

PLASKOLITE

IRIDESCENCE WITHIN ABRASION RESISTANT POLYCARBOANTE

Iridescence is the rainbow or oil slick type pattern that can appear on the surface of a hard coated polycarbonate sheet particularly under artificial lighting conditions. This rainbow appearance is caused by the interference of multiple reflections from the different layers of the coated sheet.

Coated polycarbonate (PC) sheet has a thin layer of resistant coating on the surface of the sheet in order to protect the sheet against abrasion damage. A small fraction of light hitting a coated PC surface will reflect back to the observer. This reflected light has contributions from reflection at the coating surface and the PC surface. Depending on the wavelengths (color of light) of the reflected light, these light waves (from the two different surfaces) may reinforce each other or cancel one another out. The rainbow pattern arises from the addition and subtraction of the different light wavelengths. Specifically, when light waves are out of phase with one another, iridescence can be observed.

The iridescence phenomenon is not specific to coated polycarbonate. A thin layer of oil on water can also show the effect as demonstrated in Figure 1. The type of light source, the angle of the light and the coating (or oil) layer thickness all can have an effect on the appearance of the iridescence.

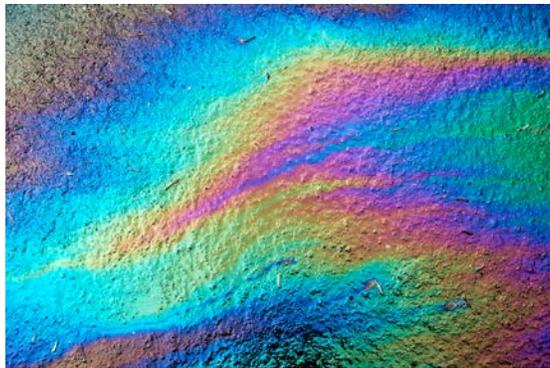
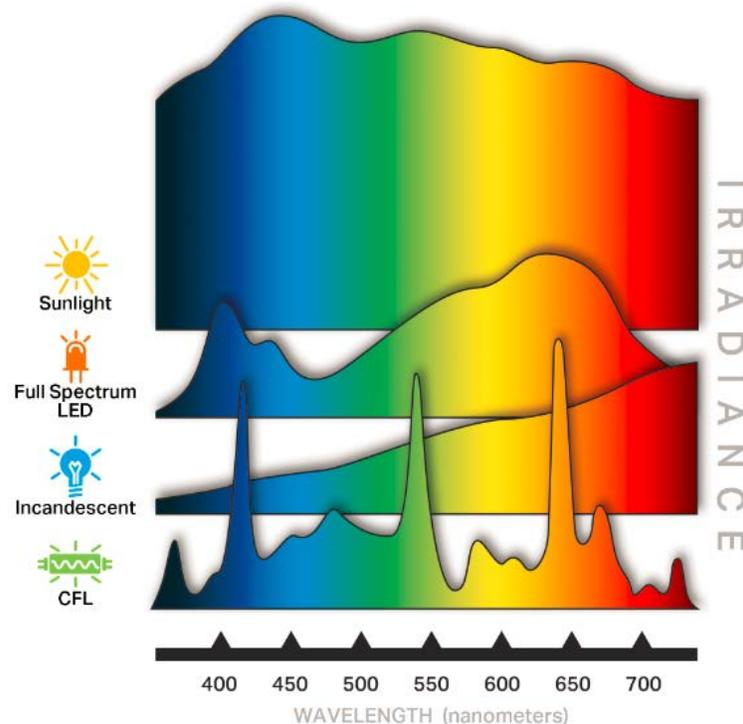


Figure 1: Iridescence of a thin oil layer on water

Light interference does not affect the abrasion resistant coating's performance or mechanical, thermal, or electrical properties of the polycarbonate in any way, and is purely an aesthetic phenomenon. Since this is an expected and known phenomenon of the natural properties of light, educating the customer can prevent any confusion they may have if they happen to observe this rainbow effect.

TRIGGER MECHANISMS TO OBSERVING A RAINBOW EFFECT ON TUFFAK AR COATED PRODUCTS:

- Hard coated, abrasion resistant polycarbonate is susceptible to iridescences under very specific circumstances and environments.
- Iridescence is not limited to any one manufacturer of hard coated polycarbonate. The difference between light being reflected off the coating and polycarbonate causes iridescence.
- Compact Fluorescence Lamps (CFL) and Fluorescent Lighting triggers the iridescences effect due to the limited and discrete amounts of visible wavelengths these light sources generate (see graphic below). Fluorescence lighting is a major problem for iridescence on polycarbonate.
- Iridescence is most noticeable in hard coated polycarbonate when the sheet is viewed close to the fluorescent lights and when held in a parallel position to the light source.
- Iridescence is less noticeable when the sheet is viewed perpendicular to or angled away from the fluorescent light source.
- ***Iridescence in hard coated polycarbonate is greatly reduced or completely eliminated when viewed under natural lighting, compact incandescent light bulbs or broad spectrum, energy efficient LED lighting .***



In practical terms, neither the sheet extrusion producer nor the abrasion resistant coater have the ability to control iridescence within the sheet while still producing a cost effective, hard coated product. The primary way to reduce the effect of iridescence is to simply change the lighting source illuminating the sheet to a full spectrum light source such as incandescent bulbs or full spectrum LEDs.

For more information: [https://en.wikipedia.org/wiki/Interference_\(wave_propagation\)](https://en.wikipedia.org/wiki/Interference_(wave_propagation))

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