



Turning  
Polycarbonate  
into Architecture

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## COLOR & ITS IMPACT ON HOW POLYCARBONATE SHEETS TRANSMIT NATURAL LIGHT & HEAT

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In the U.S., the University of Michigan's Center for Sustainable Systems reports that lighting and indoor climate control accounted for a whopping 51% of the energy costs in commercial buildings in 2010.

Around the world, light transmission and heat transfer are also top of mind because of the focus on environmental sustainability and its impact on the bottom line. As importantly, user comfort and productivity are also key considerations as various scientific studies indicate natural daylight really does make a difference, whether people are working or living in these spaces.

"Light is critical for our health and wellbeing. Ensuring that we receive adequate light levels at the appropriate time of day benefits our alertness, mood, productivity, sleep patterns and many aspects of our physiology," said Dr. Victoria Revell, a chronobiologist at the University of Surrey.

Meanwhile, scientists at the Lighting Research Center (LRC), in Troy, N.Y., have reported that daylit environments increase occupant productivity and comfort, and provide the mental and visual stimulation necessary to regulate human circadian rhythms.

In fact in 2014, a new study from Northwestern Medicine and the University of Illinois at Urbana-Champaign stated that workers with more light exposure at the office had longer sleep duration, better sleep quality, more physical activity and better quality of life compared to office workers with less light exposure in the workplace.

"Light is the most important synchronizing agent for the brain and body," said Ivy Cheung, co-lead author and Ph.D. candidate in neuroscience at Northwestern.

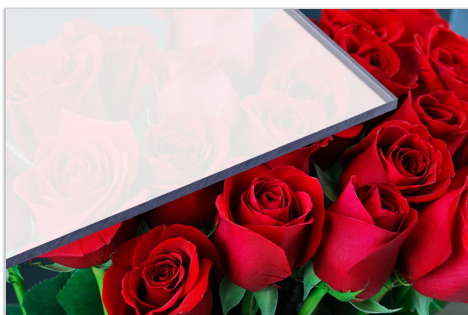
As a result, polycarbonate roofing is truly ideal because the majority of it is transparent, transmitting up to 90% of the natural light. Transparent polycarbonate also allows a clear view of objects, such as clouds in the sky. Translucent polycarbonate allows light to pass through, but objects on the other side are not clearly recognizable. Translucent material still transmits up to about 80% of the natural light. The remainder is opaque, completely blocking any view of what's on the other side of it and transmitting no light whatsoever. Color can be blended with the polycarbonate in different concentrations, creating transparent, translucent and opaque finishes and controlling the amount of visible light that goes into the structure.

In closed areas (e.g. commercial centers), particularly in hotter regions and countries, the more light is transmitted, the hotter it will become under that roof, so architects and designers must compensate.

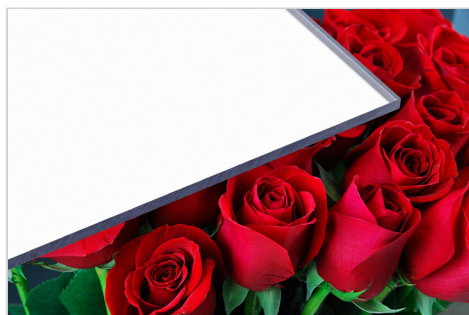
There is a simple, and cost-effective solution. Add color to the polycarbonate material to make it less transparent, or lower the light transmission. The more color you add to the polycarbonate sheet, the deeper and more opaque the color will be. Whether it's red, blue, white, black, yellow or green, the more intense the hue, the more it will cut the visible daylight and heat that's transmitted. ►



Transparent



Translucent

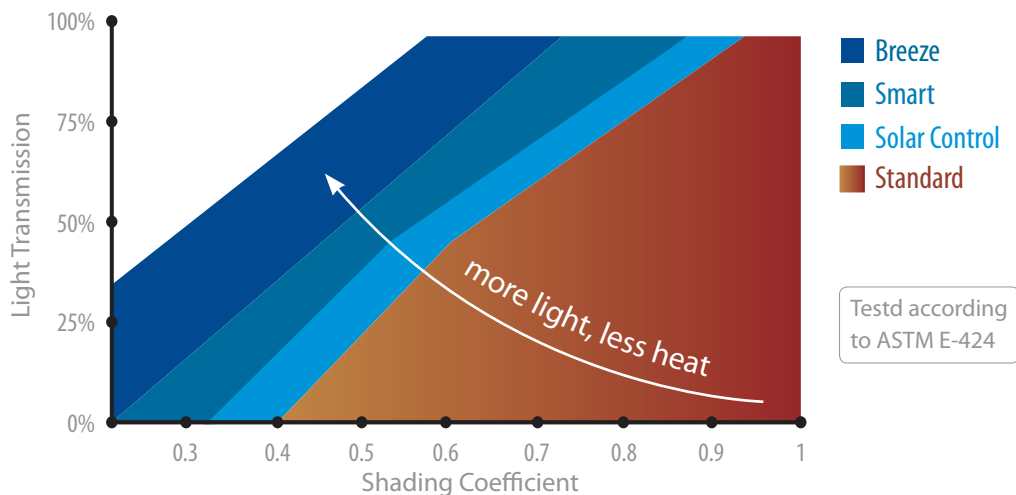


Opaque

► Fortunately, there is a more advanced solution that allows the transmission of natural daylight while deflecting the infrared light that's responsible for the heat. For example, Palram's SolarSmart technology has a positive impact on user comfort levels and productivity and helps control the energy costs associated with illumination and air conditioning.

Check out this graph to see how Solar Smart tints, Solar Control, Smart and Breeze, transmit more light while maintaining or decreasing shading coefficient values:

## Impact of Solar Smart Tints on Light and Heat Transmission



In specific applications, users not only want to block the heat while admitting as much natural daylight as possible, they need the light diffused and evenly distributed while also eliminating or softening the shadows. For instance, in greenhouses and commercial centers, a polycarbonate sheet with diffusion capabilities ensures everyone and everything in that structure will get the same amount of natural daylight.

A strategically selected polycarbonate sheet can offer a combination of "solar smart" and "diffuser/diffusion" qualities to maximize the natural daylight that's transmitted, block the heat and diffuse the light.

## Polycarbonate Skylights

Direct vs. Diffused Light Simulation



For more information on the technology that ensures your polycarbonate roofing and sidewall materials deliver the natural light qualities your building requires, Palram is here to help.

[www.palramprojects.com](http://www.palramprojects.com)



**PALRAM H.Q.**  
Tel: +972 4 8459900  
Fax: +972 4 8444012  
[palram@palram.com](mailto:palram@palram.com)

**PALRAM EUROPE LTD.**  
Tel: +44 1302 380777  
Fax: +44 1302 380778  
[sales.europe@palram.com](mailto:sales.europe@palram.com)

**PALRAM AMERICAS**  
Tel: 610 2859918  
Fax: 610 2859928  
[palramamericas@palram.com](mailto:palramamericas@palram.com)

