

Product in Focus

MasterColor[®] Integral Liquid Coloring Admixtures Solar Reflectance (SR) Values

Overview

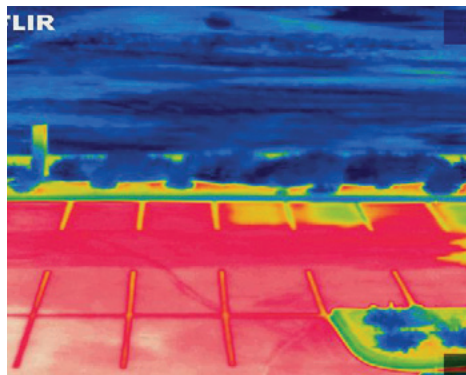
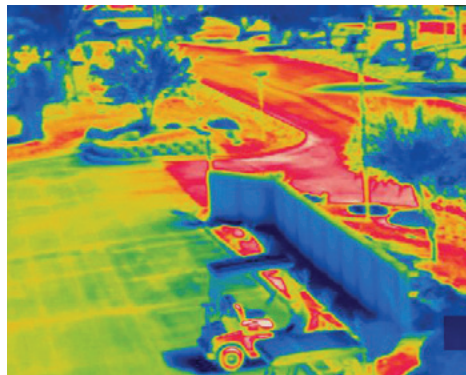
On average, cities and urban areas are 3 to 8 °F (2 to 4 °C) warmer than surrounding regions. In urban areas, buildings and pavements have taken the place of trees and vegetation, which provide shade, cool the air and reduce surface temperatures. Termed the “heat island effect,” this phenomenon can be minimized with proper measures, including the use of lighter colored concrete, which inherently is more reflective and absorbs less solar radiation than darker colored materials like asphalt (see Figure 1).

This bulletin lists the Solar Reflectance (SR) values for “cool-colored concrete” produced with the BASF MasterColor integral liquid coloring admixtures product line.

Solar Reflectance and Potential LEED Credit

Solar reflectance is the fraction of the solar energy that is reflected by a surface. SR is measured on a scale of 0 to 1 with non-reflective materials equal to 0 and 100% reflective materials equal to 1. Generally, surfaces with a lighter color have a higher SR and surfaces with a darker color have a lower SR. The standard technique for determining SR values uses a spectrophotometer to determine the reflectance at each wavelength. The average reflectance is then determined through an averaging process.

The method is documented in ASTM E903 and ASTM E892. Utilizing concrete with higher SR values can help producers and contractors implement sustainable construction programs. The U.S. Green Building Council (USGBC) LEED v4 reference guide for Building Design and Construction, Sustainable Sites credit for Heat Island Reduction offers potential LEED points for nonroof elements that have an initial SR of at least 0.33 at installation. The IgCC 2012 construction code requires an initial solar reflectance value of not less than 0.30.



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Figure 1. Thermographic comparison of a concrete parking lot and an asphalt parking lot

SR Values for Decorative Concrete with MasterColor Integral Liquid Coloring Admixtures

BASF has established SR values for each of its 55 MasterColor formulas to assist concrete producers and contractors in selecting environmentally preferable colors. Below are SR values (and corresponding SRI values) for decorative concrete mixtures containing MasterColor, made with medium gray cement and a water-cement ratio of 0.45 to 0.50. The SRI values were calculated based on a material emissivity of 0.90.

Color	SRI	SR
MasterColor White at 10%	60	0.52
MasterColor White at 6%	54	0.47
Creekside Buff	42	0.38
Sand Dune	40	0.36
Dark Gold 39	39	0.36
Caramel	38	0.35
Champagne	38	0.35
Deerskin	38	0.35
Soft Cranberry	38	0.35
Smoked Salmon	37	0.34
Bronze Medal	36	0.33
Burnt Ochre	36	0.33
Corkboard	36	0.33
Persimmon	36	0.33
Warm Earth	36	0.33
Apple Cider	34	0.32
Canyon Rock	34	0.32
Copper Tone	34	0.32
Cottage Brown	34	0.32
Gingerbread	34	0.32
Tennessee Taupe	34	0.32
Sunset Sand	33	0.31
Country Stone	32	0.3
Hilltop Tan	32	0.3
Red River Clay	32	0.3
Antique Rose	31	0.29
Brick Oven	31	0.29
Firestorm	31	0.29
Indiana Red	31	0.29

Color	SRI	SR
Spring Moss	31	0.29
White Tail Fawn	31	0.29
Mudslide	29	0.28
Mountain Trail	28	0.27
Weathered Oak	28	0.27
Country Cabin	27	0.26
Tequila Sunrise	27	0.26
Eagle's Nest	24	0.24
Light Chestnut	24	0.24
Pebble Shore	23	0.23
Wheat Berry	23	0.23
Fox Tail	22	0.22
Maple Syrup	21	0.22
Olive Branch	20	0.21
Deep Mauve	18	0.19
Buffalo Brown	17	0.19
Fall Buckeye	17	0.19
Hailstorm Gray	17	0.19
Portabella	17	0.19
Barleywine	14	0.16
English Walnut	14	0.16
Stone Harbor	10	0.13
Wild Plum	10	0.13
Natural Bark	9	0.12
Mystic Shadow	6	0.1
Pumpnickel	6	0.1
Smokestack	4	0.08
Midnight	0	0.05

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