

An Energy Friendly Combination

Reflectance and emittance are both important to the temperature that a roof will reach in direct sunlight, as are other factors such as insulation in the roof.

The solar reflectivity and emissivity requirements for several green design programs can be found in the chart below.

Cool Roof Energy Initiatives and Criteria ⁽¹⁾			
Organization	Solar Reflectance		Thermal Emittance
	Low Slope	Steep Slope	
ENERGY STAR 2.0	0.65	0.25	Must report but no minimum required
LEED-NC 2.1	0.65	0.25	0.9
LEED-NC 2.2	SRI = 78 About 0.70	SRI = 29 About 0.32	Included in SRI About 0.85
ASHRAE ⁽²⁾	0.70	0.65	0.75
CRRC/California Title 24	0.70	N/A	0.75
State and Local	Most regulations are voluntary or relate to energy credits. A large number reference one of the above.		

(1) This chart is accurate as of fall 2007

(2) American Society of Heating, Refrigeration and Air Conditioning Engineers

Solar Reflectivity Explained

A common theme in green design is the importance of building components with a high solar reflective value. Solar reflectance or reflectivity is the fraction of energy reflected over energy incident on the surface. It is the deflection of solar energy from a surface. The greater the amount of solar energy reflected from a surface, the less energy the building will need to cool down. This is especially important in the south.

Ultraviolet, visible and infrared spectra are the components of natural sunlight. A compilation of these three components is measured to determine the reflectance value of a surface: infrared radiation 42%, visible light 52%, ultraviolet 6%. Reflectivity is expressed as a value ranging from 0.00 to 1.00. The higher the number, the more heat is reflected away.

Emissivity Explained

High emissivity also plays a role in saving energy in warmer climates. Emittance or emissivity is the fraction of power radiated as thermal infrared over the amount radiated by a blackbody. It is related to the amount of energy radiated, or the radiation efficiency. The greater the emissivity, the greater the ability of a surface to cool itself through radiative heat loss. The faster a surface can cool down, the less energy the building needs to be cool.

Emissivity values are expressed from 0.0 to 1.0. A higher number indicates a more efficient radiator. The closer the value is to 1.0, the more efficiently heat is emitted.