# QUALITY HANDBOOK

OF PRODUCTION TOLERANCES AND THE VISUAL ASSESSMENT OF GLASS PRODUCTS

AGNORA

JULY 2024

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# 1 FOREWORD

## 1.1 WELCOME TO AGNORA LTD

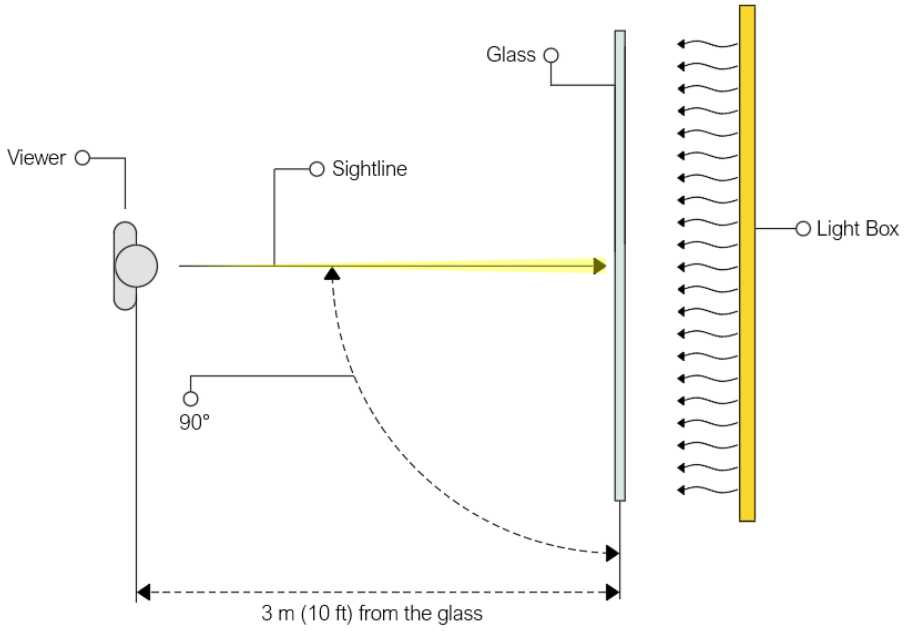
AGNORA is a customer service company that fabricates oversized and custom, quality architectural glass. Our commitment to customer service is based on the 'AGNORA Way', understanding the need, agreeing to a plan, providing excellent communication, and then exceeding expectations in quality, turn- around time and overall service. Our glass is used in luxury retail storefronts, high-end residential homes, and various institutional and one-of-a-kind projects such as zoos, stadiums, art exhibits.

## 1.2 NOTES

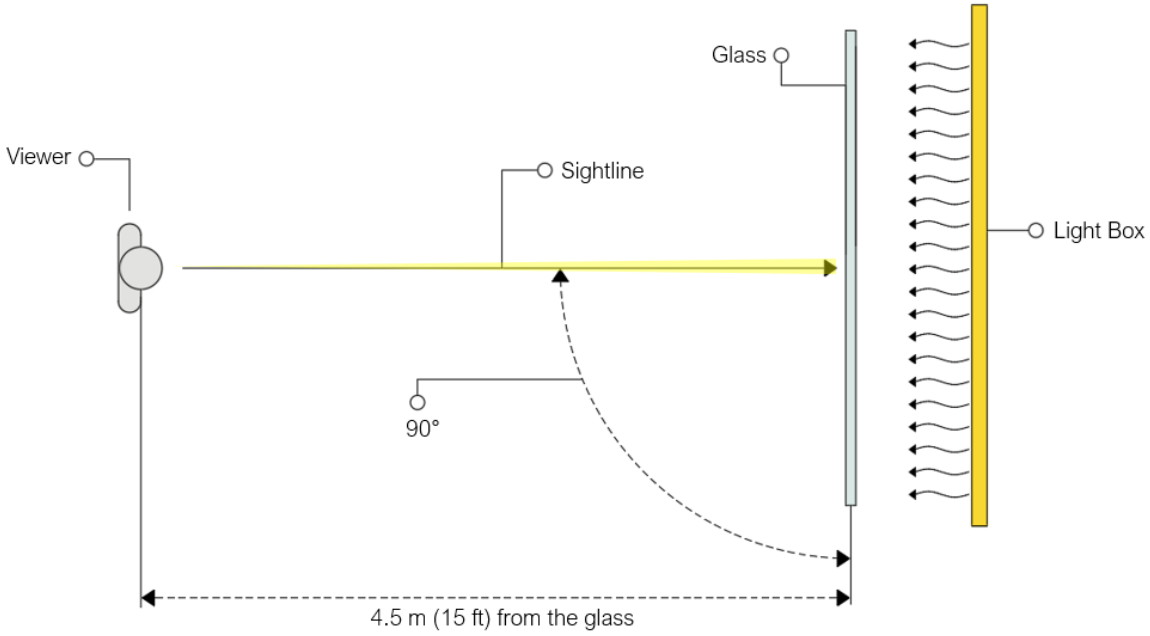
This handbook serves as a basis for the assessment of products fabricated and sold by AGNORA and as a commitment to our clients of the quality we will provide. It supplements agreed tolerances subject to order specifications and provides a basis if such agreed tolerances do not exist. If values or dimensions are not specified within this handbook, they are treated as not defined and are to be mutually agreed upon when an order is placed. If undefined, ASTM industry standards will be the default standard if the standard exists as the base level of quality. This quality handbook is based on the internal quality standards used during fabrication at AGNORA and is considered accurate at the time of the dated revision.

## 1.3 VISUAL INSPECTION

All visual inspections should be taken with the sample in the vertical position (or glass should be placed up to a 6° angle for viewing safety) and by the naked eye. The viewer should stand perpendicular to the glass at a viewing angle of 90° and minimum distance based on installation height. Natural light or uniform diffused background light should be used. Should optical distortion measurement be required, we can optionally perform visual interference inspection test per ASTM C1036.




VERTICAL INSTALLATION




OVERHEAD INSTALLATION

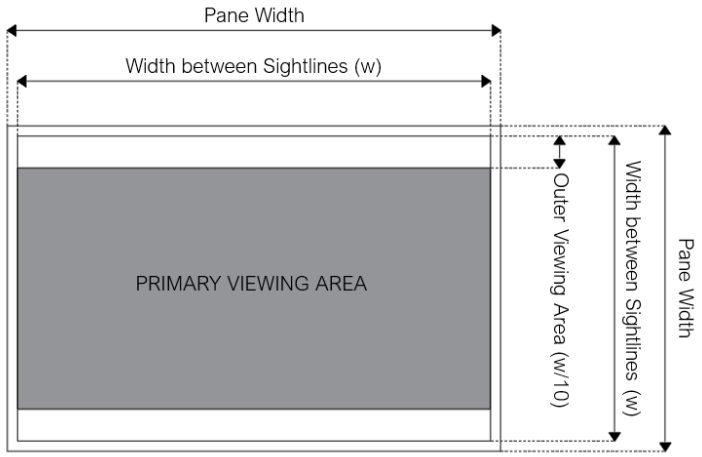
## 1.4 VIEWING AREA

The viewing area for glass inspection can be divided into different areas, **Primary Viewing Area,** and **Outer Viewing Area**. The sightline or rebate is the visually concealed area in the installed state (no limits on discrepancies, except for mechanical damage to the edges). The Primary Viewing Area is the area in the centre of the glass. This area has much tighter tolerances, and less allowances for defect.

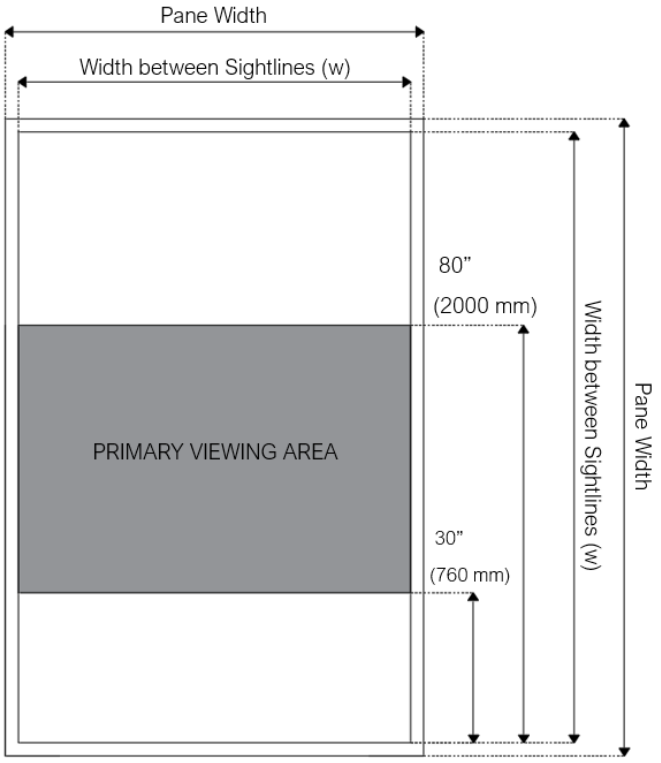
The Outer Viewing Area distance is calculated on units under 100 sq ft by taking the width between sightlines and dividing by 10 (w/10). Glass exceeding 100 sq ft., the Outer Viewing Area is calculated as under 30" (762mm) and over 80" (2032mm). The dimension for Outer Viewing Area is then considered from the sightline. This is the same for both the width and height.

Please see images below.

STANDARD VIEWING AREA




OVER 100 SQ FT.



# 2 FLOAT GLASS

Float glass is received into AGNORA from suppliers that are located both in North America and Europe. As float glass is supplied to us, AGNORA references ASTM C1036-21 Q3 as received by our suppliers.

## 2.1 GLASS THICKNESS

AGNORA inventories a combination of high quality North American and European glass manufacturers. The overall thickness of an assembly may be defined by adding up all glass and other processing tolerances. This is important to note when dealing with oversized glass as makeups will often have multi-layers of glass in lamination and IGU assemblies. There should be a consideration of using both North American and European glass in one glass makeup as this impacts overall thickness. Glass thickness to be measured by micrometer or caliper.

| C1036 (North American Supplied Glass) | | |
|---|---|---|
| SI DESIGNATION (MM) | MIN | MAX |
| 6 mm | 5.56 mm | 6.20 mm |
| 8 mm | 7.42 mm | 8.43 mm |
| 10 mm | 9.02 mm | 10.31 mm |
| 12 mm | 11.91 mm | 13.49 mm |
| 16 mm | 15.09 mm | 16.66 mm |
| 19 mm | 18.26 mm | 19.84 mm |

| EN 572 (European Supplied Glass) | | |
|---|---|---|
| SI DESIGNATION (MM) | MIN | MAX |
| 6 mm | 5.80 mm | 6.20 mm |
| 8 mm | 7.70 mm | 8.30 mm |
| 10 mm | 9.70 mm | 10.30 mm |
| 12 mm | 11.70 mm | 12.30 mm |
| 15 mm | 14.50 mm | 15.50 mm |
| 19 mm | 18.0mm | 20.00 mm |

# 3 PROCESSED GLASS – MONOLITHIC

## 3.1 SIZE SPECIFICATION

The size specifications are relevant for all monolithic, laminated, or insulated glass units fabricated at AGNORA. Dimensional tolerances may be exceeded locally due to the presence of flares in arrised or flat ground products. The overall dimension with flares fall within standard ASTM C1036 tolerance or as listed below.

| | | |
|---|---|---|
| **Length and width tolerance** | t ≤ 6 mm | ± 1.5 mm |
| | 8 ≤ t ≤ 10 mm | ± 2.0 mm |
| | t ≥ 12 mm | ± 3.0 mm |
| **Squareness – as measured in the difference in diagonals** | Up to 8 mm | ± 1.5 mm |
| | >10 mm | ± 3.0 mm |

## 3.2 BLEMISH SPECIFICATIONS

When the piece is supplied as a monolithic or is integrated into an insulated glass unit, below are AGNORA's allowable blemishes.

| BLEMISH | TOLERANCE |
|---|---|
| **Seeds, stones, knots** | Dependant on viewing area (Primary or Outer Viewing area) dependant per glass type.<br><br>>12 mm glass – determined by agreement |
| **Scratch/rubs/scuff** | Not detectable at 3 m / 10 ft.<br><br>Max Length 75 mm |
| **Deletion tolerance** | 3/8" ± 1/8" from the edge of the glass.<br><br>Deletion should be uniform in appearance (visually straight), remove minimum 95% of the coating, and not project into sightline. |

| Blemish Intensity Chart | |
|---|---|
| **Detection Distance** | **Blemish Intensity** |
| 3 m (120") | Heavy |
| 1 m (39") | Medium |
| 0.2 m (8") | Light |
| Less than 0.2 m (8") | Faint |

### Intensity Defined

Faint: Barely noticeable at 0.2 m but not at 1 m

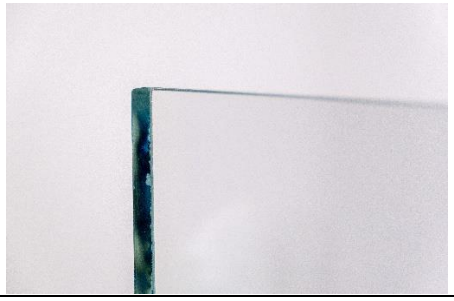
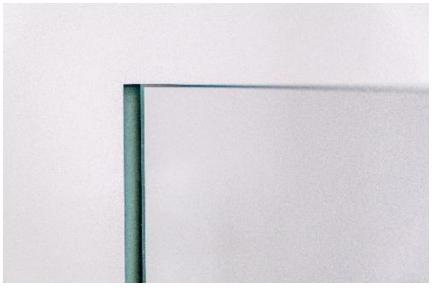
Light: Barely noticeable at 1 m

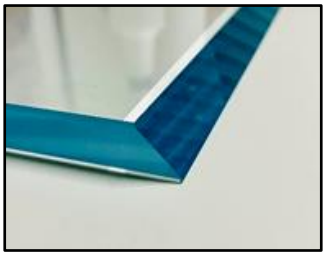
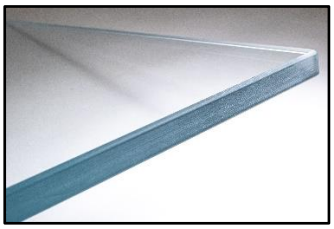
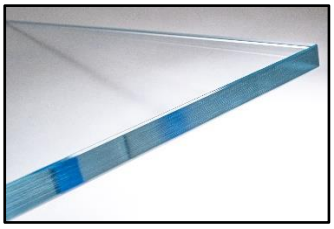
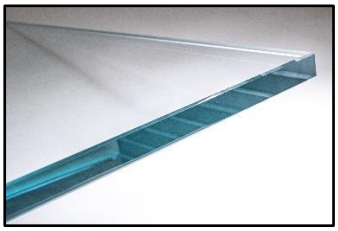
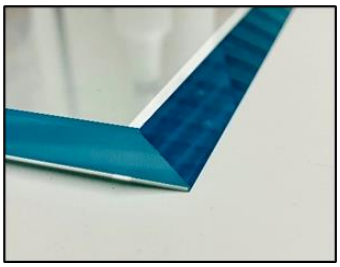
Medium: Noticeable at 1 m but not at 3 m

Heavy: Noticeable at 3 m

## 3.3 EDGEWORK TYPES

Edge quality plays a direct role in overall quality of the end piece of glass; therefore, it is important to choose the correct level of finish required for the project. This specification is required at the time of order. Should the project have captured edges this should also be specified at time of order. “Captured edges” means the edges and perimeter of glass are captured in a frame, and not seen. Minor defects in this area that do not affect the integrity of the unit will not be cause for rejection. AGNORA does not post temper polish.

| NAME | PICTURE | DESCRIPTION |
|---|---|---|
| **Belt Edge Arrised** |  | Diamond belt arrised. Sharp edges are removed, visually the main portion of the edge appears "as cut" |
| **Belt Flat Ground** |  | Diamond belt flat ground. Shiners are acceptable |
| **Diamond Tool Flat Ground** |  | Dull edge with a chamfer on each side |
| **Diamond High Polish** |  | Shiny edge with a chamfer on each side |

| | | |
|---|---|---|
| **Diamond Tool Mitre** |  | Shiny bevel with a chamfer on one side |
| **CNC Flat Ground** |  | Dull edge with a chamfer on each side. |
| **CNC Polish** |  | Shiny edge with lines parallel to surfaces and chamfers on each side |
| **CNC High Polish** |  | Shiny edge and chamfers on each side. |
| **CNC Mitre** |  | Shiny bevel with a chamfer on one side |

## 3.4 EDGEWORK TOLERANCES

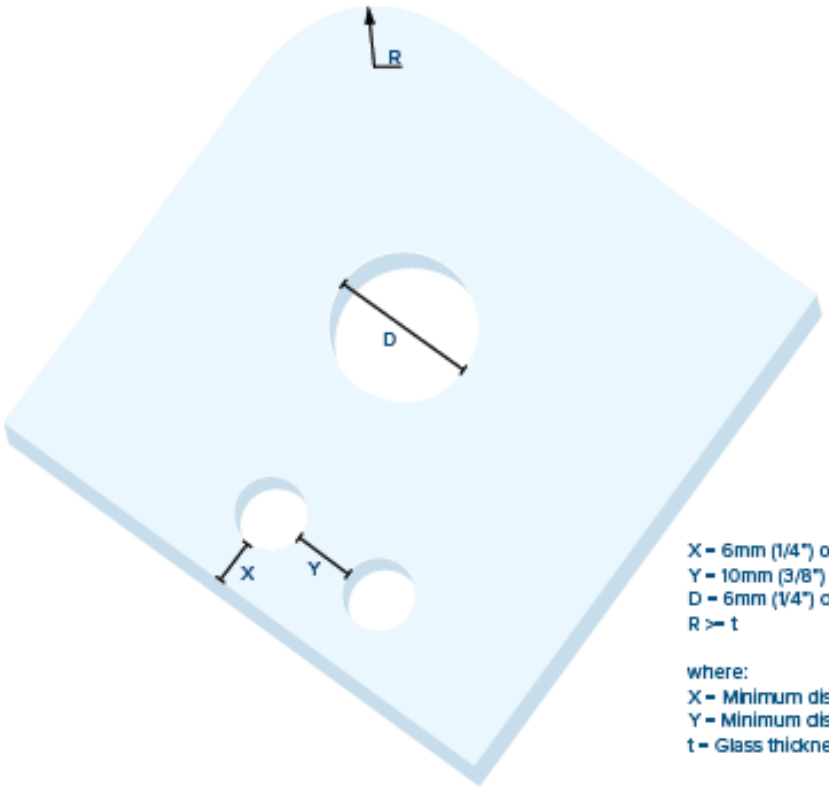
Edgework tolerances are dependant on the type of edgework requested and if the edges are captured or exposed.

| | BELT EDGE | DIAMOND TOOL | CNC | PERFECT ALIGN / ULTIMATE FINISH |
|---|---|---|---|---|
| **Shells/ Chips** | Width ≤ 3 mm (1/8") Length ≤ 6 mm (1/4") Depth ≤ 25% of glass thickness | Width ≤ 3 mm (1/8") Length ≤ 6 mm (1/4") Depth ≤ 25% of glass thickness on Flat Ground<br><br>None allowed on High Polish | None allowed | None allowed |
| | No more than 1 per 300 mm | No more than 1 per 300 mm on Flat Ground<br><br>None allowed on High Polish | None allowed | None allowed |
| **Protruding Flare** | Acceptable but must meet overall dimensional tolerances | Acceptable but must meet overall dimensional tolerances on Flat Ground<br><br>None allowed on High Polish | None allowed | None allowed |
| **Inward Flare** | Acceptable but must meet overall dimensional tolerances | Acceptable but must meet overall dimensional tolerances on Flat Ground<br><br>None allowed on High Polish | None allowed | None allowed |
| **Flat Spots** | Allowable | None allowed | None allowed | None allowed |
| **Tool Marks** | Slight tooling markings acceptable if transparent | Acceptable on Flat Ground<br>None allowed on High Polish | Acceptable e on CNC Flat Ground and CNC Polish<br><br>None allowed on High polish | None allowed |
| **Mitre Angle** | Not applicable | ± 0.5° | ± 0.5° | ± 0.5° |

## 3.5 DRILL HOLES AND NOTCHES

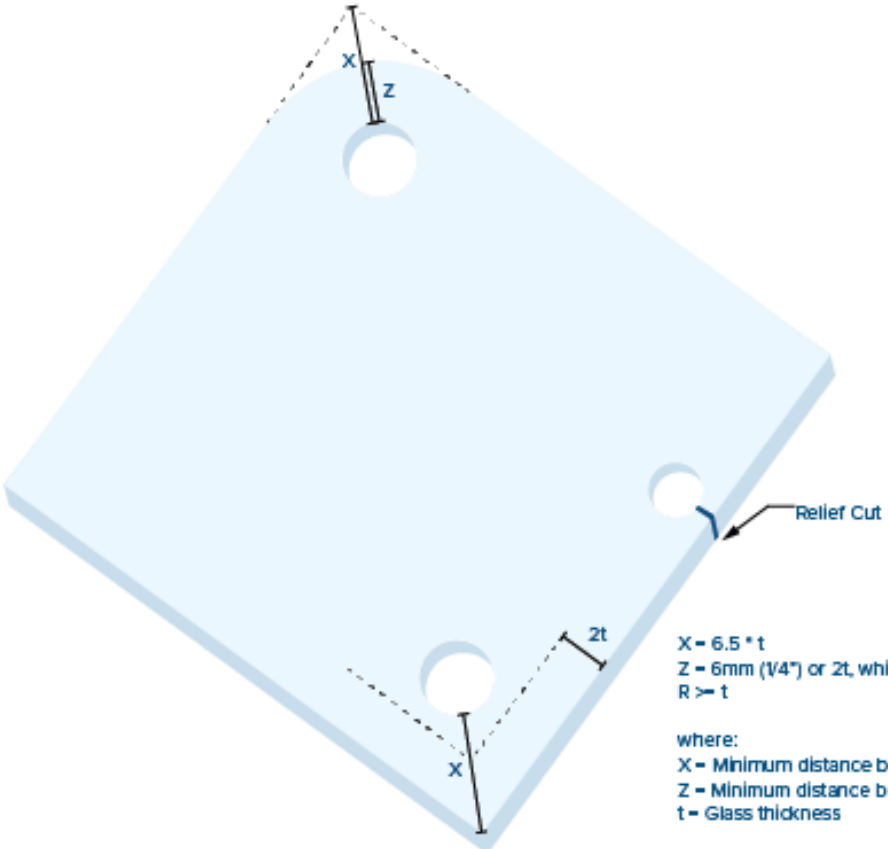
When working with heat-treated glass, thermodynamic laws command the geometry of the holes and notches. Below are the general guidelines for processes done to glass requiring heat treatment from ASTM C1048. To accommodate design requirements outside of the normal allowances, there may be visual defects. This would include a relief cut (if determined necessary) and localized warp due to localized overheating.

| PROCESS | TOLERANCE |
|---|---|
| Chamfer<br>(As measured along its length) | 1.5 ± 1.0 mm |
| Hole, cut-out, and notch location | ± 1.5 mm |
| Hole, cutout, and notch size | ± 1.0 mm |




X = 6mm (1/4") or 2t, whichever is greater
Y = 10mm (3/8") or 2t, whichever is greater
D = 6mm (1/4") or 1t, whichever is greater
R >= t

where:
X = Minimum distance between glass edge and rim of nearest hole
Y = Minimum distance between rims of adjoining holes, and
t = Glass thickness




X = 6.5 * t
Z = 6mm (1/4") or 2t, whichever is greater
R >= t

where:
X = Minimum distance between glass corner and rim of nearest hole
Z = Minimum distance between rim and hole and rounded corner, and
t = Glass thickness

## 3.6 COATING DEFECTS

Coating defects are relevant for all monolithic, laminated, or insulated glass units fabricated at AGNORA that have a pane of coated glass as observed from normal viewing distances dependant on glazing height. See 1.4 for viewing area.

| IMPERFECTION | VIEWING AREA | |
|---|---|---|
| | PRIMARY | OUTER |
| **Pinhole** | ≤ 1.5 mm | ≤ 2.40 mm |
| **Spot** | ≤ 1.5 mm | ≤ 2.40 mm |
| **Coating scratch** | 50 mm | 75 mm |
| **Coating rub** | None | L+W not to exceed 19 mm |
| **Corrosion** | None | None |
| **Crazing** | None | None |
| **Fingerprint** | None | None |

## 3.7 HEAT TREATED SPECIFICATIONS

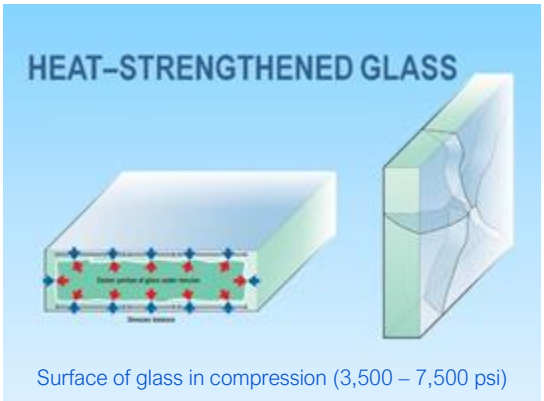
One of the benefits of AGNORA's heat treatment process is our ability to perform two procedures; heat strengthening and tempering, allowing specifiers to work with laminates, glass thickness and optical distortion/anisotropy characteristics to yield the best balance of strength, clarity, and durability.

### HEAT STRENGTHENED

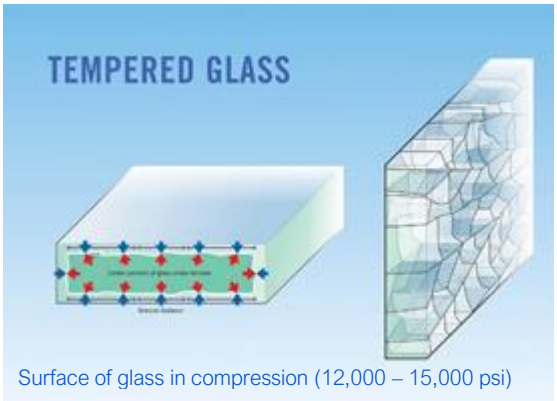
- x2 strength of annealed glass
- Breaks in large "islands"

### FULLY TEMPERED

- x4 strength of annealed glass
- Breaks in small pebbles



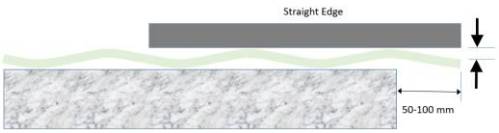
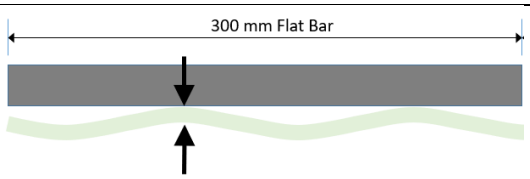
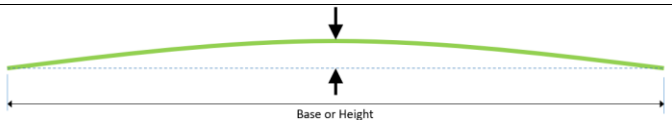
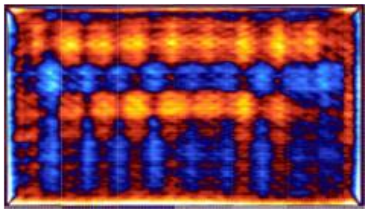
Surface of glass in compression (3,500 – 7,500 psi)



Surface of glass in compression (12,000 – 15,000 psi)

Measurements of each glass lite are taken with a quality scanner and analysed for localised distortion. We measure the distortion, or curvature of the glass. This measurement is made in (milli) diopters and calculates the traditional peak to valley and edge curl values. The distortion measurements are displayed as a color map of the entire sheet that can then be manipulated for better viewing or further analysis. We set up pass/fail optical power values that are applied to individual glass panes.

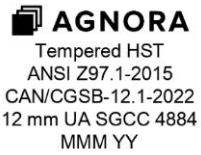
Glass greater than 130" wide (max width of our furnace) will be heat-treated with short side as the base. Roller-wave distortion, while unchanged, may be more visible due to the perpendicular (instead of parallel) orientation of the rollers to the horizon.

| HEAT TREATMENT DISTORTION MEASUREMENTS | | |
|---|---|---|
| **MEASUREMENT** | TOLERANCE | PICTURE |
| Surface stress measurement (Laser GASP) | Heat Strengthened Glass 3500 to 7500 psi.<br>Tempered Glass 12000+ psi |  |
| Edge curl (PVL/PVT) | PVE ≤ 0.3 mm |  |
| Roller wave | ≤ 10 mm glass - PVM ≤ 0.127 mm<br>≥ 12 mm glass – determined by agreement |  |
| Overall bow | 0.8 mm per 300 mm |  |
| Anisotropy | Defined per project. |  |

## 3.8 LOGO LOCATION (HEAT TREATED & LAMINATED)

All logos will include applicable US and Canadian standards information and will be laser-etched into the glass. The default is to have the glass marked, except for previously agreed upon exclusion to which at that time a statement of compliance can be supplied. Approx size is 1" x 1".

Sample logo:




## 3.9 HEAT SOAK TESTING

Glass that has gone through a heat-treated process may break without warning due to the expansion of nickel sulfide inclusions (NiS) present within float glass. The best way to avoid this risk is to use annealed glass or heat soak test. Although the incidence of heat treated glass breakage due to these inclusions is rare, greater publicity of their occurrence has resulted in an increased awareness of this phenomenon. As an optional process, after heat treatment, we reheat the glass to 260°C for two hours. Most glass containing NiS will shatter during this stressful procedure, this is why it is called destructive testing. There is no North American standard for this procedure, we use the most credible testing method: the European standard EN14179-1 and adhere to ISO 20657. Our oven is regularly calibrated via 3rd party calibration company every two years.

# 4 LAMINATED GLASS

Laminated glass is a safety glazing material that holds together when damaged. Laminated glass may crack upon impact. The glass fragments adhere to the protective interlayer rather than falling free. Laminated glass is comprised with two or more plies of glass permanently bonded together with polyvinyl butyral (PVB), ionomer (SG) as well as other interlayers. Plies can be annealed, heat strengthened or tempered. Glass is tested both internally and externally (external by 3rd party) on a monthly and quarterly basis.

## 4.1 LAMINATED GLASS INSPECTION METHOD

Glass shall be inspected, in transmission, at 3 m at a viewing angle of 90° or up to 6° to the specimen against a bright uniform background. For viewing area, please see Section 1.4.

## 4.2 EDGEWORK TYPES FOR LAMINATION

| Category | Name | Picture | Trademarked Name |
|---|---|---|---|
| **Perfect_Align®** |  | Shiny edge used for tempered laminates. | **Perfect_Align®** |
| **Ultimate SG Finish®** |  | Perfect Align with SG-SentryGlas structural interlayer. | **Ultimate SG Finish®** |

## 4.3 BLEMISH SPECIFICATIONS FOR LAMINATED GLASS

| IMPERFECTION | VIEWING AREA | |
|---|---|---|
| | PRIMARY | OUTER |
| **Trapped air (bubble)** | ≤ 1.5 mm | ≤ 2 mm |
| **Delamination** | None | None |
| **Blow in** | NA | CE 6 mm<br>EE 1.5 mm |
| **Short interlayer/ un-laminated area** | NA | CE 6 mm<br>EE 1.5 mm |
| **Lines in laminate/mismatch** | None | None |
| **Shell chips** | Only applicable on holes / cut outs - Width ≤ 3 mm Length ≤ 6 mm Depth ≤ ¼ of glass thickness V-chips not allowed | On Minimum Edgework Units<br>Width ≤ 3 mm Length ≤ 6 mm Depth ≤ ¼ of glass thickness<br><br>On Polished Edge Units<br>None Allowed |
| **Point blemish* - stain spots, dirt, surface damage, seeds** | ≤1.5 mm | ≤2 mm |
| **Scratch/rubs/scuff** | Light Intensity<br>Detectable at 0.2 m not detectable at 3 m | Medium Intensity<br>Detectable at 1m not detectable at 3 m |
| **Hair/lint** | Light Intensity<br>Detectable at 0.2 m not detectable at 3 m | Medium Intensity<br>Detectable at 1m not detectable at 3 m |
| **Warp/bow** | 0.8 mm max. per 300 mm | |
| **Poor edge quality (skips, shiners, etc.)** | None allowed in polished edge laminates, acceptable on minimum edgework laminates. | |
| **Haze** | Haze is inherent to using SentryGlas Interlayer. | |

CE – Captured Edge EE Exposed Edge

## 4.4 LAMINATED GLASS – SIZE SPECIFICAITON

| SPECIFICATION | TOLERANCE |
|---|---|
| Length, width, and thickness tolerance | Length and Width +3 mm / –1.5 mm<br><br>Thickness ± 0.5 mm (in addition to tolerance stack-up of glass thickness) |
| Flares | Edgework Units ≤ 1.5 mm<br><br>Acceptable but must meet overall dimensional requirements.<br><br>Polished Edge - None allowed |
| Laminate mismatch/offset | 3 mm max.<br><br>None on post lamination polish (annealed glass only) unless allowed by customer |

# 5 INSULATED GLASS UNITS

An Insulated Glass Unit (IGU) is two or three lites of glass enclosing a hermetically sealed air space. Insulating glass is the most effective way to increase a window's thermal performance by reducing the heat gain or loss. To create this hermetically sealed and dehydrated space, the glass panes are separated by a spacer bar filled with a desiccant to absorb internal moisture.

## 5.1 UNIT SPECIFICATIONS

All AGNORA insulated glass units are double sealed with a primary seal of polyisobutylene and a secondary seal of silicone. We prefer to use a warm edge spacer for superior performance. *For overall unit size tolerances, please refer to section 3.1 GLASS – SIZE SPECIFICATION.*

| DEFECT | TOLERANCE |
|---|---|
| **Thickness tolerance** | ± 1.5 mm<br>Refer to section 2.1 for glass thickness specifications |
| **Mismatch/offset** | ≤ 75sqft ± 2.0 mm<br>> 75sqft ± 3.0 mm<br>If unit includes laminate, add tolerance stack-up |
| **Warp/bow** | 0.8 mm per 300 mm |
| **Sight line tolerance** | ± 1.5 mm on either side (overall ± 3mm) |
| **PIB creep at corners & seams** | 3mm |

## 5.2 SEALANT

Primary Sealant Specifications: Minimum 2 mm of continuous contact with a maximum of 3 mm overflow allowed at corners into the sealed cavity. Target sealant width is 3 mm. There are to be no voids or skips in the primary seal.

Secondary Sealant Specifications: Minimum overall thickness of 4 mm. Variation from unit edge ± 2 mm.

Sealant Voids Tolerance: Maximum 1.6 mm x 51 mm in size, with a minimum distance of 460 mm between voids. The voids may be between the primary and secondary seal and within the secondary seal.

## 5.3 BLEMISH SPECIFICATIONS GLASS UNITS

| IMPERFECTION | VIEWING AREA | |
|---|---|---|
| | PRIMARY | OUTER |
| **Point blemish* - stain spots, dirt, surface damage, seeds** | ≤1.5 mm | ≤2 mm |
| **Scratch/rubs/scuff/ linear** | Light Intensity<br>Detectable at 0.2 m not detectable at 3 m | Medium Intensity<br>Detectable at 1m not detectable at 3 m |
| | 50 mm with a 600 mm separation | 75 mm with a 600 mm separation |
| **Hair/lint** | Light Intensity<br>Detectable at 0.2 m not detectable at 3 m | Medium Intensity<br>Detectable at 1 m not detectable at 3 m |
| **Warp/bow** | 0.8 mm max. per 300 mm | |
| **FOR IGU's WITH LAMINATES ON EXT / INT** | | |
| **Trapped air (bubble)** | ≤ 1.5 mm | ≤ 2 mm |
| **Delamination** | None | None |
| **Blow in** | NA | CE 6 mm<br>EE 1.5 mm |
| **Short interlayer/ un-laminated area** | NA | CE 6 mm<br>EE 1.5 mm |
| **Shell chips** | Only applicable on holes / cut outs - Width ≤ 3 mm Length ≤ 6 mm Depth ≤ ¼ of glass thickness V-chips not allowed | On Minimum Edgework Units<br>Width ≤ 3 mm Length ≤ 6 mm Depth ≤ ¼ of glass thickness<br><br>On Polished Edge Units<br>None |
| **Haze** | Haze is inherent to using SentryGlas Interlayer. | |

CE – Captured Edge EE Exposed Edge

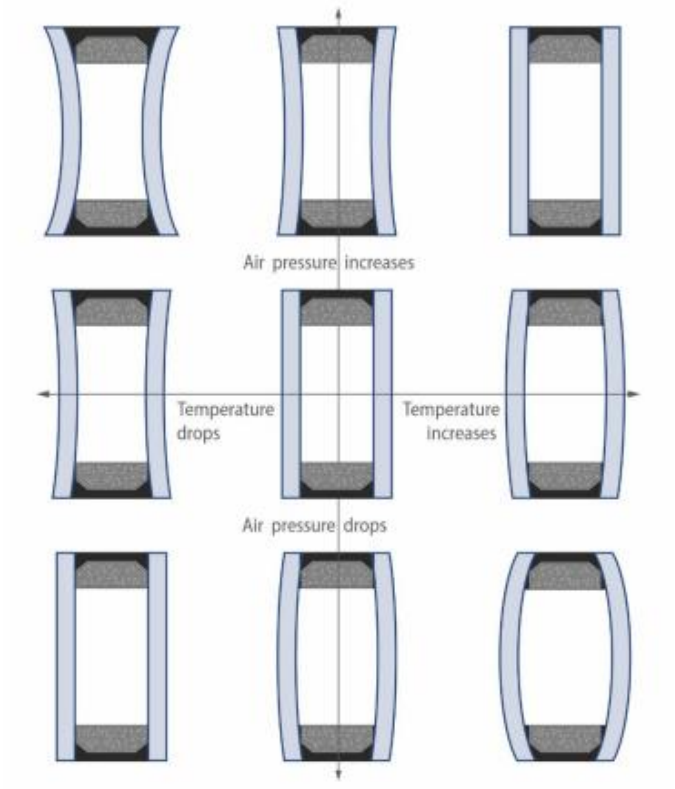
## 5.4 AIR GAP

Air gaps between glass layers are to meet the following requirements:

| SPACER SIZE | MIN AIR GAP |
|---|---|
| 10 mm | 7 mm |
| 12/13 mm | 9 mm |
| 15/16 mm | 11 mm |
| 18/19 mm | 11 mm |
| 23 mm | 11 mm |

## 5.5 IGU'S AT ELEVATION

Insulating Glass Units (IGU) that will be installed at higher altitude regions should be ordered as an Ascent Unit or with capillary tubes. Our factory elevation is 185 m - 600 feet above sea level, so as an example, if the IGUs will be installed in elevations over 700 m - 2300 feet above sea level, the Ascent Unit or capillary tubes are recommended to limit the unit swelling. Air pressure decreases as altitude increases. This phenomenon causes a sealed insulated unit to expand (swell) as it is moved to higher altitude. Glass breakage, seal breakage or glass rub marks caused by expanded IGU rubbing against adjacent IGU in a crate can result. We offer capillary tubes and AGNORA Ascent units (pre-equalized) to use at elevation. Please note warranty to be reviewed at time of order for units using capillary tubes. Argon retention is not guaranteed with capillary tubes. AGNORA recommends against the horizontal glazing of units that have been pre-equalized before reaching final elevation.



# 6 PRINTED GLASS

The success of a printed project relies heavily on the skills & expertise of the AGNORA Digital Print Specialist to manipulate the raw supplied files to reproduce the imagery with accuracy. Extensive testing using proven traditional litho-print methodologies is performed and then translated to digital ceramic ink. Artwork must be supplied, and final quality of image is dependant on file provided. Glass shall be inspected, at 3 m at a viewing angle of 90° or up to 6° to the specimen against a bright uniform background. Spandrel glass to be viewed without backlighting. For viewing area please see 1.4.

## 6.1 PAINT QUALITY SPECIFICATIONS, PREPARATION/SETUP

| SPECIFICATION | TOLERANCE |
|---|---|
| **Paintable surface** | Unless specified otherwise the 'air' side of the glass will be painted. |
| **Colour** | Per agreed upon commercially approved sample |

## 6.2 PAINT QUALITY SPECIFICATIONS

| IMPERFECTION | VIEWING AREA | |
|---|---|---|
| | PRIMARY | OUTER |
| **Pinhole / Voids** | ≤ 1.5 mm | ≤ 2.40 mm |
| **Spot** | ≤ 1.5 mm | ≤ 2.40 mm |
| **Rub** | None | L+W not to exceed 19 mm |
| **Corrosion** | None | None |
| **Crazing** | None | None |
| **Fingerprint** | None | None |
| **Blisters** | ≤ 1.5 mm | ≤ 2.40 mm |
| **Fisheyes** | ≤ 1.5 mm | ≤ 2.40 mm |
| **Finger/handprints** | 50 mm | 75 mm |
| **Orange peel** | None | 1.5mm |
| **Streaks/smears/ scratches/sawtooth** | Not visible at 3m | Not visible at 3m |

# 7 RELEVANT STANDARDS & CERTIFICATIONS

While AGNORA meets all North American Codes and Standard requirements, our goal is always to exceed what is required.

ASTM C162 – Standard Terminology of Glass and Glass Products

ASTM C1036 – Standard Specification for Flat Glass

ASTM C1048 – Heat Treated Flat Glass

ASTM C1901 – Standard Test Method for Measuring Optical Retardation in Flat Architectural Glass

ASTM C1172 – Laminated Architectural Flat Glass

ASTM C1908 – Standard Test Method for Pummel Adhesion of Testing Two Ply Architectural Glass

ASTM C1376 – Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass

ASTM E2190 – Standard Specification for Insulating Glass Unit Performance and Evaluation

ANSI Z97.1-2015 - For Safety Glazing Materials used in Buildings – Safety Performance Specifications and Methods of Test

CAN/CGSB12.1-2022 – Safety Glazing

Certification:

SGCC – Safety Glazing Certification Council

IGCC/IGMA – Insulating Glass Certification Council

Saint-Gobain – Exproclub silver