Hydronic Alternatives™

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Hydronic Snow and Ice Melting Systems

The arrival of winter presents a daunting challenge for facility managers across various industries in the northern hemisphere. Conventional snow removal methods often damage plants and landscaping, contaminate water supplies, and emit disproportionate amounts of greenhouse gas emissions.

In addition, the consequences of improper snow removal can be severe, with millions of Americans facing injuries each year due to slips and falls on ice and snow.

Tragically, about

17,000

of these types of falls result in fatalities annually, highlighting the urgent need for safer snow removal practices.

Hydronic snow melting is an innovative method of snow management that can help businesses mitigate economic losses caused by slips and falls – and it boasts numerous environmental benefits.

In this comprehensive guide, we explore the advantages and delve into the technical considerations of hydronic snow management. By adopting this innovative solution, facility managers can bid farewell to the limitations of traditional snow removal and usher in a new era of efficient, environmentally friendly, and safer snow management practices.

Benefits of Hydronic Snow Melting Systems:

Hydronic snow melting systems take a proactive approach by preventing snow and ice accumulation rather than removing it once it has already formed. This strategy ensures a safe and clear path for entering and exiting buildings, significantly reducing the risk of slips and falls that can lead to costly lawsuits. By complying with American Disabilities Act (ADA) regulations, these systems enhance accessibility and inclusivity. In addition, hydronic snow melting systems effectively reduce winter clean-up costs, while simultaneously boosting property values.

Applications for Hydronic Snow- and Ice-melting Systems:

Harnessing the power of heated water, hydronic snow and ice melting systems offer a revolutionary solution to combat snow and ice. Below are typical applications where hydronic snow and ice melting systems are beneficial.

Stairs - The tubing layout on stairs is carefully designed for pedestrians, with typically two lengths of tubing installed in the tread and one length in the riser, tailored to suit specific applications.

Automatic Car Washes - Hydronic snow-melting systems offer a reliable solution for property owners to maintain ice-free car washes and ensure uninterrupted operations. The tubing for car washes is embedded in a concrete slab. Controlling the system is simple, with the option to monitor either the air temperature or the slab temperature. If the temperature drops below 35°F, the system activates, safeguarding against ice formation. When the temperature rises above 35°F, the system automatically deactivates, optimizing energy use and efficiency.

Parking Garages and Loading Docks - Hydronic snow melting systems provide a secure passage for vehicles navigating parking garage ramps from the street, ensuring safe, seamless movement. These systems also play a vital role in enhancing the safety of loading docks, facilitating smooth and efficient transfer of goods in and out of facilities.

Hot Pads – Instead of heating the entire area exposed to winter elements, large area “hot pads” are used for cost effectiveness. Focusing on a smaller area where shoveled snow can be piled, this approach proves highly efficient. Airport runways and large parking lots frequently use this technique. Typically, tubing for hot pad slabs is spaced at 4” to 6” on center to accommodate substantial amounts of snow. Operated manually, hot pads are activated as needed, offering a practical and responsive solution.

Overview of Hydronic Melting Systems:

Hydronic snow melting systems employ advanced snow sensors that detect precipitation and trigger the system's activation. A mixture of glycol and hot water, sourced from a hydronic boiler, is circulated by pumps through PE-RT or PEX tubing. These tubes are installed beneath surfaces like poured concrete, pavers, and asphalt, and layered on top of insulation.

To ensure effective snow and ice melting, these systems use mixing or diverter valves that carefully regulate the glycol-water mixture. The hot water and anti-freeze blend retains its heat even after the heat source is shut down, enhancing the system's overall efficiency and cost-effectiveness. These systems can be combined with highly efficient boilers (condensing, electric, oil, propane, and wood), variable speed circulators, mixing or diverter valves, tubing, and controls. This combination supports optimal snow management results while keeping energy consumption in check.

Key Components of the System:

CreteHeat Underslab Insulation – Enhances the system's efficiency by providing an added R-Value under the slab to create a thermal break to the ground

Manifolds and PE-RT Tubing – Responsible for distributing a precise water and glycol mix, ensuring optimal performance in snow-melting and radiant heating systems

Hydronic Boiler – Serves as the heat source to warm the water and glycol mix

Circulator Pumps – Facilitate the circulation of fluid throughout the system

Modulating Mixing Valves – Regulate loop temperature in snowmelt and radiant heating systems

Sensors – Detect precipitation and relay feedback to the control system, which determines the appropriate system operation based on weather conditions

Plate Heat Exchangers – Offer system separation between the water and glycol mix from the boiler water

Glycol and Water Mixture – Provides crucial protection against freezing and safeguards the system from potential damage in colder conditions

Considerations for an Effective Hydronic Snowmelt System

When planning a hydronic snowmelt system, various critical factors must be considered to ensure efficient snow removal. Calculating the required BTUs per square foot to combat expected snowfall and ice, accounting for outdoor temperature fluctuations and other factors, is paramount.

Before construction, it is essential to define site conditions, design parameters, and performance expectations to tailor the snowmelt system accordingly. The system circulates a mixture of water and propylene glycol, necessitating thoughtful planning for the mechanical room to house the boiler and other equipment. Incorporating heat exchangers for system and boiler separation is another vital consideration.

While hydronic snowmelt systems may require an initial investment, their potential savings in snow maintenance make them a cost-effective solution for commercial snowmelt applications. In addition, the installation process requires specific attention, as retrofitting a hydronic snowmelt system on an existing surface is not feasible. Instead, it demands demolishing the existing driveway, parking lot, or the like. Proper site excavation is essential to accommodate insulation, tubing, and any other necessary components, and a stone substrate ensures a solid base with optimal drainage.

Summary

Incorporating awareness of hydronic snow melting systems can yield numerous benefits for architects, engineers, contractors, facility managers, and property owners alike. The most notable advantage for property owners lies in reduced insurance claims and premiums, thanks to improved safety, especially for the vulnerable aging population who are at higher risk of falls and long-term injuries. Hydronic snow melting systems provide effective solutions for areas where slip-free surfaces are of utmost importance, such as hospital emergency room entrances, for example, making them an asset for enhancing safety and convenience across various properties.

Moreover, the implementation of these systems leads to decreased exterior maintenance costs and reduced reliance on snow- and ice-melting chemicals, thereby minimizing environmental impact and preserving interior spaces like entryways.

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