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THE ENERTECH EDGE

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Snow Louvers for Data Center Buildings: Protecting Mission-Critical Air Intakes in Winter Conditions

Introduction

Data centers depend on predictable airflow, stable environmental conditions, and continuous operation. In cold and snowy climates, exterior intake louvers can become an overlooked point of vulnerability: wind-driven snow can enter the mechanical system, load filters, wet ductwork, corrode equipment, and create reliability risks for cooling systems serving high-density IT loads. Snow louvers—often paired with snow screens, drainable blades, heat trace, and properly designed intake plenums—help protect these mission-critical air paths while maintaining the airflow capacity required by the facility.

Why Snow Control Matters in Data Centers

Unlike many commercial buildings, data centers operate with very little tolerance for environmental instability. Cooling systems must remove heat continuously, and air-side economizers, makeup air systems, generator ventilation, electrical rooms, and mechanical penthouses may all rely on exterior air openings. When snow bypasses a louver, it can melt inside the system, soak filters, increase pressure drop, reduce airflow, trigger alarms, or expose downstream components to moisture. In extreme cases, accumulated snow can block intake paths or contribute to freeze-related failures.

The risk is highest when light, dry snow is carried by wind toward large intake faces operating at high air velocities. Data centers often make this challenge more demanding because their louvers may be very large, arranged in long continuous banks, placed near equipment yards, or integrated into architectural screens where visual uniformity competes with performance requirements.

What Makes a Snow Louver Different?

A conventional drainable louver is primarily intended to reduce rain penetration while allowing air to pass through the wall opening. A snow louver application requires a broader strategy. Snow behaves differently from rain: it can be light, cohesive, windborne, and capable of accumulating on screens or blade surfaces before melting and refreezing. For that reason, snow-focused designs typically combine several features rather than relying on blade shape alone.

- Lower intake face velocities to reduce snow entrainment.
- Drainable or complex blade profiles that separate moisture from the airstream.
- Horizontal/Vertical blade combinations that prevent snow accumulation beyond the wall envelope.

- Snow screens or mesh sections designed to intercept drifting snow before it reaches filters or coils.
- Heat trace or heated screen assemblies where snow loading and icing are expected.
- Dedicated drainage paths to remove meltwater from the assembly and plenum.
- Accessible plenums that allow inspection, cleaning, and maintenance during winter operation.

Eliminating Separate Wall Hoods

A purpose-designed snow louver can also reduce or eliminate the need for a separate wall hood installed over a standard louver. In traditional arrangements, wall hoods are often added to help shield conventional louvers from falling or wind-driven snow. However, hoods add projection from the building envelope, can complicate architectural coordination, may create structural and flashing challenges, and still do not always address snow entrainment through the louver face. By integrating snow separation, drainage, and snow-management features into the louver assembly itself, a snow louver provides a cleaner and more coordinated solution for data center intakes.

For data center projects, this can be especially valuable where large intake banks need to align with the facade, maintain service access, and avoid exterior projections that interfere with equipment yards, snow removal, security fencing, or architectural screening. The design team should still confirm that the selected snow louver is properly sized for airflow, pressure drop, drainage, and the expected winter exposure, but the snow louver approach can replace the common workaround of pairing a standard louver with a field-fabricated or separate wall hood.

Data Center Applications

Snow louvers may be applied wherever exterior air must enter a data center building or its support infrastructure. Common locations include outside-air intakes for air handling units, air-side economizer openings, generator radiator or combustion-air intakes, electrical and battery room ventilation, mechanical penthouse louvers, and screened equipment yards. Each application has a different balance of airflow, redundancy, acoustic control, water rejection, security, and maintainability.

For mission-critical facilities, the most important point is that louver selection should be project-specific. A louver that performs acceptably for rain in a standard commercial building may not be adequate for a northern data center with high intake volumes, drifting snow, stringent uptime requirements, and limited windows for maintenance access.

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Key Design Considerations

1. Climate and Site Exposure

Begin with local climate data, prevailing winter wind directions, expected snow type, drifting potential, roof and grade snow accumulation, and the surrounding building geometry. Intakes located near corners, parapets, loading docks, equipment screens, or snow storage areas may experience localized snow concentration that exceeds regional averages.

2. Intake Velocity and Free Area

Snow control starts with airflow rate and louver area. Higher face velocity can pull windborne snow deeper into the assembly and increase pressure drop when snow collects on screens. Oversizing the intake face, distributing airflow across multiple banks, and coordinating louver free area with fan selection can improve resilience.

3. Water, Melt, and Drainage Management

Snow that is stopped at the louver still has to go somewhere. The design should include positive drainage, sloped surfaces, corrosion-resistant materials, and a clear path for meltwater to exit without reaching filters, electrical components, or occupied spaces. In heated assemblies, drainage becomes even more important because intercepted snow may melt continuously during storms.

4. Pressure Drop and Energy Impact

Additional snow-control features can add resistance. The louver, screen, bird screen, insect screen, filters, dampers, and plenum geometry should be evaluated as a complete air path. This is especially important in data centers because fan energy, cooling efficiency, and available redundancy are closely connected.

5. Maintenance Access

Snow louvers should be designed with winter maintenance in mind. Facilities teams need safe access to inspect screens, clear accumulated snow, verify heat trace operation, maintain drains, and replace filters. Where possible, include access doors, service platforms, lighting, and monitoring points that allow maintenance without disrupting critical operations.

Standards, Ratings, and Specification Notes

Louver performance is commonly evaluated using recognized test methods for air performance, water penetration, wind-driven rain, and, in severe-weather regions, windborne debris. These ratings are valuable, but they do not eliminate the need to analyze snow exposure. Snow penetration depends on snow type, wind speed, intake velocity, geometry, and operation during storms. Specifications should therefore avoid generic language and should define the intended duty: snow-prone climate, design airflow, maximum allowable pressure drop, drainage requirements, materials, access, and whether heat trace or snow screens are required.

For data centers, it is also helpful to coordinate louver requirements with the mechanical sequence of operation. If economizer mode increases outside-air volume during cold weather, the louver must be evaluated at those operating conditions, not only at minimum ventilation airflow.

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Recommended Design Approach

1. Identify every exterior air opening serving critical data center systems.
2. Classify each opening by consequence of snow intrusion: critical, important, or noncritical.
3. Review climate, wind, drifting, and snow storage conditions for each facade and roof level.
4. Set conservative intake velocities and size louvers for both airflow and snow resilience.
5. Select louver assemblies with appropriate snow-control features, drainage, and corrosion resistance.
6. Coordinate dampers, filters, screens, access panels, heat trace, controls, and alarms as a single system.
7. Plan commissioning checks before winter and recurring inspections during snow season.

Practical Checklist for Owners and Design Teams

- Has the design considered snow, not just rain?
- Are intake velocities low enough for winter operation?
- Is there a defined path for meltwater drainage?
- Can maintenance teams access the louver, screen, drains, and filters safely?
- Are heat trace circuits monitored and alarmed where used?
- Have acoustic, security, and architectural requirements been balanced against airflow performance?
- Has the system been evaluated under economizer, generator, and emergency operating modes?
- Is there a winter operating procedure for inspection after major snow or wind events?

Conclusion

Snow louvers are not simply architectural accessories; they are part of the environmental protection strategy for mission-critical infrastructure. In data center buildings, the best results come from treating the louver, plenum, drainage, controls, and maintenance access as an integrated system. By addressing snow behavior early in design, owners can reduce winter maintenance, protect downstream equipment, and improve the reliability of the cooling and ventilation systems that keep the data center online.

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