



Kronos Porcelain Pavers are produced in the U.S., the manufacturing plants are located in Tennessee.

The factory is member of the U.S. Green Building Council, which is an organization that promotes buildings that are environmentally responsible, profitable and healthy places to live and work.

In accordance with LEED Rating System and UNI EN ISO 14021:2016 Environmental labels and declarations – (Type II environmental labelling), declares that:

MR – Material & Resources Building Product Disclosure and Optimization	
Recycled Content (% Pre-consumer)	Kronos USA products are produced with 35% of pre-consumer recycled materials
Regional Materials (% Respect factory)	These Credits are applicable for buildings constructed within 500 miles (804.5 km) from the factory. The 49% of whole Kronos USA raw materials are quarried in the 500 miles radius. Therefore Kronos USA products contribute for 49% of their value to the LEED Credits of this Section.
Sustainability Report	Available self-declared Corporate Sustainability Report (CSR) conform to Global Reporting Initiative (GRI) Sustainability Report
Environmental Product Declaration	Available industry-wide Environmental Product Declaration (EPD) conform to 18014025
Material Ingredients	Available Health Product Declaration (HPD) in compliance with the Health Product Declaration open Standard
Waste Management	All packaging material are fully recyclable and reusable. The material coming from the demolition of the tiles is "inert" material that can be recycled
EQ – Indoor Environmental Quality	
Low emitting materials	No traces of VOC (Volatile Organic Compounds) are present in Kronos USA tiles (as certified by the external labs in charge of the tests).
SS Sustainable Sites	
Heat Island Effect	The great majority of Kronos USA products do not contribute to change the energy balance of the environments where installed. They do not produce any Urban Heat Island Effect, thanks to its very good physical properties Solar Reflectance Index SRI ≥ 32:
EA – Energy & Atmosphere	
Energy Performance (Conductivity (y))	1,0 - 1,3 W/mK
IN – Innovation	
	<p>Kronos USA tiles are produced in manufacturing plants which have got the prestigious ecological mark ECOLABEL (EU Regulation 2002/272/EC). These plants have the environmental management systems compliant to ISO 14001:2004 and EMAS (European Council Regulation 761/2001). These environmental standards guarantee excellence in terms of:</p> <ul style="list-style-type: none"> <li>• safeguard of the environment;</li> <li>• continuous improvement of the environmental performances of Kronos USA products and manufacturing sites;</li> <li>• healthcare of Kronos USA workers and customers.</li> </ul>



## SS SUSTAINABLE SITES: HEAT ISLAND EFFECT THE HEAT ISLAND EFFECT

Urban areas are usually warmer than their rural surroundings, due to a phenomenon known as the "heat island effect."

Cities development involves the decrease of vegetation areas in favor of the urban backgrounds, where the surfaces are paved or covered with buildings, the change in ground cover results in less shade and moisture to keep urban areas cool. Built-up areas tend to evaporate less water, which contributes to elevate surface and air temperatures. Several properties of urban materials, in particular solar reflectance, thermal emissivity, and heat capacity, also influence the development of urban heat islands, as they determine how the sun's energy is reflected, emitted, and absorbed.

Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, as well as heat-related illness and mortality, and water quality.

Lawrence Berkley National Laboratories (LBNL), which has performed extensive research on the heat island effect in urban areas, has established that the probability of smog creation rises 5 percent for each one-half degree increase above 70°F. While LBNL has concluded that reduced vegetation accounts for the largest percentage of urban heat islands at 56 percent, dark roofing surfaces run a strong second at 38 percent. The USGBC has addressed the heat island effect in regard to both roofing surfaces and other large, typically paved areas in its LEED guidelines.

### WHAT IS THE SOLAR REFLECTANCE INDEX?

In October 2005, the USGBC released new guidelines for LEED credits.

The New Construction Version 2.2 revised the values required for mitigating the heat island effect.

The guidelines are now based on the Solar Reflectance Index (SRI) of specified materials as calculated by ASTM E 1980.

### EMITTANCE –

The emittance of a material refers to its ability to release absorbed heat.

Scientists use a number between 0 and 1 to express emittance.

With the exception of metals, most construction materials have emittances above 0.85.

### SOLAR REFLECTANCE –

Also known as albedo, is the ratio of the amount of solar radiation reflected from a surface to the total amount reaching that surface (which includes visible and ultraviolet light and infrared radiation).

### SOLAR REFLECTANCE INDEX (SRI) –

SRI is a value that incorporates both solar reflectance and emittance in a single value to represent a material's temperature in the sun. SRI quantify es how hot a surface would get relative to standard black and standard white surfaces.

It is calculated using equations based on previously measured values of solar reflectance and emittance as laid out in the American Society for Testing and Materials Standard E 1980.



### WHAT SRI VALUES DO BUILDING MATERIALS NEED FOR LEED?

As shown in Table 1, the minimum SRI for cool roofing has increased in the newer LEED v4. In the earlier LEED 2009 requirements, cool roofing did not consider age. SRI as an option for qualification.

Projects seeking LEED v4 have the option of qualifying using either initial SRI or by obtaining the 3-year aged SRI value.

MINIMUM SRI FOR COOL ROOF MATERIALS IN LEED 2009 VS. LEED V4			
	Slope	Initial SRI	3 year aged SRI
<b>LEED 2009</b>			
Low sloped roof	≤ 2:12	78	-
Steep-sloped roof	> 2:12	29	-
Parking Cover	-	29	-
<b>LEED V4</b>			
Low sloped roof	≤ 2:12	82	64
Steep-sloped roof	> 2:12	39	32
Parking Cover	-	39	32

The impact of hardscape such as roads, sidewalks, courtyards, and parking lots is an important element in earning the Heat Island reduction credit.

Table 2 shows the requirements for hardscape and shade providing architectural devices and structures. In LEED version 4, paving materials require documentation for Solar Reflectance only, not the SRI asked for in LEED 2009.

MINIMUM SOLAR REFLECTANCE FOR HARDSCAPE IN LEED 2009 VS. LEED V4			
	Metric	Initial	3 year aged SRI
<b>LEED 2009</b>	Solar Reflectance Index	29	-
<b>LEED V4</b>	Solar Reflectance	0.33	0.28

LEEDS



CONCRETE – KRONOS USA	SRI value	LEED Credit	R AVG	EM AVG
Terrazzo Cool White	84	Passed	0,682	0,8920
Monocromatica Bone	78	Passed	0,640	0,910
Monocromatica Sand	74	Passed	0,608	0,930
Terrazzo Cool Grey	72	Passed	0,600	0,890
Terrazzo White Black	69	Passed	0,576	0,900
Terrazzo Grey Black	58	Passed	0,500	0,880
Monocromatica Ash	56	Passed	0,459	0,900
Monocromatica Cognac	42	Passed	0,383	0,850
Monocromatica Leather	41	Passed	0,370	0,890
Monocromatica Basalt	35	Passed	0,310	0,950
Terrazzo Charcoal	30	Passed	0,297	0,870
COTTO – KRONOS USA	SRI value	LEED Credit	R AVG	EM AVG
Cotto	47	Passed	0,419	0,880
WOOD – KRONOS USA	SRI value	LEED Credit	R AVG	EM AVG
Tex Wood Ivory	52	Passed	0,450	0,910
Tex Wood Grey	49	Passed	0,424	0,910
Timber Wood teak	49	Passed	0,429	0,900
Tex Wood Brown	38	Passed	0,344	0,910
Timber Wood Ipe	30	Passed	0,267	0,940
STONE – KRONOS USA	SRI value	LEED Credit	R AVG	EM AVG
Quartzite Crystal White	81	Passed	0,661	0,910
Travertino Pearl	67	Passed	0,549	0,960
Travertino River	62	Passed	0,520	0,920
Quartzite Cloud	62	Passed	0,524	0,900
Ocean Stone White	58	Passed	0,504	0,960
Stone Creamstone	55	Passed	0,488	0,940
Quartzite Sandy Island	48	Passed	0,418	0,910
Stone Moonstone	44	Passed	0,392	0,910
Quartzite Laguna	44	Passed	0,405	0,960
Pennsylvania true blue thermal pattern	42	Passed	0,370	0,920
Ocean Stone Tan	37	Passed	0,352	0,870
Pennsylvania full color cleft pattern	34	Passed	0,318	0,810
Ocean Stone Black	18	-	0,314	0,950