

Describing Architectural Glass

Architectural glass products used in commercial construction applications often incorporate single or multiple lites of glass with different colors, thicknesses, strength, coatings and other surface and edge treatments. The National Glass Association (NGA) recommends the following terminology and practices for describing the construction of architectural glass products to be used in windows, doors, skylights, window walls and curtain walls:

Monolithic Glass: a single lite of glass including laminated glass as defined below

Laminated Glass: an assembly of two or more lites of glass bonded together with an interlayer material

Insulating Glass: two or more lites of glass separated by spacer material(s) incorporating a drying agent (desiccant) and hermetically sealed around the perimeter with one or more sealants. An insulating glass unit may include a breather or capillary tube in the unit's spacer to accommodate pressure differences encountered in shipping due to change in elevation.

Glass Surface Orientation / Designation: the numerical identification of a specific glass surface relative to the exterior surface of the assembly. The first surface (1) is the exterior surface (facing the sun in the diagrams) with each consecutive glass surface identified in order from exterior to interior with the last (highest number) surface being on the interior of the assembly.

Vacuum Insulating Glass (VIG): A variation of insulating glass units in which the air between the two lites is extracted. Once a vacuum is made, the edges are sealed to create a permanent vacuum.

Consult Your Glass Manufacturer / Fabricator

Many factors can affect the specific details of a glass construction for a particular application. Design professionals and specifiers should consult with the glass manufacturer/fabricator regarding intended applications and requirements before completing project specifications. The dimension given in this document's diagrams for total product thickness and layer thicknesses are nominal, and subject to customary industry tolerances.

Design and application factors that affect architectural glass construction requirements include but are not limited to:

- Safety glazing requirements
- Requirements for heat soak testing of heat-treated glass
- Protective glazing requirements
- Thermal performance requirements (U-factor, Solar Heat Gain & Condensation Resistance)
- Building code requirements
- Thermal stresses
- Project design loads (wind, snow)
- Framing edge support
- Structural silicone glazing systems
- Material compatibility

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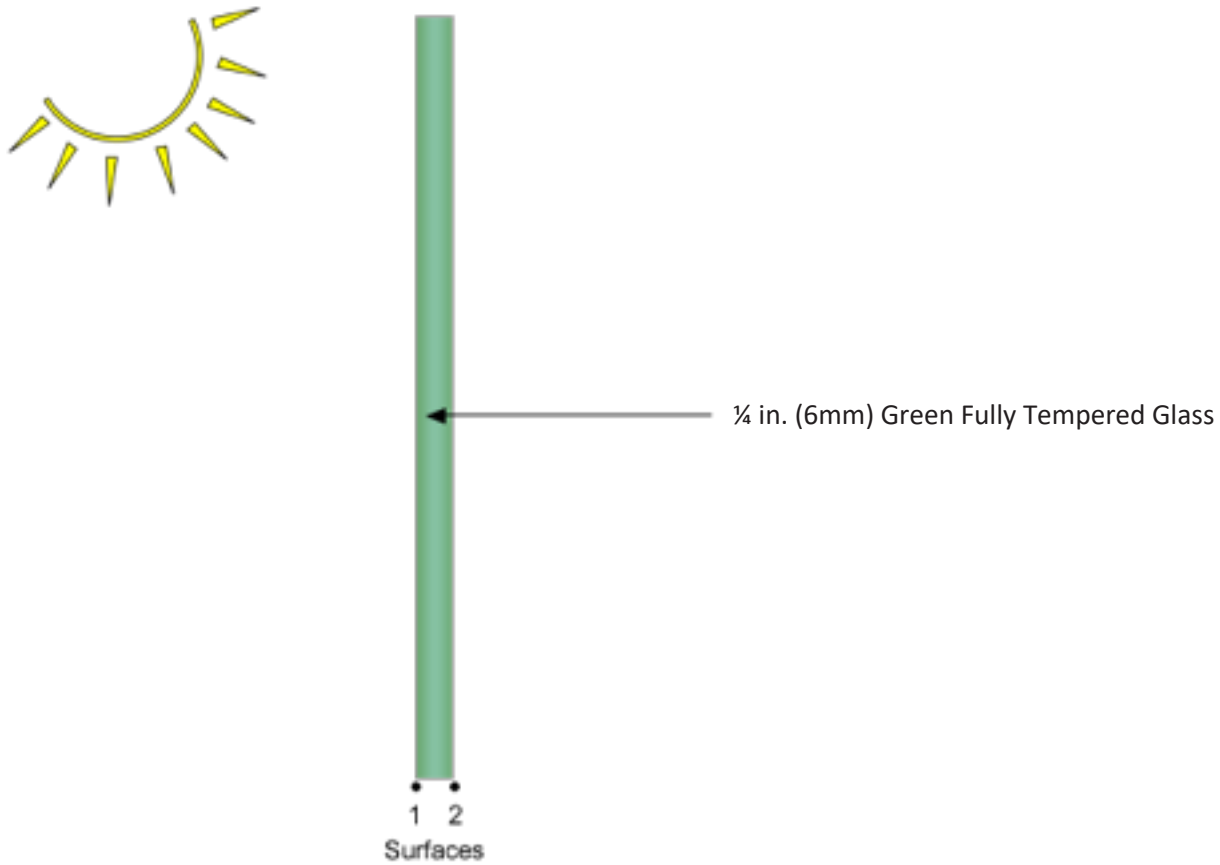
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- Coating edge deletion
- Spandrel glass viewing conditions
- Alignment of glass
- Proper support of all lites
- Suspended films
- Point-supported glazing

The following pages provide detailed descriptions and illustrations of a number of monolithic, laminated and insulating glass constructions.

Monolithic Uncoated Glass

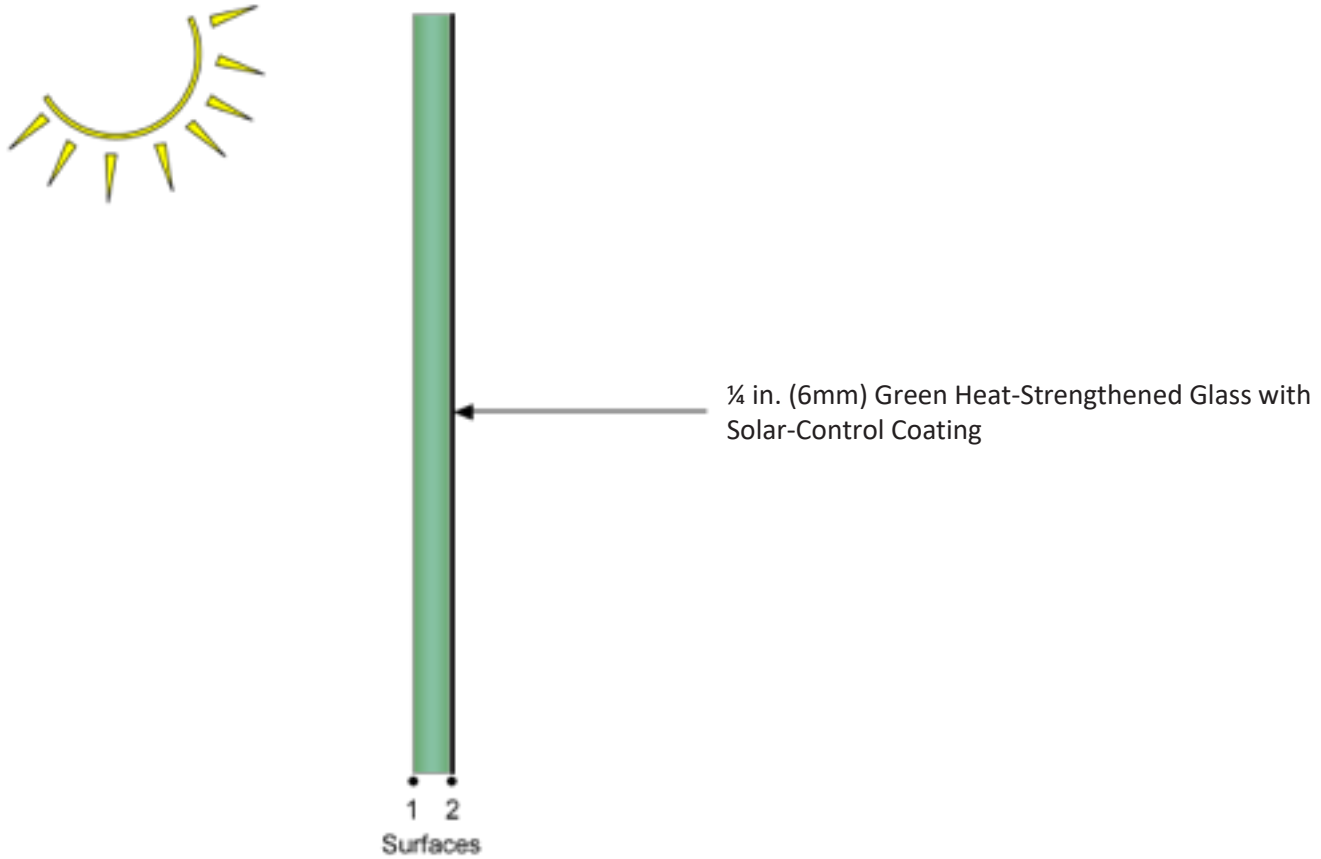
1. Glass thickness in inches and/or millimeters
2. Glass substrate (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
3. Glass strength (annealed, heat-strengthened or fully tempered)
4. Edge treatment if any (seamed, flat ground, polished, etc.)



Example: ¼ in. (6 mm) Green fully tempered glass

Monolithic Coated Glass

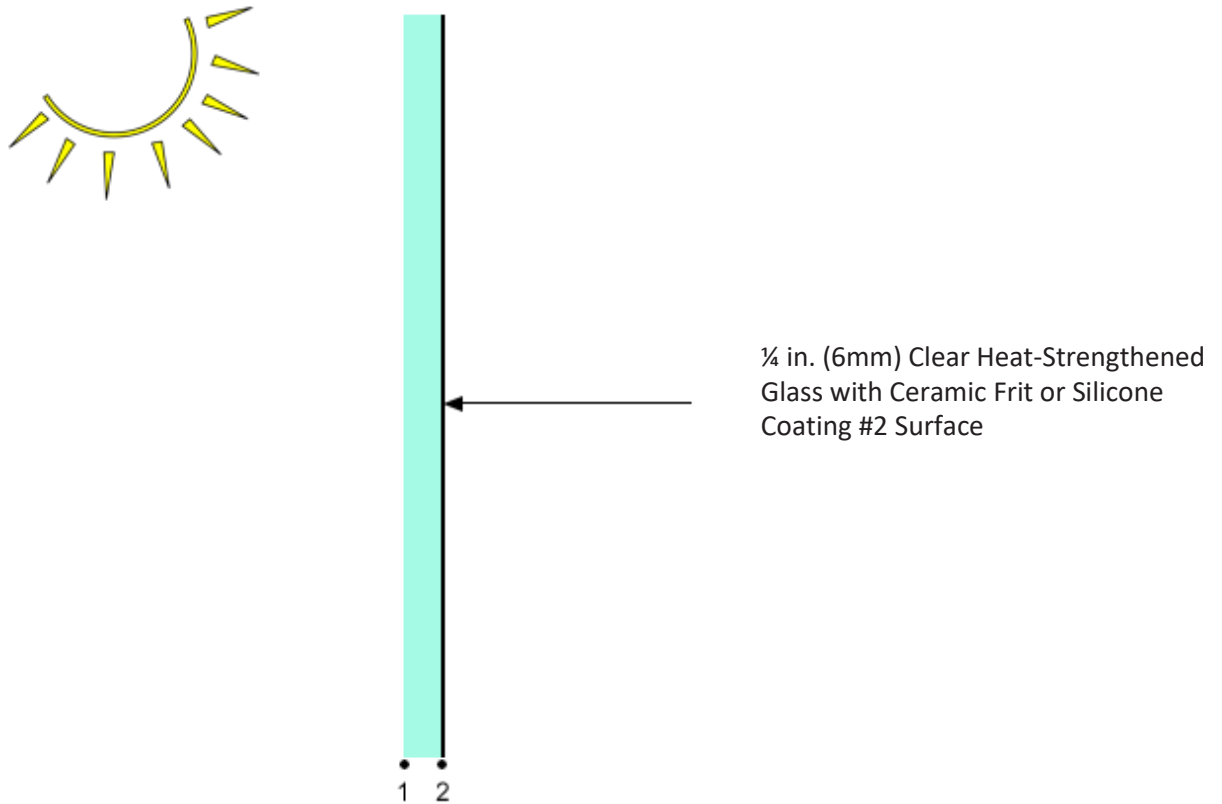
1. Glass thickness in inches and/or millimeters
2. Glass substrate (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
3. Glass strength (annealed, heat-strengthened or fully tempered)
4. Edge treatment if any (seamed, flat ground, polished, etc.)
5. Coating designation & type
6. Coated surface location (glass surface number as defined in Glass Surfaces Designation)



Example: ¼ in. (6 mm) Green heat-strengthened glass with (insert coating designation & type) coating #2 surface

Monolithic Opaque Spandrel Glass

1. Glass thickness in inches and/or millimeters
2. Glass substrate (Clear – typically spandrel coatings are applied to clear glass)
3. Glass strength (heat-strengthened or fully tempered glass is required for these products)
4. Edge treatment if any (seamed, flat ground, polished, etc.)
5. Coating designation & type (ceramic frit, silicone)
6. Coated surface – ceramic frit and silicone products are designed to be on the number two surface for monolithic glass



Example: ¼ in. (6 mm) Clear heat-strengthened glass with (insert coating designation, coating color) ceramic frit or silicone coating #2 surface

Monolithic Decorative Glass

1. Glass thickness in inches and/or millimeters
2. Glass substrate (Clear, Green, Gray, Blue, Low-iron, etc.)
3. Glass strength (heat-strengthened or fully tempered is typically required)
4. Edge treatment if any (seamed, flat ground, polished, etc.)
5. Decorative pattern description
6. Coating designation & type, pattern, pattern color and distribution if applicable
7. Coated surface – for example, ceramic frit products are designed to be on the number two surface for monolithic decorative glass



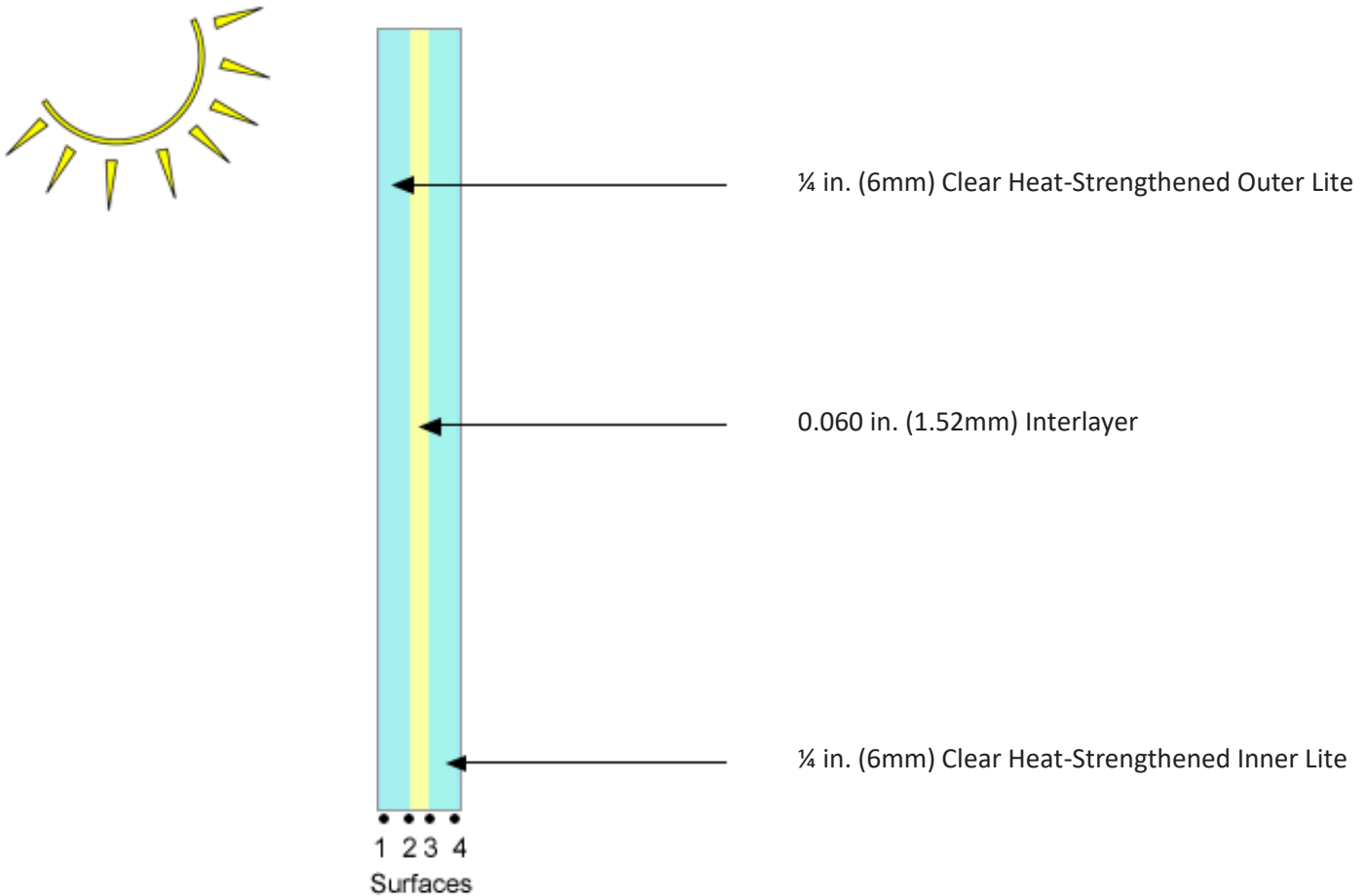
¼ in. (6mm) Clear Heat-Strengthened Glass with
½ in. (12mm) Horizontal White Ceramic Frit Lines
1 in. (25mm) on Center #2 Surface

Example 1: ¼ in. (6 mm) Clear heat-strengthened glass with (insert coating designation) ½ in. (12 mm) horizontal white ceramic frit lines 1 in. (25 mm) on center on the #2 surface

Example 2: ¼ in. (6 mm) Clear heat-strengthened glass with (insert coating designation) 1/8 in. (3 mm) ceramic frit dot pattern, black, on ¼ in. (6 mm) center, 50% coverage, on the #2 surface. Flat polished edges.

Uncoated Monolithic Laminated Glass

1. Overall assembly thickness in inches and/or millimeters (5/16-inch, 9/16-inch, etc.)
2. Outer lite thickness and substrate (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
3. Outer lite strength (annealed, heat-strengthened or fully tempered)
4. Interlayer thickness, type and color
5. Inner lite thickness and substrate (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
6. Inner lite strength (annealed, heat-strengthened or fully tempered)
7. Inner lite strength (annealed, heat-strengthened or fully tempered)
8. Edge treatment if any (seamed, flat ground, polished, etc.)

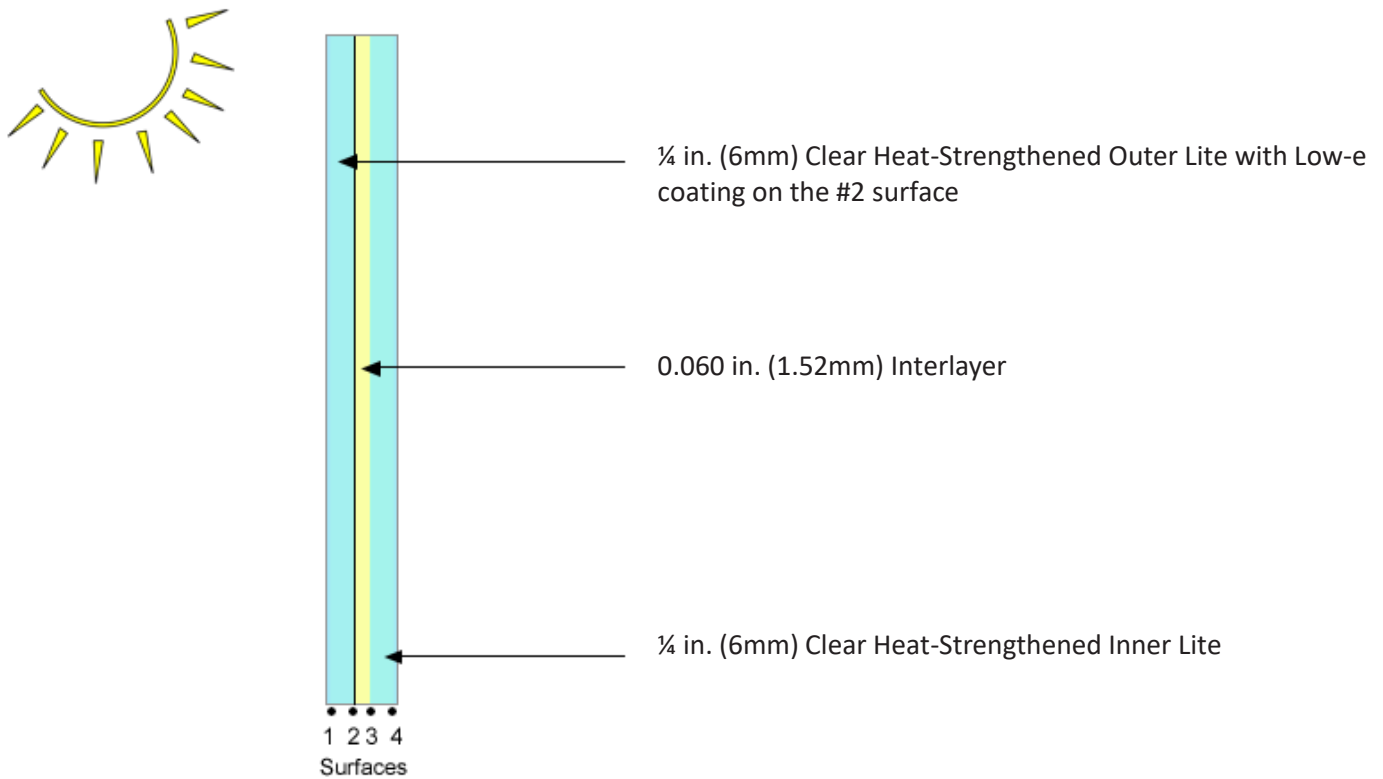


Example: 9/16 in. (14 mm) Clear laminated glass with a 1/4 in. (6 mm) Clear heat-strengthened outer lite, .060 in. (1.52 mm) (insert interlayer type and color) interlayer, 1/4 in. (6 mm) Clear heat-strengthened inner lite

Note: The description process can be continued in the order above for multi-lite laminated glass constructions.

Coated Monolithic Laminated Glass

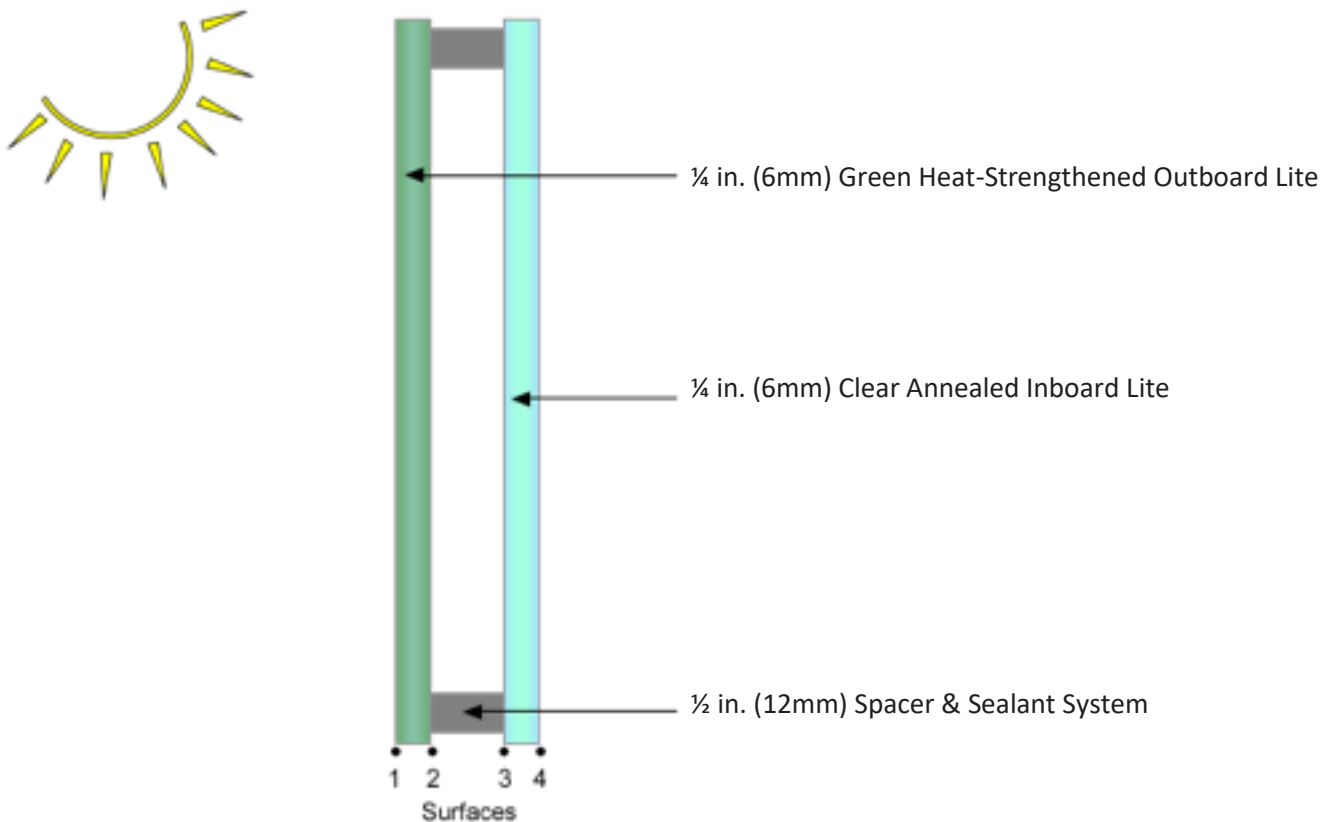
1. Overall assembly thickness in inches and/or millimeters (5/16-inch, 9/16-inch, etc.)
2. Outer lite thickness and substrate (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
3. Outer lite strength (annealed, heat-strengthened or fully tempered)
4. Outer lite edge treatment if any (seamed, flat ground, polished, etc.)
5. Coating designation & type (low-emissivity, solar-control, other) and coated surface (i.e. #2 surface (counting from the outside in)).
6. Interlayer thickness, type and color
7. Inner lite thickness and substrate (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
8. Inner lite strength (annealed, heat-strengthened or fully tempered)
9. Inner lite edge treatment if any (seamed, flat ground, polished, etc.)



Example: 9/16 in. (14 mm) Clear laminated glass with a 1/4 in. (6 mm) Clear heat-strengthened outer lite with a (insert coating designation) low-emissivity coating #2 surface, .060 in. (1.52 mm) (insert interlayer type and color) interlayer, 1/4 in. (6 mm) Clear heat-strengthened inner lite

Uncoated Insulating Glass Unit

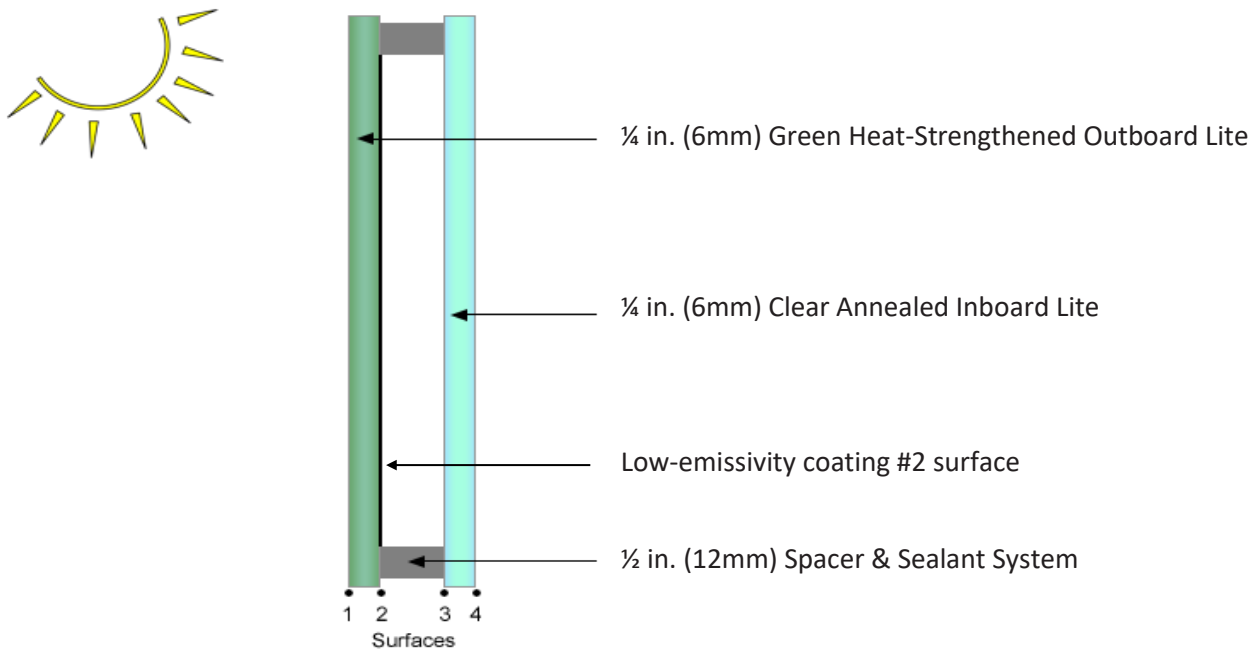
1. Overall insulating glass unit thickness in inches and/or millimeters
2. Outboard (exterior) lite thickness in inches and/or millimeters
3. Outboard lite substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
4. Outboard lite strength (annealed, heat-strengthened or fully tempered)
5. Outboard lite edge treatment if any (seamed, flat ground, polished, etc.)
6. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
7. Spacer gap gas content (Air, 90% Argon, etc.)
8. Type of primary seal (polyisobutylene, etc.)
9. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
10. Inboard (interior) lite thickness in inches and/or millimeters
11. Inboard lite substrate color (typically Clear glass)
12. Inboard lite strength (annealed, heat-strengthened or fully tempered)
13. Inboard lite edge treatment if any (seamed, flat ground, polished, etc.)



Example: 1 in. (25 mm) insulating glass unit with a ¼ in. (6 mm) Green heat-strengthened outboard lite, ½ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal and a ¼ in. (6 mm) Clear annealed inboard lite.

Coated Insulating Glass Unit

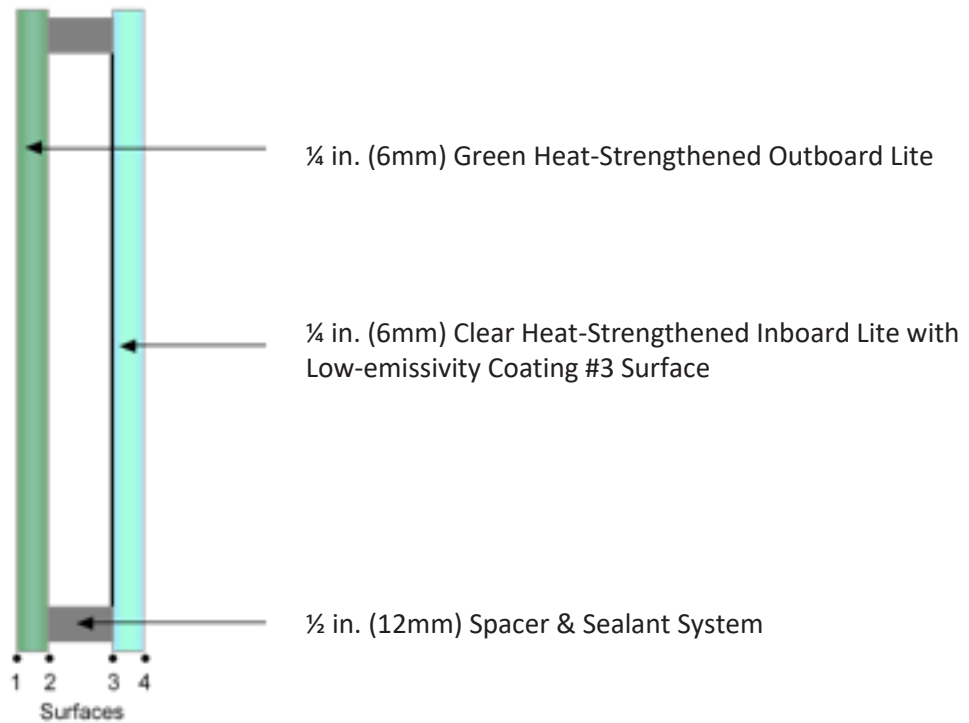
1. Overall insulating glass unit thickness in inches and/or millimeters
2. Outboard (exterior) lite thickness in inches and/or millimeters
3. Outboard lite substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
4. Outboard lite strength (annealed, heat-strengthened or fully tempered)
5. Outboard lite edge treatment if any (seamed, flat ground, polished, etc.)
6. Coating designation & type (low-emissivity, solar-control, other) and coated surface i.e. #2 surface (counting from the outside in)
7. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
8. Spacer gap gas content (Air, 90% Argon, etc.)
9. Type of primary seal (polyisobutylene, etc.)
10. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
11. Inboard (interior) lite thickness in inches and/or millimeters
12. Inboard lite substrate color (typically Clear glass)
13. Inboard lite strength (annealed, heat-strengthened or fully tempered)
14. Inboard lite edge treatment if any (seamed, flat ground, polished, etc.)



*NOTE: Architectural glass manufacturers offer a number of performance-enhancing coatings that can be applied to various glass surfaces in an insulating glass unit. Manufacturers should be consulted regarding coated surface requirements. The examples below provide guidelines for description of units with coatings on various surfaces.

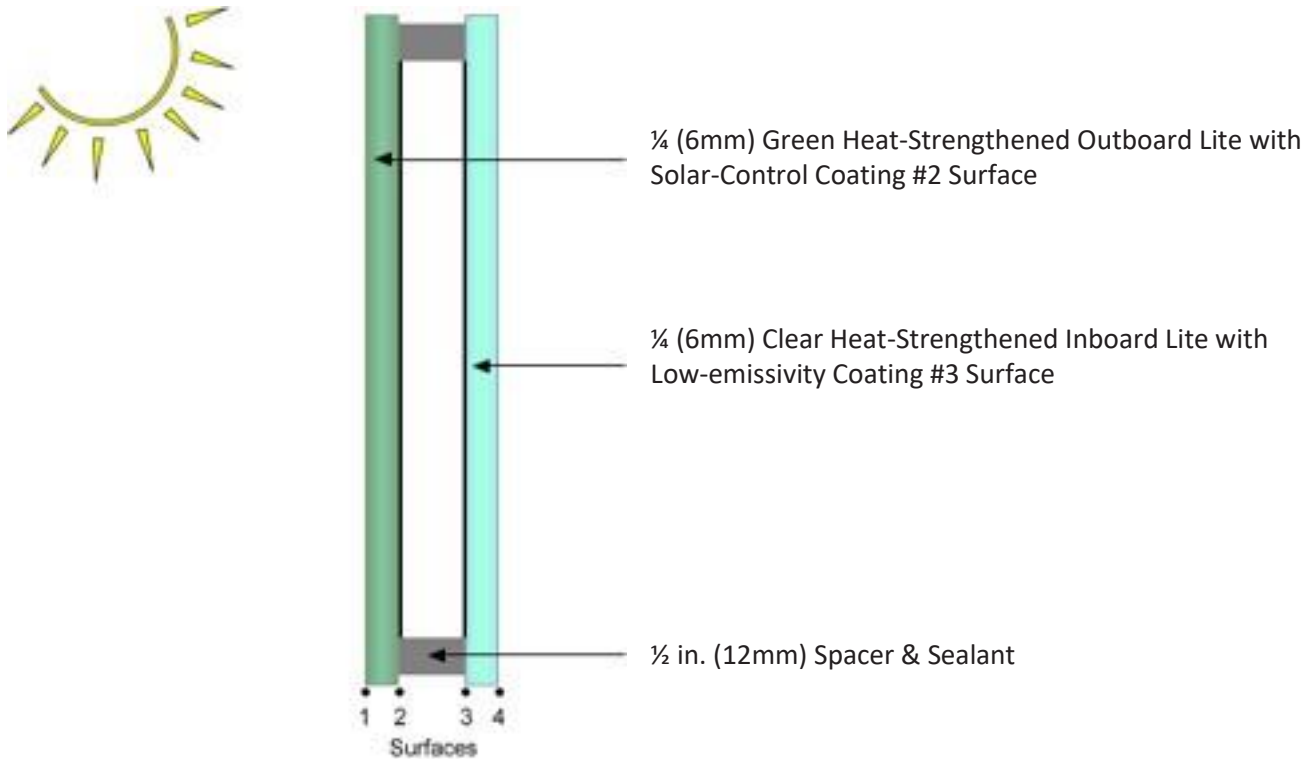
Example 1 - Insulating Unit with Coating on the #2 surface: 1 in. (25 mm) insulating glass unit with a 1/4 in. (6 mm) Green heat-strengthened outboard lite, with a (insert coating designation) low-emissivity coating #2 surface, 1/2 in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal and a 1/4 mm (6 mm) Clear annealed inboard lite.

Coated Insulating Glass Unit



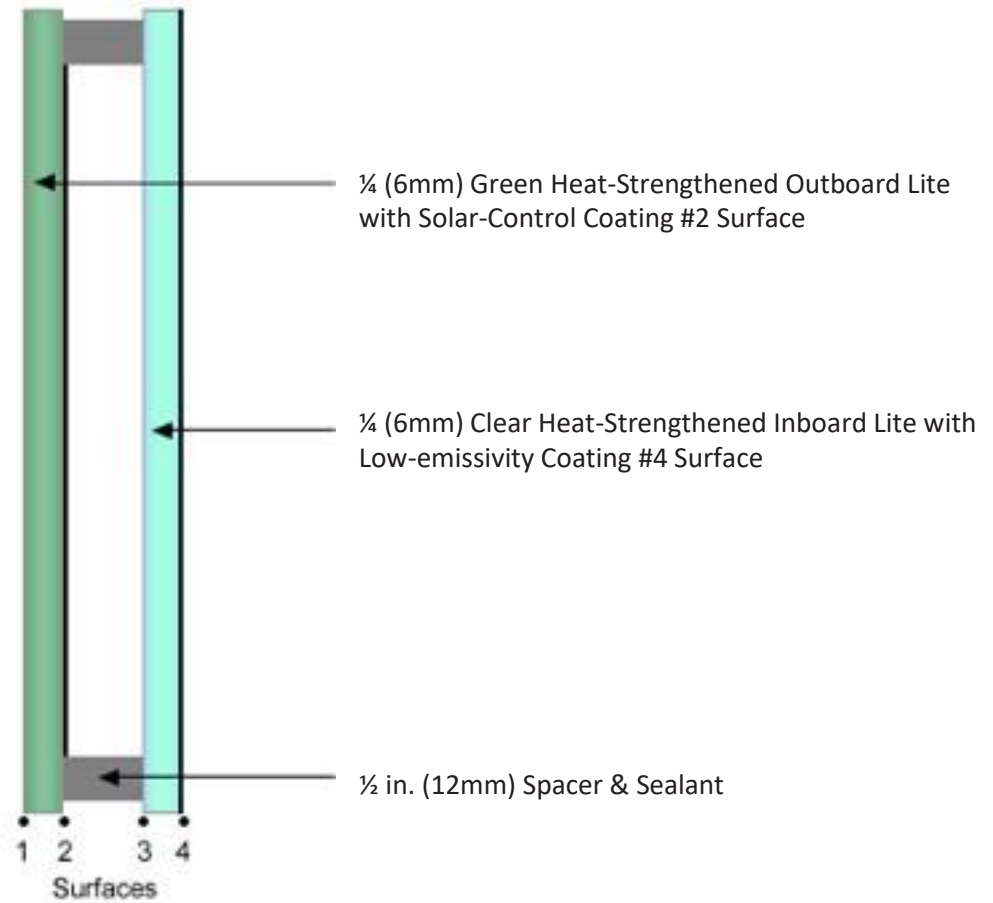
Example 2 - Insulating Unit with Coating on the #3 surface: 1 in. (25 mm) insulating glass unit with a ¼ in. (6 mm) Green heat-strengthened outboard lite, ½ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, and a ¼ in. (6 mm) Clear heat-strengthened inboard lite with (insert coating designation) low-emissivity coating #3 surface.

Coated Insulating Glass Unit



Example 3 - Insulating Unit with Coating on the #2 and #3 surfaces: 1 in. (25 mm) insulating glass unit with a ¼ in. (6 mm) Green heat-strengthened outboard lite, with (insert coating designation) solar-control coating #2 surface, ½ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, and a ¼ in. (6 mm) Clear heat-strengthened in-board lite with (insert coating designation) low-emissivity coating #3 surface.

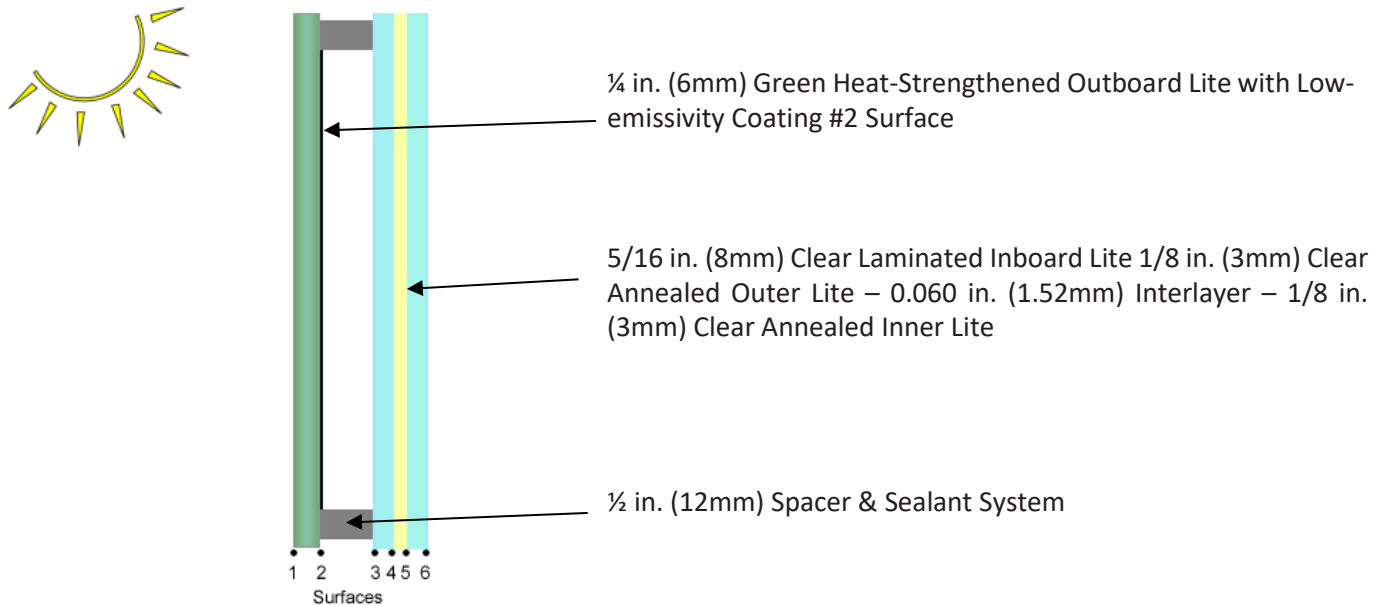
Coated Insulating Glass Unit



Example 4 – Insulating Unit with Coating on the #2 and #4 surfaces: 1 in. (25 mm) insulating glass unit with a 1/4 in. (6 mm) Green heat-strengthened outboard lite, with (insert coating designation) solar-control coating #2 surface, 1/2 in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, and a 1/4 in. (6 mm) Clear heat-strengthened in-board lite with (insert coating designation) low-emissivity coating #4 surface.

Coated Insulating Glass Unit with Laminated Lite

1. Overall insulating glass unit thickness in inches and/or millimeters
2. Outboard (exterior) lite thickness in inches and/or millimeters
3. Outboard lite substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
4. Outboard lite strength (annealed, heat-strengthened or fully tempered)
5. Outboard lite edge treatment if any (seamed, flat ground, polished, etc.)
6. Coating designation & type (low-emissivity, solar-control or other) coating and coated surface i.e. #2 surface (counting from the outside in)
7. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
8. Spacer gap gas content (Air, 90% Argon, etc.)
9. Type of primary seal (polyisobutylene, etc.)
10. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
11. Inboard (interior) laminated lite overall thickness (5/16-inch, 9/16-inch, etc.) and make-up
12. Outer lite thickness and substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
13. Outer lite glass strength (annealed, heat-strengthened or fully tempered)
14. Interlayer thickness, type and color
15. Inner lite thickness and substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
16. Inner lite glass strength (annealed, heat-strengthened or fully tempered)
17. Inner lite edge treatment if any (seamed, flat ground, polished, etc.)

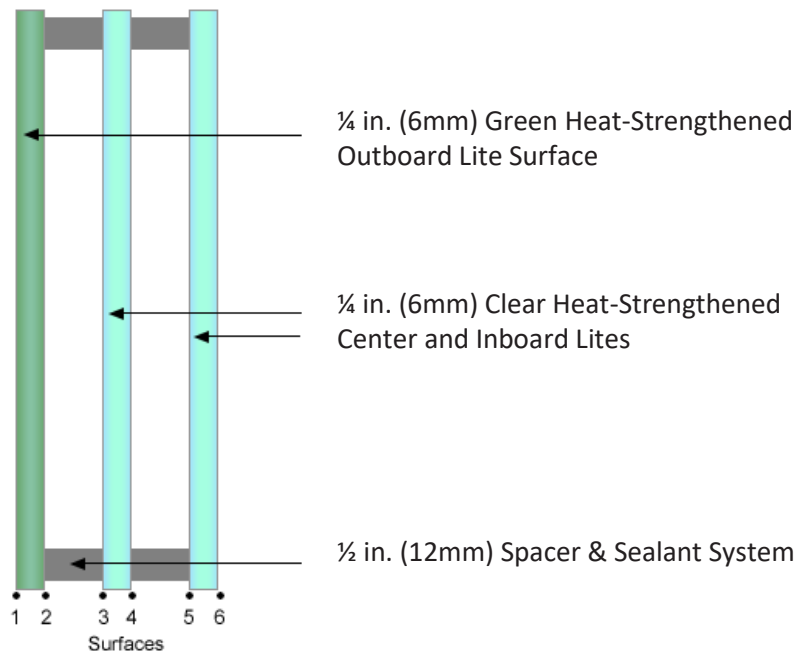


Example – Insulating Unit with Coating on the #2 surface: 1-1/16 in. (27 mm) insulating glass unit with a 1/4 in. (6 mm) Green heat-strengthened outboard lite, with (insert coating designation) low-emissivity coating #2 surface, 1/2 in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, and a 5/16 in. (8 mm) laminated inboard lite with 1/8 in. (3 mm) Clear annealed outer lite, .060 in. (1.52 mm) (insert type) interlayer, and 1/8 in. (3 mm) annealed inner lite.

NOTE: Product applications may also require laminated glass constructions for the outboard lite or both the outboard and inboard lites. The same detailed description process would apply.

Uncoated Triple Insulating Glass Unit

1. Overall insulating glass unit thickness in inches and/or millimeters
2. Outboard (exterior) lite thickness in inches and/or millimeters
3. Outboard lite substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
4. Outboard lite strength (annealed, heat-strengthened or fully tempered)
5. Outboard lite edge treatment if any (seamed, flat ground, polished, etc.)
6. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
7. Spacer gap gas content (Air, 90% Argon, etc.)
8. Type of primary seal (polyisobutylene, etc.)
9. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
10. Center lite thickness in inches and/or millimeters
11. Center lite substrate color (typically Clear glass)
12. Center lite strength (annealed, heat-strengthened or fully tempered)
13. Center lite edge treatment if any (seamed, flat ground, polished, etc.)
14. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
15. Spacer gap gas content (Air, 90% Argon, etc.)
16. Type of primary seal (polyisobutylene, etc.)
17. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
18. Inboard (interior) lite thickness in inches and/or millimeters
19. Inboard lite substrate color (typically Clear glass)
20. Inboard lite strength (annealed, heat-strengthened or fully tempered)
21. Inboard lite edge treatment if any (seamed, flat ground, polished, etc.)

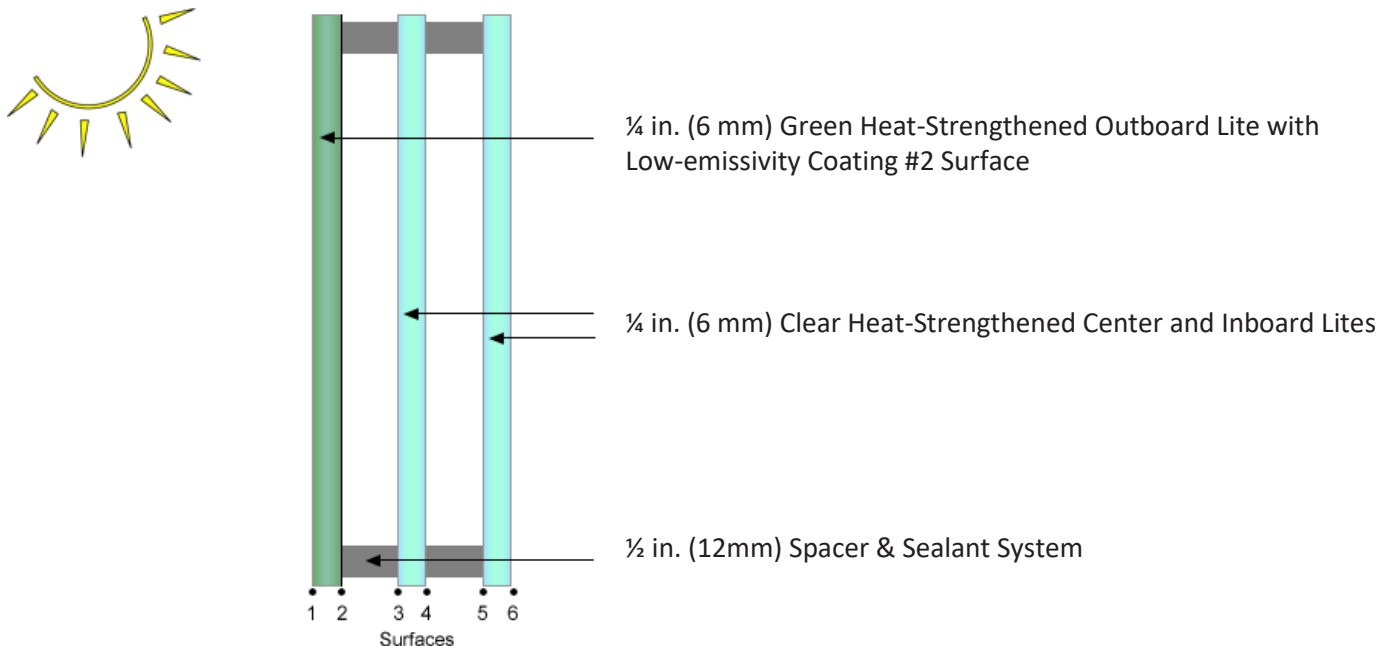


Example – Triple Insulating Unit: 1-3/4 in. (42 mm) insulating glass unit with a $\frac{1}{4}$ in. (6 mm) Green heat-strengthened outboard lite, $\frac{1}{2}$ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, $\frac{1}{4}$ in. (6 mm) clear heat-strengthened center lite, $\frac{1}{2}$ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, and a $\frac{1}{4}$ in. (6 mm) clear heat-strengthened interior lite.

Coated Triple Insulating Glass Unit

1. Overall insulating glass unit thickness in inches and/or millimeters
2. Outboard (exterior) lite thickness in inches and/or millimeters
3. Outboard lite substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
4. Outboard lite strength (annealed, heat-strengthened or fully tempered)
5. Outboard lite edge treatment if any (seamed, flat ground, polished, etc.)
6. Coating designation & type (low-emissivity, solar-control, other) and coated surface i.e. #2 surface (counting from the outside in)
7. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
8. Spacer gap gas content (Air, 90% Argon, etc.)
9. Type of primary seal (polyisobutylene, etc.)
10. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
11. Center lite thickness in inches and/or millimeters
12. Center lite substrate color (typically Clear glass)
13. Center lite strength (annealed, heat-strengthened or fully tempered)
14. Center lite edge treatment if any (seamed, flat ground, polished, etc.)
15. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
16. Spacer gap gas content (Air, 90% Argon, etc.)
17. Type of primary seal (polyisobutylene, etc.)
18. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
19. Inboard (interior) lite thickness in inches and/or millimeters
20. Inboard lite substrate color (typically Clear glass)
21. Inboard lite strength (annealed, heat-strengthened or fully tempered)
22. Inboard lite edge treatment if any (seamed, flat ground, polished, etc.)

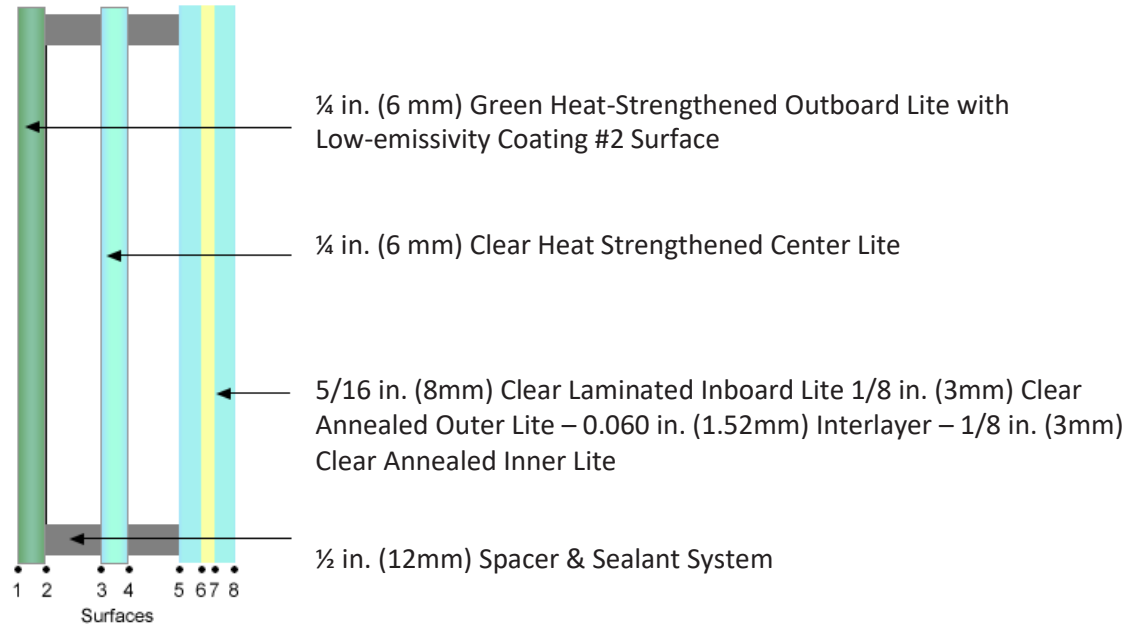
*NOTE: Architectural glass manufacturers offer a number of performance-enhancing coatings that can be applied to various glass surfaces in an insulating glass unit. Manufacturers should be consulted regarding coated surface requirements. The examples below provide guidelines for description of units with coatings on various surfaces.



Example – Coated Triple Insulating Unit: 1-3/4 in. (42 mm) insulating glass unit with a ¼ in. (6 mm) Green heat-strengthened outboard lite with (insert coating designation) low-emissivity coating #2 surface, ½ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, ¼ in. (6 mm) clear heat-strengthened center lite, ½ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, and a ¼ in. (6 mm) clear heat-strengthened interior lite.

Coated Triple Insulating Glass Unit with Laminated Lite

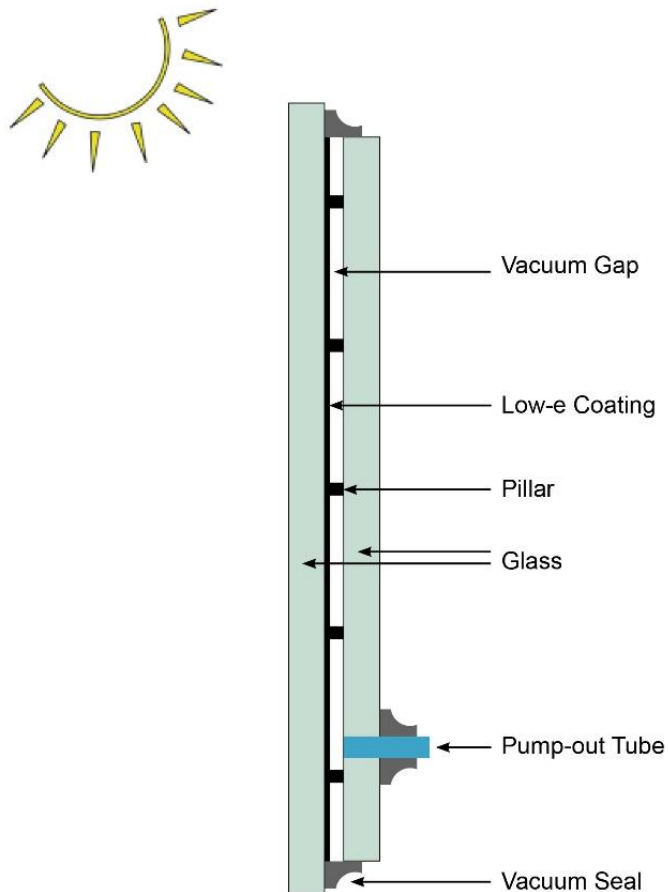
1. Overall insulating glass unit thickness in inches and/or millimeters
2. Outboard (exterior) lite thickness in inches and/or millimeters
3. Outboard lite substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
4. Outboard lite strength (annealed, heat-strengthened or fully tempered)
5. Outboard lite edge treatment if any (seamed, flat ground, polished, etc.)
6. Coating designation & type (low-emissivity, solar-control or other) coating and coated surface i.e. #2 surface (counting from the outside in)
7. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
8. Spacer gap gas content (Air, 90% Argon, etc.)
9. Type of primary seal (polyisobutylene, etc.)
10. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
11. Center lite thickness in inches and/or millimeters
12. Center lite substrate color (typically Clear glass)
13. Center lite strength (annealed, heat-strengthened or fully tempered)
14. Center lite edge treatment if any (seamed, flat ground, polished, etc.)
15. Inboard (interior) laminated lite overall thickness and make-up (5/16-inch, 9/16-inch, etc.)
16. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
17. Spacer gap gas content (Air, 90% Argon, etc.)
18. Type of primary seal (polyisobutylene, etc.)
19. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
20. Outer lite thickness and substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
21. Outer lite glass strength (annealed, heat-strengthened or fully tempered)
22. Outer lite edge treatment if any (seamed, flat ground, polished, etc.)
23. Interlayer thickness, type and color
24. Inner lite thickness and substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
25. Inner lite glass strength (annealed, heat-strengthened or fully tempered)
26. Inner lite edge treatment if any (seamed, flat ground, polished, etc.)



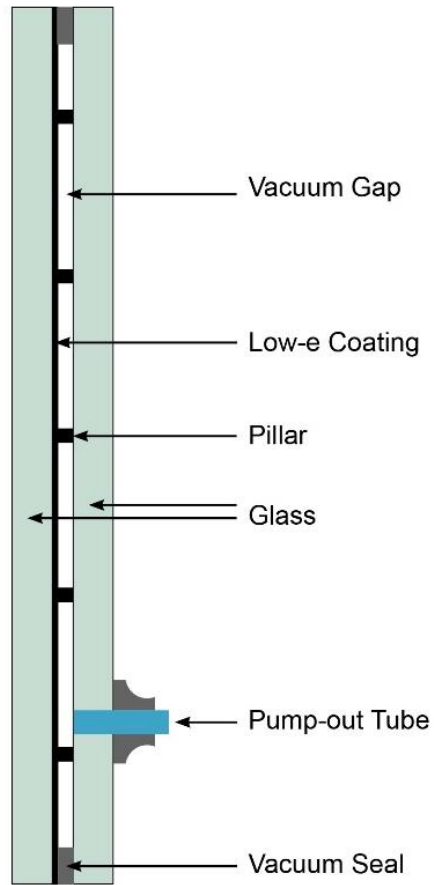
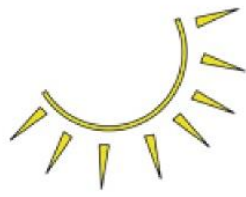
Example – Triple Insulating Unit: 1-13/16 in. (44 mm) insulating glass unit with a $\frac{1}{4}$ in. (6 mm) Green heat-strengthened outboard lite with (insert coating designation) low-emissivity coating #2 surface, $\frac{1}{2}$ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, $\frac{1}{4}$ in. (6 mm) heat-strengthened center lite, $\frac{1}{2}$ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) primary seal, (insert type) secondary seal, and a $\frac{5}{16}$ in. (8 mm) laminated inboard lite with $\frac{1}{8}$ in. (3 mm) Clear annealed outer lite, .060 in. (1.52 mm) (insert type) interlayer, and $\frac{1}{8}$ in. (3 mm) clear annealed inner lite.

Vacuum Insulating Glass Unit

1. Alignment of outboard and inboard lite (asymmetric or symmetric); *Note: Asymmetric refers to a vacuum insulating glass unit in which one lite is slightly smaller than the mating lite resulting in a stepped edge.*
2. Overall insulating glass unit thickness in inches and/or millimeters
3. Outboard (exterior) lite thickness in inches and/or millimeters
4. Outboard lite substrate color (Clear, Low-iron, etc.)
5. Outboard lite strength (annealed, heat-strengthened or fully tempered)
6. Coating designation & type (low-emissivity, solar-control, other) and coated surface i.e. #2 surface (counting from the outside in)
7. Pillars (microspacers) thickness in inches and/or millimeters and pillar type and material color/finish/description (metal, ceramic, etc.) and pillar pattern (uniform grid, spaced wider in center and closer to edges, etc.)
8. Pressure in the evacuated cavity
9. Type of non-organic edge seal (solder glass, metal weld, etc.)
10. Inboard (interior) lite thickness in inches and/or millimeters
11. Inboard lite substrate color (typically Clear glass)
12. Inboard lite strength (annealed, heat-strengthened or fully tempered)



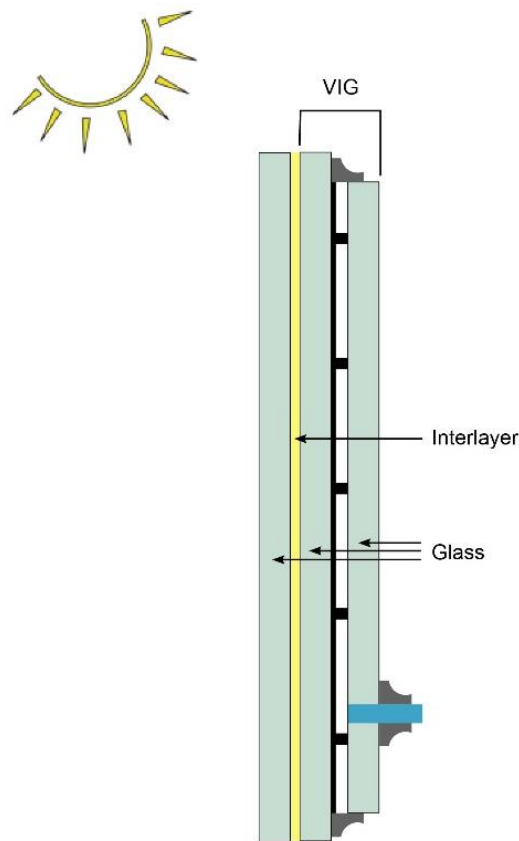
Example 1 - Asymmetric Vacuum Insulating Glass Unit with Coating on the #2 surface: 1/4 in. (6 mm) vacuum insulating glass unit with a 1/8 in. (3mm) clear annealed outboard lite, with a (insert coating designation) low-emissivity coating #2 surface, (insert pillar thickness, material and pattern) pillars, 0.1 Pa cavity pressure, (insert type) vacuum seal, and a 1/8 in. (3mm) clear annealed inboard lite.



Example 2 - Symmetric Vacuum Insulating Glass Unit with Coating on the #2 surface: 1/4 in. (6 mm) vacuum insulating glass unit with a 1/8 in. (3mm) clear fully-tempered outboard lite, with a (insert coating designation) low-emissivity coating #2 surface, (insert pillar thickness, material and pattern) pillars, 0.1 Pa cavity pressure, (insert type) vacuum seal, and a 1/8 in. (3mm) clear fully-tempered inboard lite.

Laminated Vacuum Insulating Glass Unit

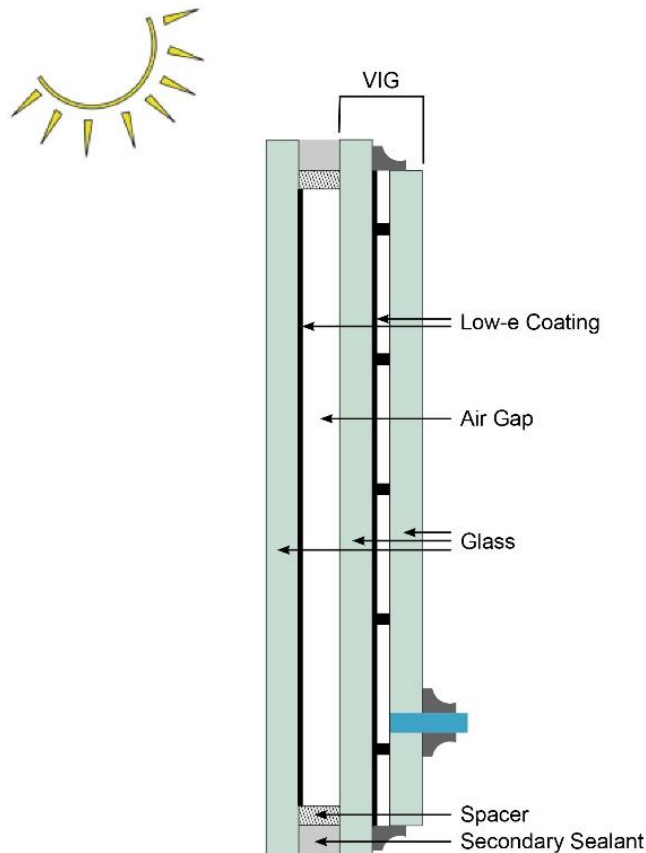
1. Alignment of outboard and inboard lite (asymmetric or symmetric)
2. Overall laminated insulating glass unit thickness in inches and/or millimeters
3. Outer lite thickness and substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
4. Outer lite glass strength (annealed, heat-strengthened or fully tempered)
5. Outer lite edge treatment if any (seamed, flat ground, polished, etc.)
6. Interlayer thickness, type and color
7. Inner lite thickness and substrate color (typically Clear glass)
8. Inner lite glass strength (annealed, heat-strengthened or fully tempered)
9. Coating designation & type (low-emissivity, solar-control, other) and coated surface i.e. #4 surface (counting from the outside in)
10. Pillars (microspacers) thickness in inches and/or millimeters and pillar type and material color/finish/description (metal, ceramic, etc.) and pillar pattern (uniform grid, spaced wider in center and closer to edges, etc.)
11. Pressure in the evacuated cavity
12. Type of non-organic edge seal (solder glass, metal weld, etc.)
13. Inboard (interior) lite thickness in inches and/or millimeters
14. Inboard lite substrate color (typically Clear glass)
15. Inboard lite strength (annealed, heat-strengthened or fully tempered)



Example - Asymmetric Laminated Vacuum Insulating Glass Unit with Coating on the #4 surface: 3/8 in (10mm) vacuum insulating glass unit with a 1/8 in. (3mm) clear annealed outer lite, (insert interlayer thickness and type) clear interlayer, 1/8 in. (3mm) clear annealed inner lite with a (insert coating designation) low-emissivity coating #4 surface, (insert pillar thickness, material and pattern) pillars, 0.1 Pa cavity pressure, (insert type) vacuum seal, and a 1/8 in. (3mm) clear annealed inboard lite.

Hybrid Vacuum Insulating Glazing Unit

1. Overall insulating glass unit thickness in inches and/or millimeters
2. Outboard (exterior) lite thickness in inches and/or millimeters
3. Outboard lite substrate color (Clear, Green, Gray, Bronze, Blue, Low-iron, etc.)
4. Outboard lite strength (annealed, heat-strengthened or fully tempered)
5. Outboard lite edge treatment if any (seamed, flat ground, polished, etc.)
6. Coating designation & type (low-emissivity, solar-control, other) and coated surface i.e. #2 surface (counting from the outside in)
7. Spacer width in inches and/or millimeters and spacer type and material color/finish/description
8. Spacer gap gas content (Air, 90% Argon, etc.)
9. Type of secondary seal (silicone, polysulfide, polyurethane, etc.)
10. Outer lite thickness in inches and/or millimeters
11. Outer lite substrate color (typically Clear glass)
12. Outer lite strength (annealed, heat-strengthened or fully tempered)
13. Coating designation & type (low-emissivity, solar-control, other) and coated surface i.e. #4 surface (counting from the outside in)
14. Alignment of outboard and inboard lite (asymmetric or symmetric)
15. Pillars (microspacers) thickness in inches and/or millimeters and pillar type and material color/finish/description (metal, ceramic, etc.) and pillar pattern (uniform grid, spaced wider in center and closer to edges, etc.)
16. Pressure in the evacuated cavity
17. Type of non-organic edge seal (solder glass, metal weld, etc.)
18. Inboard (interior) lite thickness in inches and/or millimeters
19. Inboard lite substrate color (typically Clear glass)
20. Inboard lite strength (annealed, heat-strengthened or fully tempered)



Example - Hybrid Asymmetric Vacuum Insulating Glass Unit with Coatings on the #2 and #4 surfaces: 1 in. (25mm) hybrid vacuum insulating glass unit with a 1/4 in. (6mm) clear heat-strengthened outboard lite with a (insert coating designation) low-emissivity coating #2 surface, ½ in. (12.7 mm) (insert type and color) spacer, spacer gap gas content (insert type), (insert type) secondary seal, 1/8 in. (3mm) clear heat-strengthened outer lite with (insert coating designation) low-emissivity coating #4 surface, (insert pillar thickness, material and pattern) pillars, 0.1 Pa cavity pressure, (insert type) vacuum seal, and a 1/8 in. (3mm) clear heat-strengthened inboard lite.

Since it is not the intent to address all design considerations or product assemblies in this technical paper, design professionals and specifiers should consult with the glass manufacturer/fabricator regarding intended applications and requirements before completing project specifications.

Additional information regarding architectural flat glass substrates is provided in the International Glazing Database maintained by the Windows and Daylighting Group at the Lawrence Berkeley National Laboratory (<http://windows.lbl.gov>).

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This Paper was developed by dedicated member volunteers and subject matter experts. The original version of this document was approved and published in 2007. This version of the document was updated and published in April 2022.