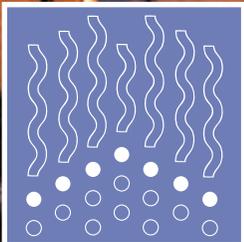




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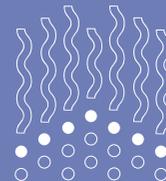
# ULTRA-Cool<sup>®</sup> Coatings

*COLOR THAT'S COOLER!*





# Cool History



PPG is home to the *ULTRA-Cool*® system. Introduced in 2001 as the metal building industry's first commercialized cool coating, *ULTRA-Cool* coating is the latest technology from a company that has been an industry leader in developing innovative, energy-saving coatings for metal roofs, side walls and building components.

*ULTRA-Cool* coatings represent an important breakthrough in metal coatings because they help customers meet regulatory and environmental requirements while giving architects and building owners a full palette of colors that fulfill their color and design demands.

PPG is a pioneer in the cool coatings industry. The company worked with ENERGY STAR® to develop the cool roofing program and was the first manufacturer to register a factory-applied cool roof coating for metal.

PPG scientists and engineers also have worked closely with the Oak Ridge and Lawrence Berkeley national laboratories, as well as the Cool Roof Rating Council (CRRC), Cool Metal Roofing Coalition (CMRC) and the U.S. Green Building Council (USGBC) to develop and promote rigorous performance standards.

As a result of these and other efforts, PPG has more than 250 cool roof colors listed with CRRC and more than 300 registered with ENERGY STAR, with more to follow.

Finally, PPG actively participates in organizations that promote the benefits of metal building and construction projects, such as the Metal Construction Association, Metal Roofing Alliance, National Coil Coaters Association and others.

## What is Cool?

PPG offers four premium *ULTRA-Cool* coatings for metal substrates: *Duramar*®, *Duramar Sunstorm*® and *Duramar VARI-Cool*® coatings, which are PVDF technologies, and *Durastar*® SMP coatings, which are formulated with siliconized polyester. These coatings have significantly higher solar reflectance values than conventional metal roof coatings made in the same colors, which leads to energy savings and cooler interior spaces.

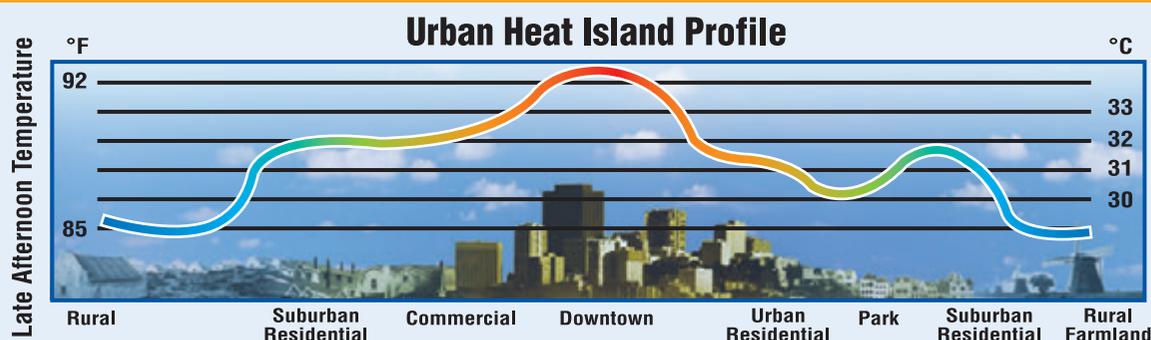


# The Problem:

## Heat Islands and High Energy Consumption



- The exponential growth of urban areas produces a negative environmental phenomenon called “Urban Heat Island” effect. Heat-absorbing roofs are among the chief contributors to Urban Heat Islands.
- The temperatures in the air above Urban Heat Islands are typically several degrees hotter than the surrounding suburbs.
- Because they increase human discomfort, higher-than-normal temperatures generate higher air-conditioning costs, greater energy consumption and more energy-related pollution.
- The increased heat and energy production leads to alarming increases in smog and ozone.





# The **ULTRA-Cool**® Coatings Solution *Color That's Cooler!*



Tests prove that on a 90-degree day, a white roof will only have a temperature of 110 degrees F at its surface, compared to 190 degrees F for a black roof. Despite the energy savings of white roofs, however, builders and architects desire a wider range of color options. The solution: PPG's **ULTRA-Cool** coatings, which offer high heat reflectivity without sacrificing color choices.

## **The Benefits of ULTRA-Cool Coatings**

- Heat is reflected away from buildings.
- Lower environmental temperatures help reduce smog levels.
- Cooler interior spaces help save the cost of energy used for cooling.
- The life expectancy of the roof itself increases due to less expansion and contraction.
- Monetary incentives, such as tax credits, are increasingly being offered for switching to reflective roofing products.
- All the advantages of greater reflectivity are available without sacrificing color choices.
- Tests have proven that coated metal is superior to many other materials, including asphalt shingles in initial and aged irradiative properties.
- Metal roofing utilizes a high percentage of recycled content and, at the end of its useful life, is 100% recyclable.
- "Oil canning" is reduced in metal roofing coated with PPG's low-gloss/low-sheen **Duranar**® coatings in combination with **ULTRA-Cool** technology.
- PPG has a history of innovation and is a leader in developing coatings technologies for the future.

*When these advantages are added to the generally recognized benefits of metal roofing—greater fire resistance, lighter weight, seamless integrity, color choice and long life—ULTRA-Cool coatings are a wise choice for you and for the environment.*



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# The Case for Cool



Data collected by many groups quantify the benefits of PPG's **ULTRA-Cool**® technology, and the benefits of cool metal roofing.

- Reflectance and emissivity degradation data reported by the ORNL, for panels exposed in different regions of the United States, show only a 5 percent loss in reflectance for an exposure period of three years for low- and steep-slope roofs. Other roofing substrates, such as PVC and EPDM, lose reflectance much sooner and require a high degree of maintenance to equal the performance of metal roofing with PPG **ULTRA-Cool** coatings.\*

## Cavalli Hills Case Study

A home with a cool metal shake roof (TSR=0.31) was compared to an identical home with a conventional metal roof (TSR=0.08). A 10 percent, reduction in air-conditioner usage was realized. The cool roof reduced heat gain through the roof deck, which reduced power consumption. (See line chart below.)

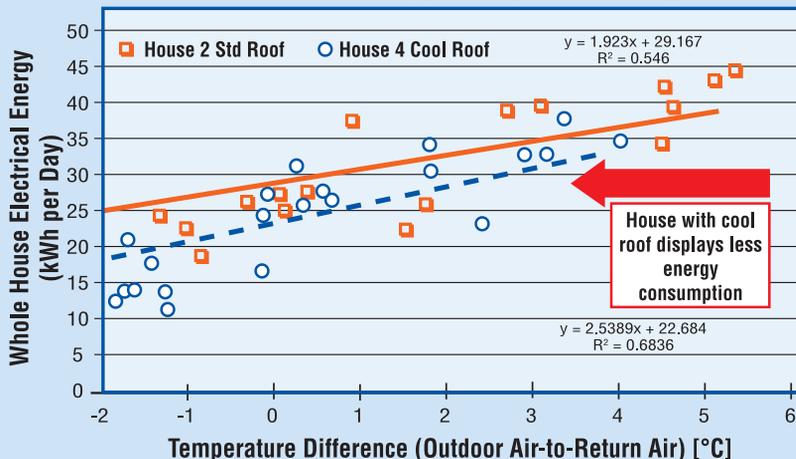
\*Data available on request.

## Examples

### Five Year South Florida Exposure Data

Product Code	Product Description	Solar Reflectance Retention	Thermal Emittance Retention	Color Change (ΔE)	Gloss Retention
872G15	Moss Green	99.13%	101.18%	.49	99.64%
872T3	Medium Bronze	99.80%	98.84%	.61	99.31%
872T15	Midnight Bronze	98.83%	100.00%	.22	80.07%
872G16	Forest Green	102.65%	100.00%	.03	97.72%
872K8	Black	102.07%	97.70%	.11	99.12%
872D6	Gray	100.00%	101.15%	.37	99.14%
870R3	Rojo Janitzio	97.73%	100.00%	.16	100.00%
<b>Overall Average</b>		<b>99.82%</b>	<b>99.84%</b>	<b>.28</b>	<b>96.43%</b>

### Whole House Energy vs. ΔT (24 Hour Period)



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# When it has to be very special, make it **VARI-Cool®** coatings

*Duramar® VARI-Cool* coatings, the latest in the *ULTRA-Cool®* family of products by PPG, is a fascinating, pearlescent coating with extremely high quality and superior durability, color-fastness, and gloss retention. *Duramar VARI-Cool* coatings are produced with special-effect pigments made from silicon-dioxide platelets that are specially coated with metal oxides.

These pigment particles create color travel, which allows colors to change subtly depending on the viewing angle and on how light refracts their surface area. PPG offers 17 standard colors in six different color groupings, with names such as *Mesa Sunrise*, *Serengeti Oasis*, *Jamaican Reef*, *Kaleidoscope* and *English Garden*.

Primary applications of *Duramar VARI-Cool* coatings include metal roofing and wall panels, aluminum composite parts and accent trim, with possible future end uses, such as household appliances, interior wall and ceiling systems, and extrusions. This new formulation also adapts easily to classical or modern architectural designs.

*Duramar VARI-Cool* coatings are not only beautiful and stimulating, they also are the only coil-formed polychromatic coatings that integrate energy-saving *ULTRA-Cool* technology.



## **Duramar VARI-Cool Coatings— Part of the *ULTRA-Cool* Family of Products**

Because *Duramar VARI-Cool* coatings also are based on *ULTRA-Cool* technology, they meet industry standards and regulations, including *Leadership in Energy & Environmental Design* (LEED®) and ENERGY STAR® criteria for steep-slope cool roofing.

*Duramar VARI-Cool* coatings are the latest example of an on-going global commitment to creating innovative, sustainable products. Because they are based on the same technology platform as *ULTRA-Cool* coatings, *Duramar VARI-Cool* coatings may be expected to exhibit similar performance characteristics over time.

In a recent analysis of five-year South Florida panels, several tested *ULTRA-Cool* formulations retained nearly 100 percent of their initial solar reflectance, thermal emittance, color and gloss, which translates into exceptional performance and weatherability for years to come.

### **PPG Cool Metal Coatings**

No matter what type of building project, there's a PPG cool metal coating to protect and enhance its appearance. From commercial projects to industrial facilities, agricultural buildings to residential projects, PPG has the right products, service and support.

### **Duramar *ULTRA-Cool* Coatings**

The *Duramar ULTRA-Cool* coating system for metal substrates offers higher solar reflectivity than many competing roofing materials, producing significant energy savings with a color palette that ranges from bold and bright to deep and dark.

An ENERGY STAR reflective roof product, *Duramar ULTRA-Cool* coatings are based on PPG's renowned *Duramar PVDF* coating system that, when applied and cured on properly prepared substrates, exhibits exceptional color stability, fire and chalk resistance, and durability.

### **Durastar® SMP *ULTRA-Cool* Coatings**

*Durastar SMP ULTRA-Cool* silicone-polyester coatings offer durable performance in harsh environments. Engineered with a proprietary resin technology and an innovative formulation process, they have excellent resistance to chalk and fade. Choose from a full range of gloss options ideal for commercial, industrial, agricultural and residential metal building applications.

### **Duramar *VARI-Cool* Coatings**

Imagine a roof or wall panel whose color shifts subtly from warm terra cotta to rich copper brown and finally to vivid green. That's *Duramar VARI-Cool* coatings in action. This groundbreaking polychromatic coating from PPG delivers a palette of vibrant color while offering superior protection.

Delivered in cost-effective coil application, *Duramar VARI-Cool* coatings benefit from the foundation of a factory-applied *Kynar 500®* or *Hylar 5000®* resin system, which have proven histories of long-term durability and performance in difficult environments.



National Coil Coating Association



## Legislation/Regulatory Info:

The regulatory environment for cool metal roofing continues to evolve. PPG stays abreast of new legislation and initiatives. Our participation in key industry organizations, combined with our knowledge of the industry's latest programs and requirements—such as LEED® certification; California Energy Commission's Title 24; American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) codes; the Cool Roof Rating Council (CRRC) Product Rating Program; ENERGY STAR®; and others—make PPG a valuable resource to customers, their employees and the building and construction industry as a whole.

Rely on expertise for training or assistance in meeting and exceeding even the most stringent industry requirements.

## Key Industry Links:

- Aluminum Extruders Council [www.aec.org](http://www.aec.org)
- American Iron & Steel Institute [www.steel.org](http://www.steel.org)
- Cool Metal Roofing Coalition [www.coolmetalroofing.org](http://www.coolmetalroofing.org)
- Cool Roof Rating Council [www.coolroofs.org](http://www.coolroofs.org)
- Design & Build with Metal [www.designandbuildwithmetal.com](http://www.designandbuildwithmetal.com)
- EPA ENERGY STAR Program [www.energystar.gov](http://www.energystar.gov)
- Lawrence Berkeley National Lab [www.lbl.gov](http://www.lbl.gov)
- Metal Building Manufacturers Association [www.mbma.com](http://www.mbma.com)
- Metal Construction Association [www.metalconstruction.org](http://www.metalconstruction.org)
- Metal Roofing Alliance [www.metalroofing.com](http://www.metalroofing.com)
- National Coil Coating Association [www.coilcoating.org](http://www.coilcoating.org)
- North American Zinc Aluminum Coaters Association [www.steelroofing.com](http://www.steelroofing.com)
- Oak Ridge National Lab [www.ornl.gov](http://www.ornl.gov)
- Steel Recycling Institute [www.recycle-steel.org](http://www.recycle-steel.org)

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