



Energy Star How to Buy Cool Roofs

Source/Author: EPA

Information about energy-efficient energy star cool roof products in this section includes the following:

Efficiency Recommendation ^{a,b}				
Roof Slope	Recommended Solar Reflectance ^{c,d}		Best Available Solar Reflectance	
	Initial	3 Years after Installation	Initial	3 Years after Installation
Low-slope (<2:12)	65% or greater	50% or greater	87%	85%
High-slope^e (>=2:12)	25% or greater	15% or greater	77%	60%

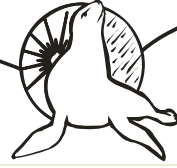
^a Roof products include single-ply membranes, built-up roof surfaces, asphalt shingles, metal roof tiles, and roof coatings.

^b Following this recommendation will provide the greatest benefit where cooling energy costs exceed heating costs.

^c Solar reflectance, or albedo, is the fraction of incoming direct and diffuse solar radiation reflected by a surface. Materials with high solar reflectance values absorb less of the sun's energy and therefore stay cooler, reducing daytime air conditioning requirements.

^d To receive these solar reflectance ratings, roof products must be tested when new and after three years of exposure, according to ASTM E-903 and the Energy Star Roof Products Memorandum of Understanding (see [For More Information](#)). Initial reflectance may decrease over time, depending on the product, due to aging, dirt, and microbial accumulation.

^e For products that can be installed on both low- and high-slope roofs, "low-slope" guidelines should be followed.



Cost-Effectiveness Example				
Performance	Base Model		Recommended Level	
Roof Product Description	Black EPDM ^a		White EPDM ^a	
Initial Solar Reflectance	6%		69%	
3-Year Solar Reflectance	8%		58%	
Geographic Location				
	Washington, DC	Phoenix	Washington, DC	Phoenix
Annual Heating Energy Use (therms)	870	46	930	60
Annual Cooling Energy Use (kWh)	20,700	40,400	19,300	37,300
Annual Energy Cost	\$1,590	\$2,440	\$1,530	\$2,260
Lifetime Energy Cost^b	\$17,100	\$25,600	\$16,500	\$23,800
Lifetime Energy Cost Savings	—	—	\$600	\$1,800

^a EPDM, Ethylene-Propylene-Diene Monomer, is a thermoset elastomer single-ply roofing membrane. Both examples assume that membrane is fully adhered or mechanically attached.

^b Lifetime energy cost savings is the sum of the discounted value of annual energy cost savings, based on average usage and an assumed roof life of 15 years. Future energy price trends and a discount rate of 3.4% are based on Federal guidelines (effective from April 2000 to March 2001).

Cost-Effectiveness Assumptions: The examples shown above are from simulations using a modeling program called DOE2. Calculations are based on a prototype building: 4,900 sq.ft., one story, flat roof, R-11 attic insulation, R-7 wall insulation, with an average existing efficiency gas furnace and central air conditioner. Assumed electricity price: \$0.06/kWh, the Federal average electricity price in the U.S. Assumed gas price: \$0.40/therm, the Federal average gas price in the U.S.



Where to Find "Cool" Roof Products

The Federal supply source for roof products is the General Services Administration (GSA), which offers them through Federal Supply Schedule 56-IV(A), "Construction and Building Materials."

In order to reduce cooling costs, be sure to specify roof products that meet the recommended levels, whether buying from GSA or through a contractor. All products with the EPA/DOE ENERGY STAR™ label meet this efficiency recommendation.

Buyer Tips

There are three properties to look for when selecting a roof material to reduce building cooling load: 1) high solar reflectance, 2) endurance of high reflectance over time, and 3) high emittance. The ENERGY STAR™ program presently considers reflectance only, not emittance. High emittance lowers roof temperature by increasing the release of heat by thermal radiation. To ensure a high-emittance roof, avoid unpainted metal roofs and aluminum coatings. If installing a metal roof, make sure it is painted a light color (not with a clear coating).

Installation and Usage Tips

Choose an installer carefully to ensure proper installation of the roof product or roof coating that will maximize durability and solar reflectance. The National Roofing Contractors Association (NRCA) provides some helpful advice in its "Guidelines for Selecting a Roofing Contractor" (available on the NRCA Web site. Roofs should be properly examined at regular intervals and maintained or cleaned when necessary and appropriate to assure the maximum solar reflectance.

For More Information

- EPA lists vendors of ENERGY STAR™ roofing products and offers other information to help select energy-efficient roofing.
- Lawrence Berkeley National Laboratory provides valuable information on energy-efficient roofing, including the solar reflectance and emittance of various roof materials.
- National Roofing Contractors Association (NRCA) provides a number of helpful guides on roofing products and installation.
- Lawrence Berkeley National Laboratory provided supporting analysis for this recommendation.



Compare Energy Star efficiency recommendation to Energy Seal Coatings

Efficiency Recommendation ^{a,b}				
Roof Slope	Recommended Solar Reflectance ^{c,d}		Best Available Solar Reflectance	
	Initial	3 Years after Installation	Initial	3 Years after Installation
Low-slope (<2:12)	65% or greater	50% or greater	87%	85%
High-slope ^e (>=2:12)	25% or greater	15% or greater	77%	60%

Energy Seal Coatings				
Roof Slope	Acu-Shield		Acu-Shield: Ceramic	
	Initial	3 Years after Installation	Initial	3 Years after Installation
Low-slope (<2:12)	89%	85%	88%	84%
High-slope ^e (>=2:12)	88%	84%	89%	82%