

# Low Iron Glass

by Jim Daniel

## Before we start

with low iron glass, let's understand what glass is, or more clearly what "clear glass" is. It is defined as "a homogeneous material with a random, liquid-like (non-crystalline) molecular structure." (Clear enough?)

There is no clear answer to the question, "Is glass solid or liquid?" In terms of molecular dynamics and thermodynamics, it is possible to justify different views that it is a highly viscous liquid, an amorphous solid, or simply that glass is another state of matter, which is neither liquid nor solid. The difference is semantic. In terms of its material properties, we can do little better. There is no clear definition of the distinction between solids and highly viscous liquids. The manufacturing process of glass requires that the raw materials be heated to a temperature sufficient to produce a completely melted substance, which, when cooled rapidly, becomes rigid without crystallizing.

Soda lime glass (which encompasses both float glass and low iron

glass) is the most common type of industrially-produced glass. A typical soda lime glass is composed of silica (71-75%), soda (12-16%), and lime (10-15%), plus small amounts of other materials to provide particular properties such as color.

Until relatively recently, almost all glass used in the picture fram-

ing industry was float or sheet "clear glass." Sometimes, regular float glass has been referred to as "green glass" due to the greenish tint seen in traditional float glass.

Now, what is low iron glass? It is defined as "a colorless clear soda lime float glass with lowered iron oxide content." Its chemical composition increases light transmission and reduces the green tint inherent to regular float glass, while the mechanical properties are very similar to regular float glass. In general, low iron glass is manufactured in a similar process to float glass; the "recipe" is the difference. Low iron float glass has an iron content only 10% of standard float glass.

The inherent clarity makes it ideal for applications in: picture framing; furniture; appliances; shelving; display cases; storefronts; and greenhouses. When low iron glass was first developed, its intended uses were mainly for the solar, furniture, and window industries. It was introduced about 30 years ago; in 1990, it became more widely available when it began to be manufactured by PPG

Industries at its specialty glass plant in Perry, GA. The product name was Starphire<sup>®</sup>, which in its standard 6mm thickness achieves 91 percent light transmittance.

Low iron glass has become increasingly popular in the architectural market. Many architects like the unique aesthetics that can be achieved with low iron glass in commercial buildings for vision and spandrel areas as well as for skylights, entrances, and dramatic interior uses.

The lack of color in low iron glass gives it very high visible and solar transmission values, but with the same reflection (about 4 percent at each surface) as standard clear glass. This results in a significantly reduced absorption of visible and solar radiant energy, which means there is more light transmission through the glass. For exam-

ple, the solar radiation absorption of 12mm (1/2") thick clear glass is about 30 percent, while it is about 7 percent for 12mm low iron glass. *Regular* low iron glass lets more light transmit through than *regular* float glass. (Note that this principle does not apply to UV-filtering glass as that has a different performance factor in this regard.)

About 10 years ago, low iron glass found its way into the picture framing community. Choosing the right glass today has become more complicated for frames and consumers alike. Framers may need to look beyond the surface of glass. Some choose a low iron glass for the following reasons:

- Makes colors more vibrant
- Ideal for artists and other customers who want to highlight details
- "Green" glass tends to change the

colors and details of an image.

Questions one might want to think about when shopping for glass: What performance properties does the glass have? What do I want it to do for my customer? What does my customer want, expect, and/or need? Does the cost of low iron glass warrant the additional inventory space? Life is full of choices, so choose wisely.

*Some of the information in this article was obtained from various manufacturers' brochures and websites. ■*

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