



**Ballistic Glass & Armor Solutions**

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## **TOLERANCE LIMITS AND AESTHETIC REALITIES FOR COMPLEX BALLISTIC GLASS CONSTRUCTIONS**

Due to the technical nature of our products, all BGAS products are produced to our own internal quality standards and specifications where applicable. These quality standards can be found on the resources page of our website under the tab "quality standards". For any product characteristics where no specific BGAS standards apply, publicly available industry standards apply.

BGAS products are designed with security and life safety first and foremost in mind. The measures necessary for these products to be successful in their primary function sometimes comes at the expense of reduced aesthetics compared to typical commercial and residential laminated fenestration products.

For example, commercial laminated window glass typically involves two pieces of glass laminated using a single layer of interlayer in between the glass. Our products can include as many as 10 layers of glass and/or polycarbonate, combined with as many as 15 different sheets of interlayer between the glass and polycarbonate to bind it together.

Every additional layer of glass, polycarbonate, or interlayer creates opportunities for added optical distortion, haze, blemishes, small bubbles and other contaminants that may be noticeable. Yet these typically have no impact on the product's abilities to serve its primary function, which is protecting lives and property.

All these added layers also make it impossible to obtain the same edge alignment, precision sizing, and precise overall unit thickness that is possible when simply laminating two pieces of glass with one interlayer between.

This means that our products have significantly larger tolerance limits for base and width dimensions, as well as larger overall unit thickness tolerances. Framing systems and installation requirements must be capable of accommodating these larger tolerances. It is the sole responsibility of the customer to verify their systems can accommodate the larger tolerance limits inherent in these products.

If you have not purchased our products before and are concerned about their ability to fit into your framing materials, please ask your BGAS salesperson to explain our dimensional and overall-unit-thickness tolerance limits and share our internal quality standard. BGAS will not replace products that are unable to fit into customer framing systems.

For more details on these expanded tolerance requirements, please visit the technical resources tab on our website.

**Notes:**

- 1) The BGAS warranty does not cover optical distortion. Optical distortion becomes increasingly difficult to control with each layer of material used. It is also more difficult to control as the dimensions of the glass increase. Distortion is inherent in all types of glass, but especially with laminated glass, and even more so with complex and thick glass/polycarbonate products.

Whether optical distortion is objectionable or not is largely subjective and “in the eye of the beholder”. Distortion is also a function of the distance the viewer is from one side of the glass and the distance the viewed object is from the other side. Which objects are being viewed through the glass also can impact the level of perceived distortion, as can the angle of incidence and any movement of the viewer or viewed object while viewing.

If concerned about potential aesthetic differences or issues, BGAS customers should order full size mock-ups for each project to be sure our products are suitable for the application. BGAS will not replace glass for distortion, so be sure to order mock-ups if this is a concern.

- 2) If required and **specified in advance**, BGAS can meet precision base x height sizing requirements by making the product slightly oversized and then cutting it to precise size using a waterjet machine. Of course, there are added cost that will be included to cover the materials used to make the part oversize to begin with as well as to cover the cost of waterjet cutting.