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Low-E Ceilings: Benefits, Costs and Tips

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Low-emissivity (low-e) arena ceilings have been around for about 20 years and yet there is still some misunderstanding of their purpose and why they are beneficial in ice arenas. Some people believe that if they have a white ceiling that is insulated a low-e ceiling will not help them. Others believe that a low-e ceiling will make the arena colder.

The fact is that a low-e ceiling works because the material it is made of has a very low potential to transfer radiant energy. Most objects and materials including bright white-faced insulation have an emissivity factor of .9; this means they are 90 percent efficient in transferring their radiant energy to other objects. A good low-e ceiling has an emissivity factor of .03, or is 3 percent efficient in transferring its radiant energy. Like infrared heaters, radiant energy never heats the air; it only heats the objects it strikes - your ice surface.

Radiant energy will always flow from objects at a higher temperature to objects at lower temperature. The greater the temperature differential, the faster the rate of heat transfer. Since your arena ceiling is always warmer than your ice surface, there is a constant transfer of radiant energy to the ice. When a low-e ceiling is installed over the ice sheet, it interrupts the flow of radiant energy to the ice. This reduces the heat load on the ice sheet by as much as 20 percent. Radiant energy always flows perpendicular to the surface that is emitting it; therefore walls or ceilings outside the ice sheet will not see a heat load reduction benefit from a low-e covering.

An incidental but very beneficial side effect of the low-e ceiling is that it is highly reflective. This substantially increases the perceived light level and may allow you to decrease the number of light fixtures, resulting in even greater energy savings.

Retrofit cost

Installed costs average $1.15 to $1.50 per square foot depending on material grade and netting requirement. A 25,000-square-foot arena should cost somewhere around $30,000 for a high-quality installation.

Utility incentives

Electric utility rebates are a customized calculation that may allow you to receive a rebate of up to 50 percent of the installed cost. Some utilities will finance the net cost of the upgrade after rebates. Low-e ceilings are standard technology for a specialized purpose; therefore you may need to educate your utility engineer a bit on how to calculate the energy savings.

Tips and suggestions

o Retrofit ice lighting in conjunction with the ceiling project to reduce fixture requirements and eliminate the need for patching the ceiling when you change lighting after a ceiling has been installed.

o If you have natural light sources in your arena, be sure to extend the ceiling to them to reflect the natural light down and gain full advantage of it.

o If you control your ice temperature by brine or slab temperature, raise the ice set point by 2-4 degrees to achieve the same surface temperature and reduce chiller energy consumption.

o Be careful not to cover ventilation or heat detectors/sprinklers with your new ceiling.

o Choose a higher-grade tear-resistant material; it will resist damage from errant pucks or sticks and look good for a longer period of time.

o Protect your ceiling with netting over the end zones when the height of the ceiling is less than 25 feet to prevent tears and damage from deflected pucks.

o Leave space at all sides and above the ceiling for air flow and direct a small portion of your dehumidified air above the ceiling.

o Incorporate the installation of netting around your ice into your ceiling project. The install will cost less with the contractor already mobilized.

Excerpted from the presentation "Facility Facelifts: New Luster for Old Facilities." Rob McBride is the owner and president of Facility Management Corp