



ARCHITECTS QUICK FACTS

THE WHYS AND
HOWS OF BIG GLASS
IN ARCHITECTURE

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WHY BIG GLASS

Big Glass has the benefit of being one of the most versatile facade materials in the world. It is the perfect blend of form and function and can yield creative, versatile and timeless results. Big Glass can mean a lot of things, but at AGNORA, we believe it comes down to these core values:

AESTHETICS

Big Glass provides numerous aesthetic benefits:

- In homes it creates incredible vistas, with unhindered views
- In retail it creates an enhanced, human, authentic in-store experiences with natural light and openness
- In commercial and institutional spaces, it elevates mood and efficiency

Large glass is used throughout commercial, institutional retail and residential spaces as a way to improve overall personal well-being to each area. Multiple studies have shown the benefits of natural light in both productivity, consumer purchases and overall happiness.

EFFICIENCY & ENERGY

Performance coatings, lamination, and insulated glass units (IGU's) can all have a tremendous effect on the end products durability and efficiency. AGNORA uses a blend of all of these elements to create glass facades perfectly tailored to the requirements of the building, regional environment and government regulations.

Energy and efficiency aren't the only benefits BIG glass can offer.

Do you need theft protection? Do you need a custom solutions (e.g. staircase)? Big glass fabrication can be used for these applications.

Also consider:

While Building

Each crane movement, each large panel can lay more area, resulting in less parts to the "puzzle." Less caulking, less hardware.

For the Building

Glass is the only cladding material that brings energy into the building, and big glass can do an incredible job at controlling both interior and exterior thermals.



GLASS DESIGN CONSIDERATIONS

- What is the regional windload?
- What is the final dimension of the glass pane?
 - Does the application merit Heat Treatment?
 - a) Heat Strengthen
 - b) Tempering
- Is the final dimension on the “edge” of a manufacturers glass size?
 - If yes - can it be a smaller dimension to save costs?
- Does the application require solar control characteristics? (exterior)
- Does the application require Low Emissivity characteristics? (interior)
- Will this Unit be an Insulated Glass Unit?
 - Will it be at an altitude higher than roughly 2000' above sea level
- Do you know the regions glazing capabilities, and whether you need special equipment to lift over 200lbs?



GLASS TERMS

TEMPERING - The process of strengthening glass

- Full Temper - Up to an 4x strength over annealed glass. Shatters in pebbles
- Heat Treated - Up to a 2x strength over annealed glass. Shatter in larger islands
- Annealed - Native state of the glass. Shatter in large, sharp, shards
- Heat Soak Testing (HST) - Heat treatment and tempering create compression and tension forces within the glass. HST effectively “weather tests” the glass for impurities and encourages breakage in the test facility as opposed to public

LAMINATING - The process of adding layers to glass

- Interlayer - Laminate that is sandwiched between the glass lites
- PVB - A standard high strength laminate used in a majority of applications
- SentryGlas - A high strength laminate used for security or structural glass applications

CNC - Machining glass to size and shape

- Rough Edge - Cheapest, a finished edge appropriate for tempering and manipulation, but not to be used as an exposed edge
- CNC Polish - Provides a high end look appropriate for exposed edge that will not be touched
- Diamond Polish - Provides a clear finish like the rest of the glass, for exposed edge and can be touched

INSULATED GLASS UNIT(s) / IGUs - Window and Exterior/Interior glass interfaces

- Spacer - Strip of metal situated between two glass lites. Filled with drying agent to reduce any residual moisture within the sealed unit
- Argon Gas - Nobel gas infused between 2 glass lites and spacer. Inert and resistant to temperature transfer between interior and exterior lites
- Double Glazed IGUs - Two pieces of glass with one spacer
- Triple Glazed IGUs - Three pieces of glass with two spacers
- Equalization IGUs - IGUs that have had pressure set to a high altitude to eliminate concavity or convexity when the unit is finally installed
- Surface Number - The surface from outside in. For example, the exterior surface is Surface 1, the inner surface to of the same glass is Surface 2



GLASS TYPES

STANDARD

Cheapest glass, contains iron and thus has a greenish hue to the glass

LOW IRON

Low Iron - Or “clear” glass. This is a preferred glass that does not contain excessive iron and thus is aesthetically clear

LOW EMISSIVITY COATING

Low Emissivity (low-e) Coating - Used on interior glass, and part of an IGU, low-e coatings repel radiant energy such as interior temperature. This ensures that internal room temperatures stay consistent without “leaking” through the glass to mix with exterior temperature

SOLAR CONTROL COATING

Solar Control Coating - Use on exterior glass, and part of an IGU. Solar control coatings resist energy transfer from solar radiation into the interior room. An example is Saint-Gobains COOL-LITE XTREME 70/33. 70% of sunlight is allowed through (transmitted) while the Solar Factor is 0.33 (G value range from 0-1, 0 being no solar energy transmittance, 1 being complete transmittance)

EXOTIC

Acid etch coatings, painted glass and other exotics exist and are stocked by AGNORA.



DESIGN CONSIDERATIONS

LOADS

Loads placed on glass can be from wind, application of force (i.e. someone hitting it) or from the glass itself if placed at an angle other than 90 degrees vertical.

Glass loads are table driven, and require the glazier or fabricator to help determine the appropriate glass thickness / glass thickness + interlayer for a given size. Be aware, and consult with a fabricator from the onset of the project to ensure loads are properly accounted for.

RAW MATERIAL LIMITATIONS

Glass ribbon from the float plant is manufactured in a 130" (3.3m) wide ribbon, which is then cut into lengths that can be transported. North American fabricated glass can reach sizes of 130" x 300" when production processes are applied.

Fabricators stock many of different sizes, often from a variety of glass manufacturers. Keep in mind that manufactured glass sizes can differ, thus design with consideration of cost (ie. don't make a piece of glass 205" when you could make it 203" and save on overall glass costs because a sheet is 204" vs 300")

INTERLAYER CONSIDERATIONS

Interlayers come in two main flavors and should be specified based on the glasses final application.

- PVB (standard)
- SentryGlas (security, structural, impact resistant)

The general :

ANNEALED LAMINATE

Breaks in large portions, allowing the form to be maintained by the laminate

HEAT STRENGTHENED LAMINATE

Provide adequate protection in most application, and resists most thermal stresses, and breaks in large islands

TEMPERED LAMINATES

For high stress lites only and fails in a non-structural manner

INTERLAYER SIZE CONSTRAINTS

Both SentryGlas and PVB laminates can accommodate the overall 130" glass width, common to North American manufactured glass.

Other, more exotic laminates can include color stock, which range in roll widths of 96"-126". Special considerations regarding size must be made if these laminates are to be used.



FABRICATION TIPS

HEAT SOAK TESTING

NiS inclusions are extremely small particles that occur in the manufacturing process of the glass. Very seldom, these inclusions find their way into the glass ribbon, and become part of the product shipped to the fabricator.

Expansion and contraction properties of the NiS inclusions differ to that of glass, and failure can occur to glass that has had thermal stress (ie. heat strengthening or tempering) applied. The failure is not immediate, and may result many days, months, or years later as the NiS attempts to expand back to its original state against the glass.

Failure will result in total breakage of the glass, and can cause personal or property damage.

Heat Soak Testing accelerates NiS expansion, and causes failure in a contained, safe space.

Heat Soak Testing of any heat treated glass is your best insurance.

ON-SITE DIGITAL TEMPLATE

Digital templating is a useful step if installing complex glass pieces such as stairways, bridges, etc into any existing space. Glass structures must be highly accurate to maintain their strength and form. Accurate scanning allows for fabricators to provide product at the exact requirement.

LOGISTICS

Oversized architectural glass must have special crates and shipping. It is important to work with a fabricator who has a track record of successful shipments, and works with partners such as architects, designers, GC's and glaziers to help pack shipments for:

- Sequenced installation to avoid additional manipulations
- Oriented for minimal manipulations

The more time the glass stays on a manipulator, the more risk it carries for damage.

Another consideration is of the final weight and size of the glass. Do the regional glaziers have the equipment and capabilities to install jumbo or oversized glass, or will specialty installers or equipment need to be brought on to handle sizes. It is worth consulting with a regional glazier at the design stage to determine these capabilities.