. When wind driven rain is unavoidable, the engineer selects a louver designed to resist rain. There is an energy penalty to be paid for using these louver types.

To control entraining rain with the intake air, larger louvers and louvers with larger free area ratios are selected, so that the air passes through the louver too slowly to entrain the raindrops.

Drainable louvers are often selected for applications that encounter heavy rain . These louvers include gutters and ridges formed into the louver blades to keep water from passing through the louver to indoor spaces. See Figure 2.

Bird/Insect Screen: While louvers serve as an entry or exit point for ventilation and exhaust air, they may also serve as a path for wildlife and vermin to enter the building. For this reason, louvers are generally fitted with a wire mesh screen in the inside face, to keep out birds and climbing animals, such as squirrels. When a louver is provided for natural ventilation, without a fan, it is a good idea to include an insect screen. Insect screens are quickly damaged when used in louvers serving fan systems.

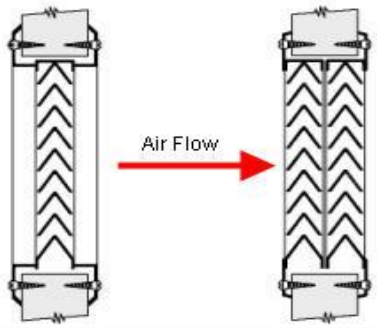


Figure 1. Vertical section through two louvers having the same free area. The louver on the right will exhibit twice as much resistance to flow (pressure drop) as the louver on the left, because it has two rows of baffles.

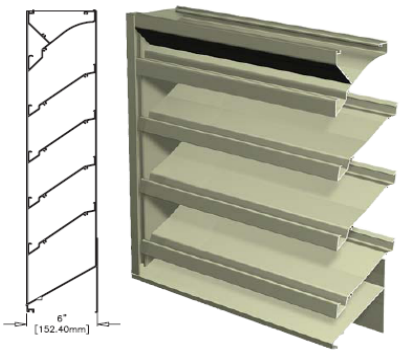
Conclusion

There is more to selecting a louver than picking a face area, a free area, a finish type, and a finish color. Louver selection is a complex process that balances the competing, interrelated considerations of:

- Required airflow
- Physical size
- Free area ratio
- Pressure drop
- Rain penetration resistance.

Louver manufacturers offer free computerized selection programs that allow designers to select the louver model for the required function, and then adjust the free area and pressure drop to find the minimum required overall size.

After that, the designer adjusts the size to fit the building look.



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