

Surface Orientation of Low Light Transmittance Glasses

Through the years, Vitro Glass Technology has led the way in the development of high performance tinted glass products. Beginning with Solexia[®] (formerly Solex[®] glass) tinted glass, introduced over 50 years ago, to the more recent introduction of selective transmitting “super tints”, such as Azuria[®] (formerly Azurlite[®] glass) and Atlantica[®] (formerly Solargreen[®] glass) tinted glasses, Vitro Glass Technology has enabled architects to design energy efficient buildings without sacrificing the occupant friendly environment that is created through the liberal use of glass.

In addition to helping conserve energy, tinted glass allows designers to achieve aesthetically pleasing buildings that harmonize with the surrounding environment. An obviously critical element in the aesthetic appearance of building facades is visual consistency. When higher light transmitting glasses, such as Azuria[®], Solexia[®], Solarbronze[®], or Solargray[®] glass are used, consistency in appearance is virtually never an issue. In order to achieve consistency in appearance with lower light transmitting glasses, such as Graylite[®] II glass, the glass must be glazed with consistent surface orientation. Therefore, appropriate care must be taken in the cutting, handling and fabrication of insulating glass units and spandrel units to maintain consistent orientation in

order to ensure a consistent appearance. Also, when darker tinted glasses are used in monolithic glazing applications, it is critical that the glass be glazed with consistent surface orientation.

Tin vs. Air Surface

Float glass is produced by floating molten glass on a bed of molten tin. The surface of the glass that contacts the molten tin is traditionally referred to as the “tin surface”, while the opposite surface is referred to as the “air surface.”

Due to contact with molten tin, the “tin surface” of the glass actually acquires an extremely thin tin coating and, as a consequence, has a slightly higher visible light reflectance than the air surface. The difference in reflectance between the two surfaces is approximately ½% and is not perceptible with higher light transmitting glass. However, with low light transmitting glass, such as Graylite[®] II glass, the difference in reflectance is perceivable. When this product is fabricated and/or glazed without maintaining consistent surface orientation, a “checkerboard” visual effect may be the result.

The need to consistently orient the glass surface applies to *all low light transmitting tinted glasses*. The level of light transmittance at which the difference in surface reflectance may become perceivable is most likely influenced by several factors, including

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viewing conditions, glass color and the “eye of the beholder.” However, Vitro recommends that attention be paid to surface orientation beginning at 40% light transmittance. Under certain conditions, those viewers with very discriminating viewing skills may even detect a difference at slightly higher light transmittance. Therefore, glass fabricators and glazing contractors may wish to maintain consistent surface orientation with any tinted glass product.

As always, **Vitro strongly recommends the viewing of a full-size mockup prior to making design decisions.**

Recommendations

- Vitro repeats its long-standing recommendation that Graylite® II tinted glass be glazed with the “air surface” oriented to the exterior of the building. This will result in the truest aesthetic appearance of these products.
- Tinted glasses derive their improved solar performance by absorbing more of the incident solar energy. Vitro recommends that a thermal stress analysis, based on specified design conditions, be done to determine whether heat strengthening is required to resist the estimated thermally induced stresses.
- As for all commercial projects, Vitro recommends the viewing of a full-size mockup prior to making design decisions.

RANGE SELECTED Vitro TINTED GLASSES WITH LESS THAN 40% VISIBLE LIGHT TRANSMITTANCE	
PRODUCT	VISIBLE LIGHT TRANSMITTANCE
<i>1/8" GRAYLITE II</i>	24%
<i>1/4" GRAYLITE II</i>	9%
<i>3/8" SOLARBRONZE</i>	37%
<i>1/2" SOLARBRONZE</i>	27%
<i>5/16" SOLARGRAY</i>	33%
<i>1/2" SOLARGRAY</i>	18%

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HISTORY TABLE		
ITEM	DATE	DESCRIPTION
Technical Services Memo	12/15/86	Design Aesthetics with Vitro <i>GRAYLITE Glass</i>
Inside Glass 89-4	10/19/89	New <i>GRAYLITE</i> Performance Data
Original Publication	4/23/2002	Updated information and moved to Internet
Revised Publication	12/12/2011	Updated based on current product line
Revision #2	10/04/2016	Updated to Vitro Logo and format
Revision #3	1/25/2019	Updated the Vitro Logo and format
Revision #4	11/29/2024	Updated in the table I change for RANGE SELECTED Vitro TINTED GLASSES, new disclaimer & removed PPG references.

This document is intended to inform and assist the reader in the application, use, and maintenance of Vitro Flat Glass products. Actual performance and results can vary depending on the circumstances. Vitro makes no warranty or guarantee as to the results to be obtained from the use of all or any portion of the information provided herein, and hereby disclaims any liability for personal injury, property damage, product insufficiency, or any other damages of any kind or nature arising from the reader's use of the information contained herein.

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