

COOL ROOFING

A Factsheet from Austin Energy's Green Building Program

The reflectivity and emissivity of various roofing choices can have a significant impact on the cooling load of your building. The higher the reflectivity and emissivity, the cooler the roof surface will be. According to Department of Energy research, 1 additional percentage of reflectivity on average, will reduce roof temperature by 1^o.

What Are Reflectivity and Emissivity?

Solar reflectivity is the ability of a material to turn away or deflect a fraction of the radiant heat generated by the sun. Sun light that is not reflected is converted into heat that is dissipated through conduction, convection, or radiation. Conduction and convection usually draw heat into the interior air of a structure. Heat that is not dissipated through conduction or convection is radiated away from the roof in the form of far infrared light. The tendency to radiate heat is known as emissivity. The higher the emissivity, the more quickly an object will cool itself through radiation.

Energy Star Guidelines

Energy Star guidelines for cool roofs are broken into two categories: low-slope roofs, less than 2:12 pitch and steep-slope roofs, 2:12 pitch and greater. The guidelines for low-slope roofs call for initial solar reflectance of at least 65% and a maintained solar reflectance after three years of at least 50%. The guidelines for steep-slope roofs call for initial solar reflectance of at least 25% and a maintained solar reflectance after three years of at least 15%. Emissivity is not a requirement of Energy Star.

Cool Roof Rating Council (CRRC)

The CRRC was created to develop methods for evaluating and labeling the solar reflectance and thermal emittance of roofing products in an accurate manner and to disseminate the information to all interested parties. To see a listing of CRRC rated products, go to http://www.coolroofs.org/pdf/productlisting_0703.pdf.

Benefits of Cool Roofing

- Reduce cooling energy use. A cooler roof transfers less heat to the building below, so the building uses less energy for cooling.
- Improve building comfort. Besides lowering energy use, buildings with cool roofs tend to be cooler and more comfortable inside. Whether or not your building uses air-conditioning, a cool roof can help it stay more comfortable in the summertime.
- Reduce heat island effect. By using cool roofing materials, the average surface temperature of an entire community can be reduced, making summertime temperatures cooler and more comfortable for everybody.
- Reduce air pollution. The use of cool roofing both directly and indirectly reduces air pollution. Direct reduction in air pollution comes about because less cooling energy is used, so fewer power plant emissions are produced. Indirect air pollution reductions can occur if cool roofing is used widely enough throughout an area to reduce the heat island effect, and thus reduce smog formation.
- Reduce building maintenance expenses. Cool roofs last longer since they are protected from both ultra-violet and thermal degradation. Roofing materials contract and expand daily as they heat up during the day and cool down at night. Cool roofs have smaller daily temperature fluctuations which means less thermal fatigue.
- Reduce roofing waste to landfills. Cool roofing is likely to have a significantly longer life than traditional roofing materials. With an increased life span, waste can be greatly reduced and the energy and materials needed to produce new roofing can be conserved.

Resources

Roofing Products

[Energy Star Roofing Products](#) 1-888-STAR-YES

[Sarnafill](#) (Membrane roofing systems) 1-781-828-5400

[Microteja](#) (Cool roof coatings) 1-512-750-9429

[Shepard Color Company](#) (Reflective and emissive paints) 1-513-874-0714

Urban Heat Island Information

[Summary of Cool Roof research project in Austin](#)

[International Council for Local Environmental Initiatives](#)

[US EPA Heat Island Reduction Initiative \(HIRI\)](#)