

How and Why Cool Roofs Work

There are two things that keep a roof cool.

High reflectivity - High emissivity

Cool roof coatings reflect 70% to 90% of the sun's energy when newly installed. Most of the energy is radiated away. Conventional roofing materials have reflectivity of 5% to 25%, meaning they absorb 75% to 95% of the sun's energy. A typical "white" cap sheet roof only reflects 25% of the sun's energy. The absorbed energy is transferred to the building.

Emissivity is the ability to radiate away absorbed heat. Most cool roof coatings emit 90% or more. Even though aluminum coated roofs are highly reflective they are not considered a cool roof because they only emit 50% to 60% of the absorbed energy.

In southern California conventional roofs can get up to 180° on hot sunny summer days. A cool roof coating keeps the roof at just 10°-15° above the air temperature. This means a cool roof can be 80° to 90° cooler than a conventional roof.

Ambient temperature 55° F

Roofing Material	Degrees F
Black acrylic paint	142°
Galvanized steel	138°
"White" fiberglass cap sheet	118°
Clay terra cotta tile	112°
Red acrylic paint	106°
White acrylic paint	74°
Hyper white acrylic paint	65°

Even at relatively cool temperatures there is a big difference in how much heat is absorbed. The chart on the left, done by Lawrence Berkeley National Laboratory, demonstrates how different roofing materials are affected on a sunny day when the air temperature was only 55°.

Cooler roof surfaces means less heat is transferred into the building. If you air condition your building you will save money on cooling energy. How much you will save depends on many factors including roof insulation, cooling system equipment and other variables. In the right situation, a reflective roof can bring **cooling savings of up to 50%**¹, with a reduction in peak cooling demand of 10% to 15%.

Your Roof Will Last Longer With A Cool Roof

Two enemies of long roof life are heat and ultraviolet light.

In the cool of the evening, a roof contracts. During the day it expands due to the heat it absorbs. This constant movement is called thermal shock. Roofs with a cool roof coating do not experience large temperature fluctuations so there is less stress on the roof membrane.

On a cloudy day at the beach you can get severe sunburn because of the ultraviolet rays of the sun. Your roof is affected by ultraviolet light even on cloudy days. Heat from the sun accelerates the breakdown process of your



Photo of Rohm and Haas Co. Philadelphia

This photo shows the effects of weathering over a 20-year period on a portion of an untreated roof. The remainder of the roof was coated with an acrylic roof coating about 10 years after it was built, and has resisted additional weathering.

roof. An acrylic coating not only reduces heat dramatically, it blocks 100% of ultraviolet light!

A Cool Roof Coating Pays For Itself Over Time!

A considerable sum of money will be saved each year on lower energy costs with a cool roof

Roof life will be significantly increased. In fact, according to an article written by an expert on cool roof research, Dr. Gartland; “Cool coatings are assumed to greatly slow down, if not stop, the aging process of the underlying roof materials...they can be applied indefinitely for decades before the old roof must be torn off and replaced”².

Are All Cool Roof Coatings Equal?

Some coatings start out as very reflective but after a few short years, they lose much of their reflectivity.

CRRC (Cool Roof Rating Council) list of field applied roof coating products. This list gives an unbiased rating on the performance of competing materials. The following is a list of some of them. The full list can be examined online at www.coolroofs.org



Advanced coatings Acu-Shield material was used on this school roof. The coating will block 100% of ultraviolet light and the roof will stay 85% reflective, even after 3 years.

Company Name	Brand	Model	Initial Solar Reflectance	Solar Reflectance after 3 years
Advanced Coatings Systems	Energy Seal Coatings	Acu-Shield	.89	.81
Advanced Coatings Systems	Energy Seal Coatings	Acu-Shield: Ceramic	.86	.78
Elastomeric Roofing Sys.	ERS	Eraguard 500	.86	.60
Hydro-Stop, Inc.	Premium Coat Finish White	2003-015	.79	.70
Insulating Coatings Corp.	ASTEC	#900	.85	.75
Karnak Corp.	Karnak	501 Elasto-Bright	.86	.77
Republic Powdered Metals	Solarguard Hy-Build	15107000	.80	.67
Topps Products, Inc.	Topps Seal	#9100	.88	.71
United Coatings	Roof Mate	Roof Mate w/ Acrysheen	.83	.60
Gardner Asphalt	APOC	#248	.87	.74
Henry Company	Henry	#280	.88	.73
Henry Company	Henry	#589	.85	.75
Metacrylics	Metacrylics	Acrylic White	.87	.71
National Coatings	Acryshield	A600	.83	.76
Thermo Manufacturing	Thermolastic	Solar Shield	.87	.80

Tremco, Inc.	Tremco	Polarcote	.83	.66
Western Colloid	Western Colloid	720 ARC	.84	.75
Superior Products	Super Therm	Ceramic Coatings	.83	.74
Structural Elastomeric Products, Inc.	E-las-tek	#109 Solar Magic	.84	.81
Gardner-Gibson	Sta-Kool	780 White Elastomeric	.87	.72
Sherwin-Williams	Kool Seal	Premium White	.85	.57
Sherwin-Williams	Snow Roof	White Elastomeric	.81	.57
Sherwin-Williams	Uniflex	41-500	.85	.57
American Weatherstar	American Weatherstar	Silicone 410 White	.84	.66
Gaco Western, Inc.	Gecoflex	S2000	.88	.63

Of the hundreds of acrylic products that are on the CRRC list, Advanced Coating Systems, Energy Seal Coatings ranks at the top in long-term solar reflectance.

¹ Rita Tatum Cool Roofs Hot Topic

² Dr. Lisa M. Gartland Cool Coatings Heat Up Savings

If you keep your roof coated, you may never have to re-roof again!