Oldcastle BuildingEnvelope®

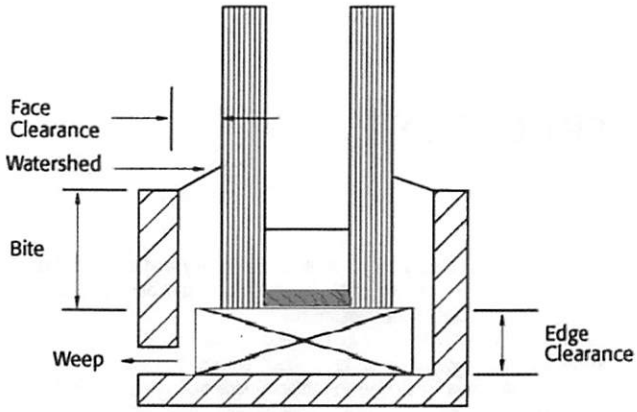
GLAZING INSTRUCTIONS

CAUTIONS

1. Failure of any Oldcastle BuildingEnvelope® product due to incompatibility with any other product not supplied by Oldcastle BuildingEnvelope® (including, but not limited to, blocks, gaskets, glazing sealants, spacers, tapes, plasticizing oils and solvents) voids all warranties and exonerates Oldcastle BuildingEnvelope® from any liabilities.
2. Setting blocks and anti-walk blocks must be silicone for IGUs used in 4-sided SSG, sloped glazing, and with IGUs that have gray silicone secondary sealant. Silicone or silicone compatible EPDM setting blocks and anti-walk blocks can be used in conventional 4-sided captured glazing and vertical 2-sided SSG.
3. Do NOT use razor blades or broadknife blades of any kind to clean glass. Oldcastle BuildingEnvelope® is not responsible for scratches and/or damage caused by window cleaners or other construction tradesmen.
   Follow NGA *Proper Procedures for Cleaning Architectural Glass Products,* available at http://www.glasswebsite.com/techcenter/default.asp.
4. Use of all abrasives, chemicals, or other surface treatments should be spot tested and evaluated under actual use conditions and under various lighting extremes before proceeding with use.

The following Glazing Instructions are intended to assist the design professional and installer. Additional glazing recommendations and guidelines provided by NGA/GANA and FGIA (AAMA/IGMA) must also be followed. If there is any variation in glazing recommendations, the more stringent guideline will apply.

1. **Glass Handling & Protection -** Care must be exercised in the handling and the glazing of glass to prevent edge damage. The glass must not contact the framing members, or other metal components such as screws, during glazing. Glass must be protected from weld splatter, blasting and other impact damage. Alkali or fluorinated materials released from concrete or masonry during rainstorms can stain or etch glass. Weathering steel releases oxides while aging which can result in stained glass if proper periodic cleaning is not done. Solutions used to restore or neutralize masonry surfaces can attack glass and first surface pyrolytic reflective coatings.
2. **Glass Storage -** Glass should be kept on a lean of 5-7° from vertical using broad, sturdy uprights. Never store glass in sunlight without using an opaque cover to protect it. Glass should be stored in a dry, clean and cool location where the temperature is above the dew point. Circulation of dry, cool air is required especially after periods of high humidity and cyclic temperatures. If glass must be stored outdoors, use tarps or plastic coverings to protect it from getting wet, and vent periodically to prevent moisture accumulation. Repeated wetting and drying of glass surfaces can result in staining or etching of the glass.
3. **Glazing Frames -** Frames must be square, in plane, free of any internal obstructions and structurally adequate.
   a. Squareness: 1/8" maximum diagonal difference
      i. Bow: 1/16" maximum per any 4' length
      ii. Plumbness: 1/16" per 6' length
      iii. Corner Joint Offset: must not exceed 1/32" of adjoining members
   b. Design Load Deflection: Unless applicable codes or the design professional establish a more stringent requirement, deflection of framing members supporting glass shall not exceed the length of the unsupported span divided by 175 (L/175).
   c. Dead Load Deflection: Horizontal Framing Member deflection should not reduce glass bite by more than 25% of design dimension, nor reduce edge clearance of glazing below to less than that required to prevent glass to metal contact. Refer to the chart on the following page for recommended clearance and bite values.
   d. Dead Load Twisting: Twisting of the horizontals due to the weight of glass should not exceed 1°, measured between ends and center of each span.
   e. Edge and Face Clearance, and Bite: The glazing system must have adequate edge and face clearance to 'cushion' the glass, thermally isolate the glass from framing members, and prevent glass-to-metal contact. An adequate bite is required to provide proper seal; however, excessive bite could increase thermal stresses. Refer to the chart on the following page for recommended clearance and bite values, and exceptions.
4. **Glazing System Water Management –** The edges of insulating, laminated, and spandrel glass should not be exposed to water or other liquids or vapors for extended periods of time, which may result in seal failure, delamination, or coating deterioration and void the warranty. OBE requires either a positive weather seal, or an adequate weep system to prevent such exposure. Setting blocks must not hinder the flow of liquid from the glazing channel.
5. **Glass Installation**
   a. Setting Blocks – All lites of glass should be set on 2 identical setting blocks with a Shore A durometer hardness of 80 to 90. The preferred location is at 1/4 points of the sill. In some cases, it may be necessary to move the blocks equally closer to the corner of the unit but not closer than 1/8 points or 6" from the edge, whichever is greater. The setting blocks should be sized to provide 0.1" of length per square foot of glass but not less than 4" long. Setting blocks should be wider than the IGU thickness in a conventional framing system. In an SSG application, the setting block must support a minimum of half of the outer lite thickness. Setting blocks should not block the weep holes or prevent water from exiting the frame quickly. The thickness of the setting block should provide the recommended nominal bite and minimum edge clearance for the glass. When a lock strip gasket glazing system is used, each setting block should be sized to provide 0.4" of length per square foot of glass area, but not less than 6" long. The lock strip gasket manufacturer should recommend the height of the blocks.
   b. Edge Blocks, or anti-walk Blocks – All dry-glazed lites of glass should have at least one edge block per jamb that has a Shore A durometer hardness between 50 to 70. Blocks should be a minimum of 4" long, placed in the vertical channel and sized to allow a nominal 1/8" clearance between the edge of the glass and block.
6. **Dry-Glazing Methods**
   a. Pressure-Plate Gaskets: These gaskets must apply pressure onto the glass uniformly between 1/8" to 9/16" from the unit edge. The sealing pressure should be in the range of 4 to 10 pounds per linear inch, which should be achieved by tightening the pressure plate fasteners with torque-controlled wrenches. The fasteners should be tightened at quarter points of sill, then quarter points of head, then quarter points of jambs, and then the remaining bolts. Excessive torque on the pressure plate fasteners may contribute to glass breakage, or cause squeeze out of the PIB into the vision area.
   b. Wedge Gasket Glazing: Wedge gaskets must be properly sized and installed so that the gasket is crowded, not stretched. Refer to the system manufacturer's instructions for proper sizing and installation procedure.
   c. Structural Gasket Glazing (Lock Strip Glazing): This system must have a continuous wet sealant applied as a cap bead to the exterior glazing leg.
7. **Structural Glazing Methods**
   a. IG Unit Sightline: For all structurally glazed IG units, the customer must verify that the IG unit is ordered with an IG unit sightline that provides the necessary secondary silicone contact width to resist the lateral loads, while not exceeding a silicone design stress of 20 psi.
   b. Structural Silicone Glazing: It is critical that the structural silicone supplier review the details and project conditions to approve the application, and provide recommendations regarding, but not limited to, application, environmental restrictions, product selection, surface preparation, material selection and structural sealant contact width. It is the customer's responsibility to confirm that the recommendations are followed.
   c. Structural Glazing Tape: The structural glazing tape supplier must review the shop drawings and project conditions to approve the use of their tape in the application. The customer must take extreme care to verify all the written procedures are followed. Do not apply more force to the IG unit edge than what is prescribed in the written instructions while adhering the glass to the framing. OBE will not be responsible for damage to the glass or the IG sealant resulting from excessive pressure to the IG unit edge during installation.
8. **Capillary Tubes -** IGUs that experience an elevation difference of 2,500 feet or more in transportation or installation location from the IGU manufacturing elevation may require capillary tubes. Capillary tubes may not be used with IGUs containing a gas filled air space. It is the customer's responsibility to determine when capillary tubes are required and verify that the IGUs are ordered accordingly. These tubes will be installed on the IGU vertical edge and must be cut, sealed, and then pointed downwards after the IGUs have stabilized for 72 hours (or until flat) at final destination. Oldcastle BuildingEnvelope® Closing Procedure for Capillary Tubes is available on request from any Oldcastle BuildingEnvelope® plant. Failure to follow the Oldcastle BuildingEnvelope® closing procedure will void the IGU warranty.



(1) Specialty glazing system designs such as ones with glazing tape or sealant back-bedding may be designed for reduced face clearance. Deviations from typical clearances should be fully considered within the context of the design and expected performance of the glazing system. Consult glass manufacturer, fabricator, glazing material manufacturer, and/or design professional for relevant performance properties
(2) Annealed glass
(3) Fully tempered and heat-strengthened glass

TYPICAL FACE & EDGE CLEARANCE & BITE

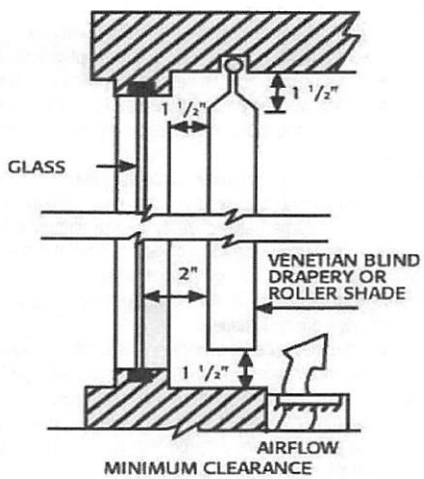
GLASS TYPE	GLASS THICKNESS		MINIMUM FACE CLEARANCE (1)	MINIMUM EDGE CLEARANCE	MINIMUM BITE
	inches	mm	inches	inches	inches
Single Glazing	3/32	2.5	1/16	1/8	1/4
	1/8 (2)	3	1/8	1/8	1/4
	1/8 (3)	3	1/8	1/4	3/8
	5/32	4	1/8	3/16	5/16
	3/16 (2)	5	1/8	3/16	5/16
	3/16 (3)	5	1/8	1/4	3/8
	1/4	6	1/8	1/4	3/8
	3/8	10	3/16	5/16	7/16
	1/2	12	1/4	3/8	7/16
	5/8	16	1/4	3/8	1/2
	3/4	19	1/4	1/2	5/8
	1	25	1/4	1/2	3/4
Spandrel	1/4	6	3/16	1/4	1/2
Insulating Glass	1/2	12	1/8	1/8	1/2
	5/8	16	1/8	1/8	1/2
	3/4	19	3/16	1/4	1/2
	1	25	3/16	1/4	1/2
	1-1/8	28	3/16	1/4	1/2

Thermal Stress

Thermal Stress is created when one area of a glass pane gets hotter than the adjacent area, causing the hotter area to expand at a greater rate. If the stress is too high, then the glass will crack. The amount of thermal stress is dependent on the glass type, size, thickness, shape, and how it is isolated from the framing system. Other factors include building orientation, interior shading devices, exterior shading patterns, heating register location, etc. Heat-strengthening or tempering the glass increases the strength and decreases the chance for thermal stress breakage. The following conditions must be considered when evaluating the effects of thermal stress. When the risk of thermal stress breakage is a concern, heat-treated glass should be used. Oldcastle BuildingEnvelope® Technical Services will offer suggestions on the need to heat-treat glass when requested.

1. **Interior Heat Traps** — These situations occur when there is inadequate air circulation to properly remove heat from the inside surface of the glass. Spandrel areas are a good example of a heat trap since the spandrel cavity does not allow adequate circulation of air. Spandrel glass should always utilize heat-treated glass to minimize thermal stress breakage. Insulation should be held away from the face of the spandrel glass 2 inches but should never be placed closer than 1 inch, and the insulation shall be secured in a manner that will prevent the insulation from sagging onto the glass surface.

In vision areas, air movement over the room side of the glass must not be restricted. Suspended soffits, structural pockets, walls and other building elements placed directly in front of the glass surface must be far enough from the glass surface to allow natural convection, or the glass should be heat-strengthened or tempered.



2. **Interior Shading** — Draperies, venetian blinds or other interior shading devices must be hung with space to permit natural air movement over the room side of the glass. The following criteria must be met to avoid formation of a heat trap:
A. Minimum 1-1/2" clearance required at the top and bottom, or one side and bottom, between the shading device and the surrounding construction.
B. Minimum 2" clearance between glass and shading device.
C. Heating/cooling outlets must be to the room side of the shading device with airflow directed away from the glass.
D. Use mechanical stops to prevent complete closure of blinds to 60% of closed position.
Heat-strengthening or tempering of the glass may be necessary to offset the effects of a lack of adequate ventilation.

3. **Heating Register Location and Orientation** — In any building, the registers need to be carefully placed in order to ensure that warm air is not being directed at the glass, which can cause isolated areas of the glass to heat up and lead to thermal stress

4. **Exterior Shading** — Shadows cast by overhangs, light shelves, sunshades, surrounding structures, trees and shrubbery can create shading patterns on the glass, creating thermal stress. Maximum stress occurs when 25% or less area of a lite is shaded and the shade includes more than 25% of the perimeter. Generally, horizontal, vertical, and diagonal shading patterns are not as critical as shading that combines several patterns. Double diagonal shading is generally the most critical pattern. See the sketches of typical shading patterns that are labeled "Acceptable", "Marginal", and "Harmful".

EXTERIOR SHADING PATTERNS