ROOF & GUTTER DE-ICING HIGH-EFFICIENCY CONTROL PANEL SYSTEM FOR ROOF ICE MELT (RIM) SYSTEMS

PRODUCT OVERVIEW
The nVent RAYCHEM HECS (High-Efficiency Control System) uses an ambient sensing RTD and temperature controller in series with RAYCHEM roof ice melt (RIM) system panel temperature sensing RTDs, controllers and solid state relay circuitry to provide a highly energy-efficient control system.

The ambient controller will power the RIM panel controllers only when the ambient temperature is between the heater on set point and the low temp cutout set point (both field-adjustable). When this condition is met the RIM panel controllers will adjust the power level to the RIM panels to maximize efficiency and keep them at the maintain temperature set point (field-adjustable). As temperatures drop and winds pick-up, the controllers increase the heating cable output.

GENERAL
The High-Efficiency Control System (HECS) is designed to optimize RIM System performance while minimizing energy consumption. At the onset of snow accumulation on the roof, the owner/operator enables the heating system by turning on the main and branch circuit breakers. A temperature sensor measures the outside air temperature and only permits the RIM panel controllers to power the heating cable when the ambient temperature nears freezing (e.g., 34°F). The RIM panel controllers then maintain the RIM heater panels above freezing (e.g., 42°F) so that snowmelt will not refreeze and form icicles and ice dams at the eaves.

The RIM System uses self-regulating heating cables as the source of heat and is designed to handle over 90% of the worst-case winter storm conditions.

ENERGY EFFICIENCY
When ambient temperatures are in the 20-32°F range, only a portion of the heaters’ energy is required for proper system operation, so the HECS modulates power to the heaters, keeping energy consumption to a minimum (see Figure 1). If just a simple ambient sensing, on/off controller were used, the RIM cover temperature would range anywhere from 40°F during harsh winter storm conditions (10-15°F, snowing, windy) to 70°F during milder winter conditions (25-32°F, calm, sunny). Figures 2 and 3 show the relative energy consumption for an ambient on/off controlled system versus the HECS for two winter days.

The HECS reduces energy consumption by 40-60% during mild winter days and by 10-40% during colder and stormy winter days. For the average winter, energy savings should average around 30%.

EXAMPLES OF STEADY STATE POWER VERSUS AMBIENT CONDITIONS:

<table>
<thead>
<tr>
<th>Weather Conditions</th>
<th>Percent of Steady State Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>27-30°F, Light Winds</td>
<td>20-25%</td>
</tr>
<tr>
<td>27-30°F, Strong Winds</td>
<td>35-50%</td>
</tr>
<tr>
<td>20-25°F, Light Winds</td>
<td>40-60%</td>
</tr>
<tr>
<td>20-25°F, Strong Winds</td>
<td>50-70%</td>
</tr>
<tr>
<td>10-15°F, Light Winds</td>
<td>60-90%</td>
</tr>
<tr>
<td>10-15°F, Strong Winds</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 1 - Energy loads for various weather conditions
LOW AMBIENT TEMPERATURE OPERATIONS

Since snowmelt at the roof/snow interface depends on the roof snow depth, ambient temperature, roof design, and building insulation, there are low ambient temperature conditions when no snowmelting occurs. For new construction in heavy snowfall areas, temperatures below a 0-10°F range will most often create “no snowmelting” conditions. The HECS includes a control panel mounted solid state controller and an eave soffit mounted RTD temperature sensor. The temperature at which the RIM System turns on can be set at the control panel and is adjustable (recommended 34-38°F). In addition, the low-temperature cutout feature can be set at the control panel (recommended 0-10°F) and can then be adjusted up or down based on the local winter conditions for the building. For example, if 10°F is the proper low temperature cutout set point and the winter had 150 hours below 10°F, up to 10% energy savings can be realized when compared to a control system Figure 4 demonstrates how the low temperature cutout option would typically operate. without the low temperature cutout option operating.

SUMMARY

When compared with standard ambient-only temperature control, the High-Efficiency Control System will provide up to 30% energy savings for a typical winter. In addition, up to 10% more energy savings can be realized when using the low temperature cutout feature.

SPECIFICATION

NEMA 4/12 enclosure
Up to 18 branch circuit breakers with ground fault protection
Multiple separate control zones available
Accommodates 1-phase or 3-phase incoming power
Ambient controller displays sensed ambient temperature and heater-on set point
RIM panel controllers display sensed RIM panel temperature and set point

UL approved panel

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