

Screening Out Ultraviolet Radiation with Laminated Glass

Introduction

Furniture, fabrics, and other interior fixtures, as well as valuable paintings and papers, will fade over time. The main contributors to fading are ultraviolet (UV) radiation, visible light, absorbed heat and moisture. Most laminated glass interlayers, available in both commercial and residential fenestration, are formulated to screen out UV radiation below 380 nanometers (nm). The UV filtering characteristics in the laminate interlayer enable laminated glass to reduce the rate of fading and deterioration of these materials.

UV Properties

UV radiation is broken down into three categories: Ultraviolet A (UVA), Ultraviolet B (UVB) and Ultraviolet C (UVC). Although references to the applicable wavelengths that define these categories are inconsistent, they are typically described as occurring as follows:

UVC	100 nanometers (nm) – 280 nm
UVB	280 nm - 315 nm
UVA	315 nm – 400 nm

UVC is generally screened out naturally by atmospheric gases, but UVB and UVA wavelengths reach the earth even on a cloudy day.

Glass Screening Capabilities

Standard clear glass typically screens out nearly all UVB radiation but does little to screen UVA. Enhancements to the glass, such as laminating, tinting or colorants, as well as the application of reflective and low emissivity coatings, can reduce the amount of UVA transmittance. Of the fabricated glasses, laminated glass screens the most significant amount of UVA, as seen in Figure 1.

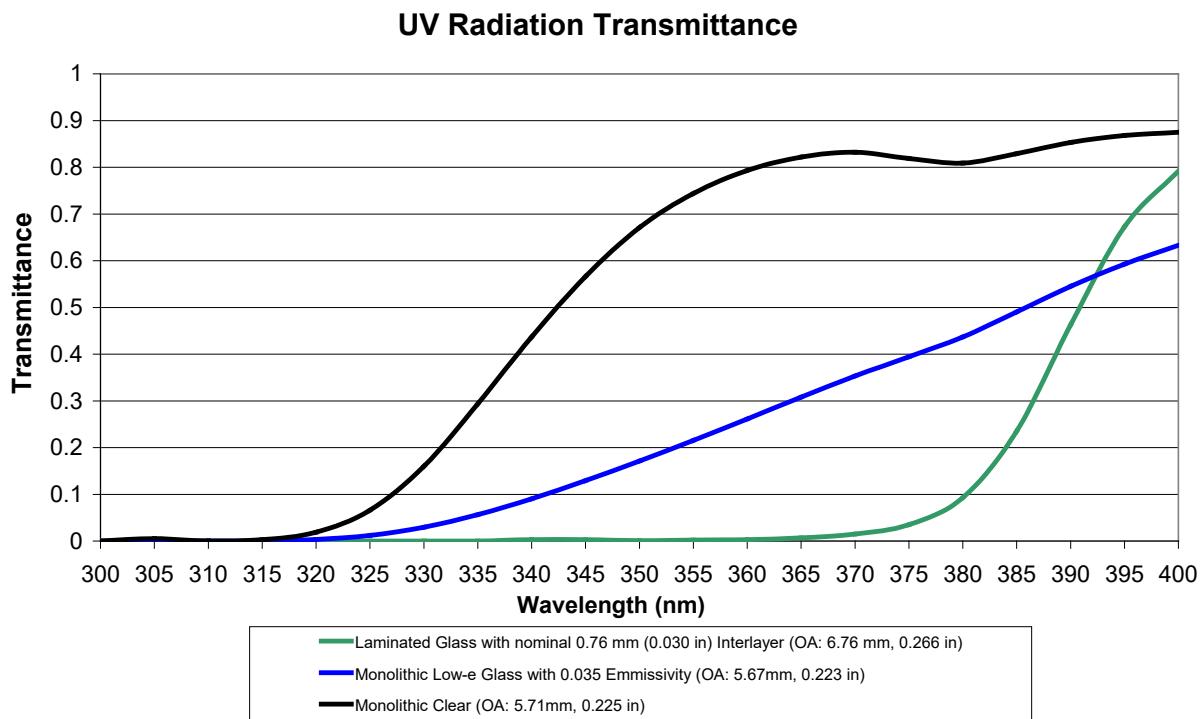


Figure 1: UVA Radiation Transmittance of Common Glasses

Notes Figure 1:

1. Check with manufacturer for UV transmittance of specific products.
2. Laminated glass curve depicts the conservative transmittance of nominal 0.76 mm (0.030 in) interlayer products that are not reliant on UV treatment for final processing of laminate.
3. Data extracted from Lawrence Berkeley National Laboratories (LBNL) Optics software.
4. Data shown are typical and not guaranteed for all specimens.
5. Note that this chart represents the most conservative performance for product type.

Glass Rating

The Lawrence Berkeley National Laboratories' (LBNL) Window Program can be used to determine UV performance of glass. Upon selecting the type of glass used and running the calculations, the results under the Optics tab show three classifications for UV: Tdw-K, Tdw-ISO and Tuv. The Tdw-K and Tdw-ISO ratings are damage-weighted ratings that provide an indication of the amount of damage to materials from one product versus another; these ratings extend beyond the traditional UV cut-off of 380 nm because they include damage potential from visible wavelengths.

The amount of transmitted UV light designated as Tuv, is the unweighted transmittance over a portion of the ultraviolet spectrum from 310-380 nm. Since this classification is unweighted, it provides a direct number to the amount of UV light transmitted through a glazing from 310-380 nm. The rating, however, does not divide UVA and UVB wavelengths. Tuv can vary due to interlayer and glass type thickness and color, the presence of coatings and other variables. Contact your manufacturer for Tuv ratings on specific configurations.

Notes Figure 2:

6. Laminated Glass with nominal 0.76 mm (0.030 in) interlayer (OA: 6.76 mm, 0.266 in)
7. Monolithic Low-e Glass with 0.035 Emissivity (OA: 5.67mm, 0.223 in)
8. Monolithic Clear Glass (OA: 5.71mm, 0.225 in)

Tips for Selecting UV Screening Glass

- Clear glass screens mostly UVB radiation
- Coated glass screens more UV radiation than clear glass
- Tinted or colored glass screens more UV radiation than clear glass
- Laminated glass with UV-absorbing interlayers screens both UVA and UVB radiation
- Combinations of coated, colored and laminated glass will provide the best protection against UV radiation

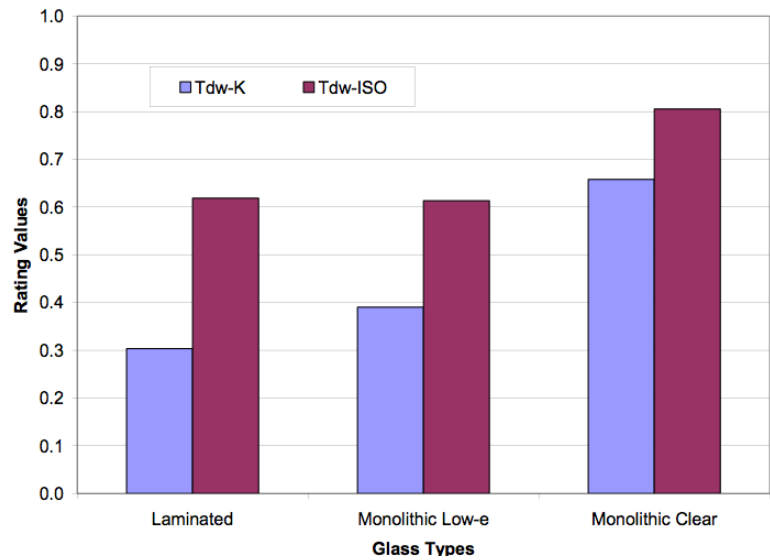


Figure 2: UV Damage Ratings

Conclusion

Glass allows the passage of sunlight that can result in fading of interior furnishings in residential dwellings and commercial settings. Coatings on glass and tinted glass screen more UV radiation than clear glass. Laminated glass with UV absorbing interlayers screens both UVA and UVB radiation. The best UV screening glass solutions combine coated, colored and laminated glass. Thus, the proper selection and installation of laminated glass can provide many benefits without increasing the risks associated with UV exposure.

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