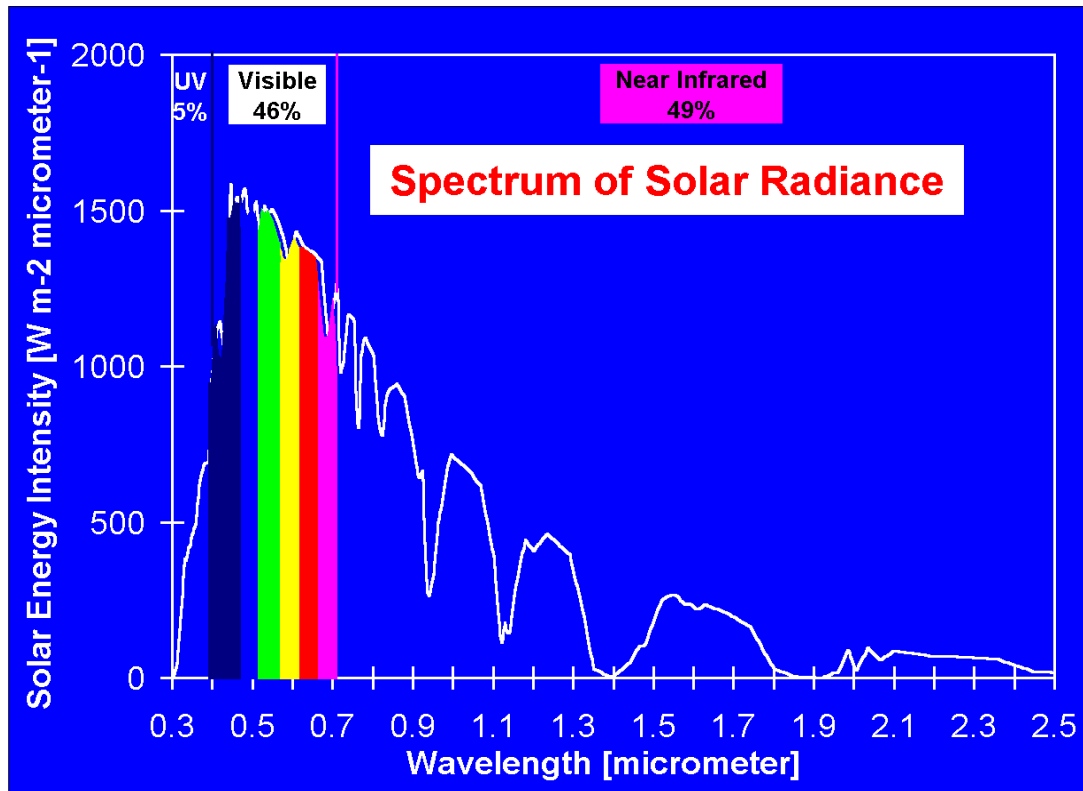
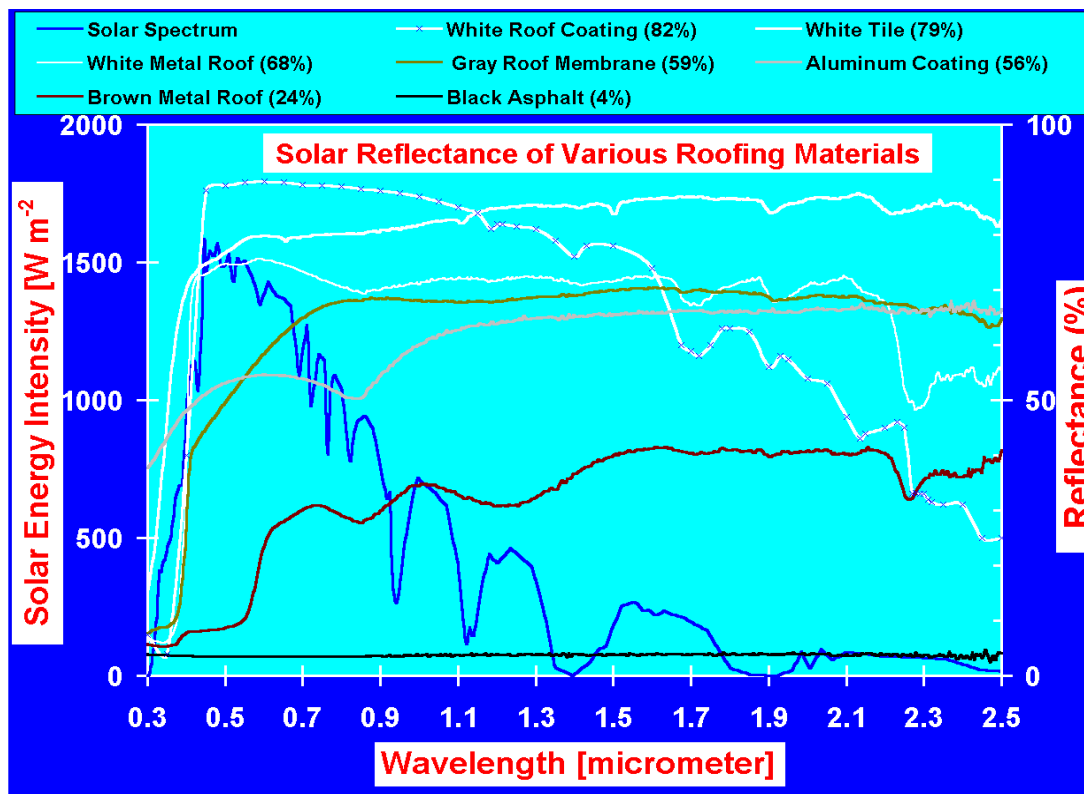


# Cool Roofing Materials Database

## Introduction



A portion of the sun's incident energy inevitably finds its way into the buildings on which it falls. In the summertime, this unwanted heat energy causes discomfort and requires the use of extra energy for air conditioning. Since the summertime sun rises high in the sky, the sun's radiant energy falls mainly on the roof, with east and west walls of buildings also receiving a significant share. (In the wintertime, the desirable solar flux falls mainly on the south facade.) The purpose of this Cool Roofing Materials Database is to assist with the selection of roofing materials which reflect, or otherwise reject, the sun's radiant energy, before it penetrates into the interior of the building.



One of the best measures for keeping solar heat out of buildings is simply to use reflective roofing materials. Then, the sun's radiant energy is simply reflected back toward the sky from which it came. In fact, reflective materials also help keep the building's environment (i.e., the city) cool, by reflecting solar energy back out into space. A purpose of the Database is thus to provide a tabulation of solar reflectances of ordinary building materials. Conventional white materials and coatings are rather good from this standpoint. Besides high solar reflectance, a high infrared emittance is also desirable. Infrared emittance is a measure of the ability of a surface to emit its energy in the form of heat radiation. Fortunately, most roofing materials (excepting bare metals) have a high infrared emittance. Also desirable is good convective heat transfer: as the roof heats in the sun some of the heat can be carried away by the outside air. In some roofing systems air can circulate underneath the outer roofing material (e.g., tile and wood shake systems). Attic venting also can be used to intercept heat before it penetrates into the conditioned space. Finally, of course, thermal insulation is effective in reducing, but not eliminating, the flow of unwanted heat.

- While the Cool Roofing Materials Database focuses on the important issue of keeping the building cool, one should not overlook the fact that the primary function of a roof is to keep out all the elements of the weather! A roof must last for decades, with minimal maintenance, and at a reasonable cost. Factors which can shorten the lifetime of a roof include ultraviolet radiation from the sun, freeze-thaw cycles, wind, rain, damage from foot traffic, biological growth, chemical reactions with air pollutants, thermal expansion stresses due to temperature changes, poor installation, etc. Thus, if a cooler material is inferior from a cost or lifetime point of view compared to a warmer material, it's not a good deal. It's important to find a contractor or supplier who has experience with the materials to be used, and who will stand behind the quality of the work.