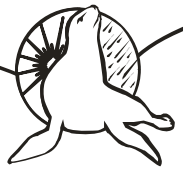


Reflective Coatings: Steps to Efficient Roofs

Source/Author: James Piper

Routine maintenance, the right materials and reflective coatings can improve the energy performance of most facilities

Although often ignored until they fail, roofs can be assets that help facility professionals control energy costs. By carefully planning a roof replacement project, facility professionals can improve the performance of their roofing systems, while decreasing the roof's contribution to the building's energy load.

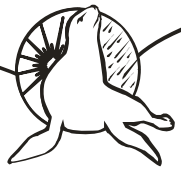
Trying to improve the energy performance of a roof without considering other issues can be a frustrating, if not fruitless experience. A roof's performance depends on more than just its ability to reject or retain heat.

There are four basic steps that facility professionals can take to improve the energy performance of roofs: implement a comprehensive maintenance program, select the right type of replacement roof, improve the roof's insulation, and add a reflective coating to the roof's surface to decrease the rate at which the roof absorbs solar energy.

A program of scheduled semiannual inspections - one conducted in the spring and the other in the fall - will help identify problems that can be corrected well before they require extensive and costly repairs. Split seams, separated layers, failed flashings, clogged roof drains, surface punctures and cracks all allow water to penetrate the roof membrane and destroy the thermal integrity of the underlying insulation. Repairing those defects promptly will help maintain the roof's thermal efficiency and extend the service life of the roof.

Roof maintenance programs must also limit the roof's exposure to damage by both building occupants and maintenance personnel. Roof access must be limited to authorized personnel, minimizing foot traffic and its potential damage. Pads and pavers should protect areas surrounding rooftop mechanical and telecommunications equipment. Any new equipment installations that penetrate or are mounted on the roof should be reviewed and approved by the facility department and then inspected after completion.

Even with a good maintenance program, all roofs eventually need to be replaced.



Constant exposure to the elements breaks down roof materials, destroying their ability to perform. When that happens, additional repairs are no longer cost effective, and the roof should be replaced or recovered.

Too often, however, a replacement roof is selected without considering how well it is suited for an individual building. In most cases, the existing roof is simply replaced with a new one of the same type and construction, even if it was the wrong roof to start with.

The first step in replacing a roof is to evaluate its performance. In some cases, the roof may have failed simple from old age. But in other cases, specific contributing factors can be identified. Roof deck structural failure, inadequate slope, frequent foot traffic, and insufficient expansion joints are all factors that contribute to early roof failure.

Because each roof design reacts differently to those factors, it is essential to consider how each roofing option will react under various conditions.

One option facility professionals have is to cover the roof with a new membrane. In making that decision, take into consideration the overall condition of the existing roof, load-carrying capacities of the roof structure, and the condition of the insulation on the existing roof.

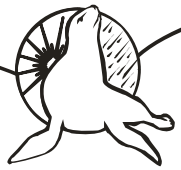
In general, deteriorated roofs or those that have large areas of wet insulation are better candidates for total replacement than simple recovering. Recovering projects typically cost between one-third and one-half the expense of a total roof replacement, but they do not improve the thermal performance of the roof.

In most cases, the only way to improve a roof's thermal performance is to install more insulation when the roof is replaced.

One exception is when insulation can be attached to the lower surface of the roof deck. To be effective, the insulation must be fully adhered to the deck and installed with a new vapor barrier on the building's interior.

When the insulation is installed, make certain that all water lines mounted on or near the roof deck, such as sprinkler lines, are protected enough to keep them from freezing. Depending on the application, costs for the insulation upgrade range from $50 to $100 per square foot. The energy savings payback takes from five to ten years.

When replacing a roof, upgrading insulation is more involved than just specifying thicker insulation or insulation with a higher R-value.



The type of insulation selected as well as its thickness must be compatible with both the roofing system and the load-carrying capabilities of the supporting structure. Failure to work closely with the roofing manufacturer and a structural engineer may result in a replacement roof that is unsound or unsafe.

If the roof's supporting structure can hold the weight of additional insulation, and the roof design is compatible, the cost of that upgrade is relatively small in comparison to the total cost of the roof replacement project. For example, adding an inch of extruded polystyrene insulation (R5) to a roof increases the total project cost by less than $10 per sf or between 5 and 10 percent of the total replacement project cost.

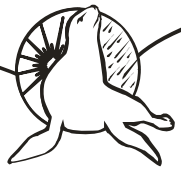
One of the most cost-effective ways to enhance a roof's ability to reduce a facility's energy use is to add a reflective coating. In addition to reducing the load on the building's air conditioning system, reflective coatings can extend the life of a roof. The latest generation of reflective coatings is thick, easy to apply, and provide an additional level of protection from water.

Coatings improve the energy efficiency of a roof by reflecting a major portion of the sunlight. Most dark roof surfaces, such as asphalt and black rubber membranes, absorb between 70 to 90 percent of the solar energy that strikes them. On a windless day, this solar energy can raise roof temperatures as high as 150°F; increasing the building's air conditioning load as the heat is transferred through the roof into the conditioned space.

By covering the roof's surface with a reflective coating, 70% or more of the solar radiation can be reflected from the roof, lowering roof temperatures to typically no more than 20 to 25 degrees higher than ambient temperatures. The results are lower cooling loads and a lower peak electrical demand for the facility.

Lower roof temperatures also extend the life of a roof. Ultraviolet rays in sunlight attack rubber roof materials, causing them to dry out. The heat contained in those ultraviolet rays break down roof materials. By reflecting the rays, reflective roof coatings help retard the rate of roof deterioration.

Although most roofs can benefit from reflective coatings, there are some types the can benefit more than others. The lower the R-value of the roof insulation, the greater the potential benefit that can be achieved through the use of reflective coatings. As a rule of thumb, it is cost-effective to install reflective coatings on any roof with an R-value of less than R-11 or on buildings located in geographic regions with hot sunny summers. It is especially beneficial with the area of the roof is large in comparison to the building's total area.



Reflective roof coatings must be matched to the type of roof installed. Components in the roof coating must be compatible with the materials used to construct the roof.

Prices of the coatings vary with the type and configuration of the roof. Typical paybacks for the coatings based solely on energy savings are between one and three years.

To make sure the project delivers the type of payback expected, begin planning for the replacement of a roof well in advance of the actual project. Reviewing inspection and maintenance data will help when a roof needs to be repaired or replaced.

When the roof does need to be replaced, determine the best type for the building. Decide if the roof's deck and supporting structure can carry the load of an additional insulation.

For roofs that are not in need of replacement within five years, consider applying reflective coatings to reduce solar heat hain and to extend the service life of the roof.

By taking these actions in a comprehensive roof management program, facility professionals can reduce the energy requirements of their facilities while improving the performance and extending the lives of their roofs.

Energy Seal Coatings

"There are four basic steps that facility professionals can take to improve the energy performance of roofs: implement a comprehensive maintenance program, select the right type of replacement roof, improve the roof's insulation, and add a reflective coating to the roof's surface to decrease the rate at which the roof absorbs solar energy."

Energy Seal Coatings are an ideal choice for the facility professional who wants to decrease the rate at which a roof absorbs solar energy.