

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass products.
2. Laminated glass.
3. Insulating glass.
4. Glazing sealants.
5. Glazing tapes.
6. Miscellaneous glazing materials.

B. Related Requirements:

1. Section 08 41 26 "All-Glass Entrances and Storefronts."
2. Section 08 44 23 "Structural-Sealant-Glazed Curtain Walls" for glazing sealants used in structural-sealant-glazed curtain walls.
3. Section 08 83 00 "Mirrors."
4. Section 08 88 53 "Security Glazing."

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **[Project site]<Insert location>**.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

C. Glass Samples: For each type of **[glass product other than clear monolithic vision glass][the following products]**; **12 inches** square.

1. Tinted glass.
2. Coated glass.
3. Laminated glass.
4. Insulating glass.
5. Spandrel glass.

- D. Glazing Accessory Samples: For **[sealants][and][colored spacers]**, in **12-inch** lengths. **[Install sealant Samples between two strips of material representative in color of adjoining framing system.]**
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **[Installer][manufacturers of fabricated glass units][glass testing agency][and][sealant testing agency]**.
- B. Product Certificates: For glass.
- C. Product Test Reports: For **[fabricated glass][and][glazing sealants]**, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved **[and certified]** by primary glass manufacturer.
- B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors **[and who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program]**.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
- E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in Section 08 41 13 "Aluminum-Framed Entrances and Storefronts" to match glazing systems required for Project,

- including glazing methods.
- 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 - 2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - 3. Test no fewer than **[eight]<Insert number>** Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
 - 4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
 - 5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below **40 deg F**.

1.8 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed

to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

- D. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent (3/1000) within specified warranty period. Coverage for any other cause is excluded.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design glazing.
- C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:
1. Design Wind Pressures: **[As indicated on Drawings][Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings].**
 - a. Wind Design Data: As indicated on Drawings.
 - b. Basic Wind Speed: **[85 mph][90 mph][100 mph][110 mph]<Insert value>.**
 - c. Importance Factor: **[1.0]<Insert factor>.**
 - d. Exposure Category: **[B][C][D].**

2. Design Snow Loads: **<Insert design snow load>**[As indicated on Drawings].
 3. Probability of Breakage for Sloped Glazing: For glass sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
 4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or **1 inch**, whichever is less.
 5. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.
- D. Windborne-Debris-Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone **[1][2][3][4]** for **[basic][enhanced]** protection.
1. Large-Missile Test: For glazing located within **[30 feet]<Insert dimension>** of grade.
 2. Small-Missile Test: For glazing located between **30 feet** and **[60 feet]<Insert dimension>** above grade.
- E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- F. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites **[6 mm thick][of thickness indicated]**.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as **Btu/sq. ft. x h x deg F**.
 5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
 6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.
- G. Acoustic Performance:
1. Exterior Glazing: **[28][33][35]<Insert number>** OITC.
 2. Interior Glazing: **[35][37][41]<Insert number>** STC.

2.2 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are

indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: ["**Laminated Glazing Reference Manual**" and] "Glazing Manual."
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of [the **SGCC**][**the SGCC or another certification agency acceptable to authorities having jurisdiction**][or][**manufacturer**]. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Thickness: Where glass thickness is indicated, it is a minimum. [**Provide glass that complies with performance requirements and is not less than thickness indicated.**]
1. Minimum Glass Thickness for Exterior Lites: [**6 mm**]**<Insert thickness designation>**.
 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass [**as needed to comply with "Performance Requirements" Article**]. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass [**as needed to comply with "Performance Requirements" Article**]. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.3 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.
- B. Low-Iron Annealed Float Glass: ASTM C1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent [**and SHGC of not less than 0.87**].
- C. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.
- D. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion

parallel to bottom edge of glass as installed unless otherwise indicated.

- E. Pyrolytic-Coated, Low-Maintenance Glass: Clear float glass with coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.
- F. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.
- G. Ceramic-Coated Vision Glass: ASTM C1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in NGA's "Engineering Standards Manual."
- H. Reflective- and Low-E-Coated Spandrel Glass: ASTM C1376, Kind CS.

2.4 LAMINATED GLASS

- A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with **[polyvinyl butyral interlayer][ionoplast interlayer][or][cast-in-place and cured-transparent-resin interlayer]** to comply with interlayer manufacturer's written instructions.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.

2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.
 - 1. Sealing System: Dual seal, with **[manufacturer's standard][polyisobutylene and polysulfide][polyisobutylene and silicone][polyisobutylene and hot-melt butyl][polyisobutylene and polyurethane]<Insert description>** primary and secondary sealants.
 - 2. Perimeter Spacer: **[Manufacturer's standard spacer material and construction][Aluminum with mill or clear anodic finish][Aluminum with black, color anodic finish][Aluminum with bronze, color anodic finish][Aluminum with powdered metal paint finish in color selected by Architect][Galvanized steel][Stainless steel][Polypropylene-covered stainless steel in color selected by Architect][Thermally broken aluminum][Nonmetallic laminate][Nonmetallic tube][Silicone with integral desiccant and vapor barrier]<Insert material>**.
 - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 Low-E-Coated Vision Glass
2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
5. Colors of Exposed Glazing Sealants: **[As indicated by manufacturer's designations][Match Architect's samples][As selected by Architect from manufacturer's full range of industry colors]**.

B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

1. Manufacturers: Subject to compliance with requirements, **[provide products by the following][provide products by one of the following][available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]**:
 - a. **[GE Construction Sealants; Momentive Performance Materials Inc.]**
 - b. **[Pecora Corporation]**
 - c. **[Sika Corporation]**
 - d. **[The Dow Chemical Company]**
 - e. **[Tremco Incorporated]**
 - f. **<Insert manufacturer's name>**
2. Applications: **<Describe types of glazing applications where sealant is required>**.

C. Neutral-Curing Silicone Glazing Sealant, Class 50: Complying with ASTM C920, Type S, Grade NS, Use NT.

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

1. Manufacturers: Subject to compliance with requirements, **[provide products by the following][provide products by one of the following][available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]**:
 - a. **[Adfast]**
 - b. **[GE Construction Sealants; Momentive Performance Materials Inc.]**
 - c. **[Pecora Corporation]**
 - d. **[Polymeric Systems, Inc.; PPG Industries, Inc.]**
 - e. **[Sika Corporation]**
 - f. **[The Dow Chemical Company]**
 - g. **[Tremco Incorporated]**
 - h. **<Insert manufacturer's name>**
2. Applications: **<Describe types of glazing applications where sealant is required>**.

- D. Neutral-Curing Silicone Glazing Sealant, Class 25: Complying with ASTM C920, Type S, Grade NS, Use NT.

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

1. Manufacturers: Subject to compliance with requirements, **[provide products by the following][provide products by one of the following][available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]**:
 - a. **[Bostik; Arkema]**
 - b. **[GE Construction Sealants; Momentive Performance Materials Inc.]**
 - c. **[Pecora Corporation]**
 - d. **[Permathane; a Holcim brand]**
 - e. **[Polymeric Systems, Inc.; PPG Industries, Inc.]**
 - f. **[Sika Corporation]**
 - g. **[The Dow Chemical Company]**
 - h. **[Tremco Incorporated]**
 - i. **<Insert manufacturer's name>**
2. Applications: **<Describe types of glazing applications where sealant is required>**.

- E. Acid-Curing Silicone Glazing Sealant, Class 25: Complying with ASTM C920, Type S, Grade NS, Use NT.

Retain "Manufacturers" Subparagraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

1. Manufacturers: Subject to compliance with requirements, **[provide products by the following][provide products by one of the following][available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]**:

- a. [Adfast]
- b. [Bostik; Arkema]
- c. [GE Construction Sealants; Momenive Performance Materials Inc.]
- d. [Pecora Corporation]
- e. [Permthane; a Holcim brand]
- f. [Polymeric Systems, Inc.; PPG Industries, Inc.]
- g. [Sika Corporation]
- h. [The Dow Chemical Company]
- i. [Tremco Incorporated]
- j. <Insert manufacturer's name>

2. Applications: <Describe types of glazing applications where sealant is required>.

2.8 Ceramic-Coated Spandrel Glass

"Retain "Basis-of-Design Product" Subparagraph and list of manufacturers below to identify a specific product or a comparable product from manufacturers listed."

- A. Basis-of-Design Product: Subject to compliance with requirements, provide <Insert manufacturer's name; product name or designation> or comparable product by one of the following:

1. [Guardian Glass LLC]
2. <Insert manufacturer's name>

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks:
 1. [EPDM][Silicone]<Insert type> with Shore A durometer hardness of 85, plus or minus 5.
 2. Type recommended in writing by sealant or glass manufacturer.
- D. Spacers:
 1. [Neoprene]<Insert type> blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 2. Type recommended in writing by sealant or glass manufacturer.
- E. Edge Blocks:

1. **[EPDM][Silicone]<Insert type>** with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

Retain "Cylindrical Glazing Sealant Backing" Paragraph below if applicable for glazing channels.

- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

Differential values in "Temperature Change" Subparagraph below (for aluminum in particular) are suitable for most of the United States.

- a. Temperature Change: **[120 deg F, ambient; 180 deg F, material surfaces]<Insert temperature change>**.

Retain first paragraph below for butt-glazed lites.

- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

Retain paragraph below if any exposed edges or corners are required.

- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 MONOLITHIC GLASS SCHEDULE

Monolithic glass refers to glass that is made in a single sheet without being laminated.

Copy paragraphs below and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

If thickness designations are indicated on Drawings or are determined solely by compliance with "Performance Requirements" Article, delete "Minimum Thickness" subparagraphs below.

- A. Clear Glass Type : **[Annealed][Heat-strengthened][Fully tempered]** float glass.

1. Minimum Thickness: **[6 mm]<Insert thickness>**.

Retain subparagraph below if required; "Fully tempered" option must be retained in paragraph above if safety glazing is required.

2. Safety glazing required.

B. Low-Iron Glass Type : **[Annealed][Heat-strengthened][Fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Minimum Thickness: **[6 mm]<Insert thickness>**.

Retain subparagraph below if required; "Fully tempered" option must be retained in last paragraph above if safety glazing is required.

3. Safety glazing required.

C. Pyrolytic-Coated, Low-Maintenance Glass Type : Clear **[annealed][heat-strengthened][fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Minimum Thickness: **[6 mm]<Insert thickness>**.

Retain subparagraph below if required; "fully tempered" option must be retained in last paragraph above if safety glazing is required.

3. Safety glazing required.

D. Tinted Glass Type : **[Annealed][Heat-strengthened][Fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
3. Minimum Thickness: **[6 mm]<Insert thickness>**.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

4. Winter Nighttime U-Factor: **<Insert value>** maximum.
5. Summer Daytime U-Factor: **<Insert value>** maximum.
6. Visible Light Transmittance: **<Insert number>** percent minimum.
7. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required; "Fully tempered" option must be retained in last

paragraph above if safety glazing is required.

8. Safety glazing required.

E. Ceramic-Coated Vision Glass Type : **[Heat-strengthened][Fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Glass: **[Clear][Low-iron][Tinted]** float glass.
3. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
4. Ceramic Coating Color and Pattern: **[As selected by Architect from manufacturer's full range][Match Architect's samples]<Insert one manufacturer's color and pattern designation if matching is required><Insert manufacturer's name; color and pattern designation>**.
5. Minimum Thickness: **[6 mm]<Insert thickness>**.
6. Coating Location: Second surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

7. Winter Nighttime U-Factor: **<Insert value>** maximum.
8. Summer Daytime U-Factor: **<Insert value>** maximum.
9. Visible Light Transmittance: **<Insert number>** percent minimum.
10. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required; "Fully tempered" option must be retained in last paragraph above if safety glazing is required.

11. Safety glazing required.

Not all sputtered-coating colors are suitable for monolithic applications and must be on second surface.

F. Reflective-Coated Vision Glass Type : **[Annealed][Heat-strengthened][Fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.

Consider retaining option in first subparagraph below if applicable; option is based on ASTM C1376.

2. Kind CV (coated vision glass) [, **except that Kind CO (coated overhead glass) may be used where lower edge of glass is more than 6 feet above the adjacent floor level or cannot be approached closer than 10 feet**].

Pyrolytic coatings may be used on either first or second surface of monolithic-glass lites.

Sputtered coatings may only be used with monolithic glass if recommended by manufacturer, and then only on second surface.

3. Coating Type: **[Pyrolytic][Sputter-coating (vacuum deposition process)]**.

Retain one color from options in "Coating Color" Subparagraph below. Not all sputtered-coating colors are suitable for monolithic applications and must be on second surface for monolithic applications.

4. Coating Color: **[Gold][Pewter][Silver]<Insert color>**.
5. Glass: **[Clear][Tinted]** float glass.
6. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
7. Minimum Thickness: **[6 mm]<Insert thickness>**.
8. Coating Location: **[First][Second]** surface.

Insert performance properties, if required, in "Outdoor Visible Reflectance," "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

9. Outdoor Visible Reflectance: **<Insert number>** percent maximum.
10. Winter Nighttime U-Factor: **<Insert value>** maximum.
11. Summer Daytime U-Factor: **<Insert value>** maximum.
12. Visible Light Transmittance: **<Insert number>** percent minimum.
13. SHGC: **<Insert value>** maximum.

Retain "Low-Maintenance Coating" Subparagraph below only with sputter-coated clear float glass and only after verifying availability.

14. Low-Maintenance Coating: Pyrolytic coating on first surface.

Retain subparagraph below if required; "Fully tempered" option must be retained in last paragraph above if safety glazing is required.

15. Safety glazing required.

- G. Ceramic-Coated Spandrel Glass Type : **[Heat-strengthened][Fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Glass: **[Clear][Low-iron][Tinted]** float glass.
3. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
4. Coating Color: **[As selected by Architect from manufacturer's full range][Match Architect's samples]<Insert one manufacturer's color designation if matching is required><Insert manufacturer's name; color designation>**.
5. Minimum Thickness: **[6 mm]<Insert thickness>**.
6. Coating Location: Second surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor" and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

7. Winter Nighttime U-Factor: **<Insert value>** maximum.
8. Summer Daytime U-Factor: **<Insert value>** maximum.

Requirement in "Fallout Resistance" Subparagraph below is optional test in ASTM C1048 and is not required by the IBC.

9. Fallout Resistance: Passes fallout-resistance test in ASTM C1048 for an assembly of glass and adhered reinforcing material.

H. Silicone-Coated Spandrel Glass Type : **[Heat-strengthened][Fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Glass: **[Clear][Low-iron][Tinted]** float glass.
3. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
4. Coating Color: **[As selected by Architect from manufacturer's full range][Match Architect's samples]<Insert one manufacturer's color designation if matching is required><Insert manufacturer's name; color designation>**.
5. Minimum Thickness: **[6 mm]<Insert thickness>**.
6. Coating Location: Second surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor" and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

7. Winter Nighttime U-Factor: **<Insert value>** maximum.
8. Summer Daytime U-Factor: **<Insert value>** maximum.

Requirement in "Fallout Resistance" Subparagraph below is optional test in ASTM C1048 and is not required by the IBC.

9. Fallout Resistance: Passes fallout-resistance test in ASTM C1048 for an assembly of glass and adhered reinforcing material.

Not all sputtered-coating colors are suitable for monolithic applications and must be on second surface.

I. Reflective-Coated Spandrel Glass Type : **[Heat-strengthened][Fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.

Pyrolytic coatings may be used on either first or second surface of monolithic-glass lites. Sputtered coatings may only be used with monolithic glass if recommended by manufacturer, and then only on second surface.

2. Coating Type: **[Pyrolytic][Sputter-coating (vacuum deposition process)]**.

Retain one color from options in "Coating Color" Subparagraph below. Not all sputtered-coating colors are suitable for monolithic applications and must be on second surface for monolithic applications.

3. Coating Color: **[Gold][Pewter][Silver]<Insert color>**.
4. Glass: **[Clear][Low-iron][Tinted]** float glass.
5. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
6. Minimum Thickness: **[6 mm]<Insert thickness>**.
7. Coating Location: **[First][Second]** surface.

Insert performance properties, if required, in "Outdoor Visible Reflectance," "Winter Nighttime U-Factor" and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

8. Outdoor Visible Reflectance: **<Insert number>** percent maximum.
9. Winter Nighttime U-Factor: **<Insert value>** maximum.
10. Summer Daytime U-Factor: **<Insert value>** maximum.

Requirement in "Fallout Resistance" Subparagraph below is optional test in ASTM C1048 and is not required by the IBC.

11. Fallout Resistance: Passes fallout-resistance test in ASTM C1048 for an assembly of glass and adhered reinforcing material.

Retain subparagraph below if read-through is not controlled by another means. Opacifier below can be applied only over reflective coating; verify availability with glass manufacturers.

12. Factory apply manufacturer's standard opacifier of the following material to coated on second surface of lites, with resulting products complying with Specification No. 89-1-6 in NGA's "Engineering Standards Manual":

Retain one of two subparagraphs below. If retaining a specific material, coordinate with product listing and verify, with glass manufacturer, availability and suitability for installation indicated.

- a. Manufacturer's standard opacifier material.
b. Polyester film laminated to glass with solvent-based adhesive.

3.2 LAMINATED GLASS SCHEDULE

Copy paragraphs below and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

If thickness designations are indicated on Drawings or are determined solely by compliance with "Performance Requirements" Article, delete "Minimum Thickness of Each Glass Ply" subparagraphs below.

- A. Clear Laminated Glass Type : Two plies of **[annealed][heat-strengthened][fully tempered][low-iron annealed][low-iron heat-strengthened][low-iron fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
3. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.

Retain subparagraph below if required.

4. Safety glazing required.

- B. Laminated Tinted Glass Type : Two plies of **[annealed][heat-strengthened][fully tempered]** float glass with outer ply tinted and inner ply clear.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
3. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
4. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

5. Winter Nighttime U-Factor: **<Insert value>** maximum.
6. Summer Daytime U-Factor: **<Insert value>** maximum.
7. Visible Light Transmittance: **<Insert number>** percent minimum.
8. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required.

9. Safety glazing required.

- C. Tinted Interlayer Laminated Glass Type : Two plies of clear **[annealed][heat-strengthened][fully tempered]** float glass and tinted interlayer.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
3. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.
4. Interlayer Color: **[Blue-green][Bronze light][Gray]<Insert color>**.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

5. Winter Nighttime U-Factor: **<Insert value>** maximum.
6. Summer Daytime U-Factor: **<Insert value>** maximum.
7. Visible Light Transmittance: **<Insert number>** percent minimum.
8. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required.

9. Safety glazing required.

Samples for verification or mockups should be used for laminated glass that has the coating facing the plastic interlayer due to potential color shift.

- D. Ceramic-Coated, Laminated Vision Glass Type : Two plies of **[heat-strengthened][fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Outer Ply: **[Clear][Low-iron][Tinted]** float glass.
3. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
4. Inner Ply: **[Clear][Low-iron]** float glass.
5. Ceramic Coating Color and Pattern: **[As selected by Architect from manufacturer's full range][Match Architect's samples]<Insert one manufacturer's color and pattern designation if matching is required><Insert manufacturer's name; color and pattern designation>**.
6. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
7. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.
8. Coating Location: **[Second][Third][Fourth]** surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

9. Winter Nighttime U-Factor: **<Insert value>** maximum.
10. Summer Daytime U-Factor: **<Insert value>** maximum.
11. Visible Light Transmittance: **<Insert number>** percent minimum.
12. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required.

13. Safety glazing required.

Samples for verification or mockups should be used for laminated glass that has the coating facing the plastic interlayer due to potential color shift.

- E. Reflective-Coated, Laminated Vision Glass Type : Two plies of **[heat-strengthened][fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.

Consider retaining option in first subparagraph below if applicable; option is based on ASTM C1376.

2. Kind CV (coated vision glass) [, **except that Kind CO (coated overhead glass) may be used where lower edge of glass is more than 6 feet above the adjacent floor level or cannot be approached closer than 10 feet**].

Pyrolytic coatings may be used on any surface of laminated glass. Sputtered coatings may only be used on second or third surface of laminated glass.

3. Coating Type: **[Pyrolytic][Sputter-coating (vacuum deposition process)]**.

Retain one color from options in "Coating Color" Subparagraph below. Not all sputtered-coating colors are suitable for monolithic applications and must be on second surface for monolithic applications.

4. Coating Color: **[Gold][Pewter][Silver]<Insert color>**.
5. Outer Ply: **[Clear][Tinted]** float glass.
6. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
7. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
8. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.
9. Coating Location: **[First][Second][Third]** surface.

Insert performance properties, if required, in "Outdoor Visible Reflectance," "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

10. Outdoor Visible Reflectance: **<Insert number>** percent maximum.
11. Winter Nighttime U-Factor: **<Insert value>** maximum.
12. Summer Daytime U-Factor: **<Insert value>** maximum.
13. Visible Light Transmittance: **<Insert number>** percent minimum.
14. SHGC: **<Insert value>** maximum.

Retain "Low-Maintenance Coating" Subparagraph below only with sputter-coated clear float glass and only after verifying availability.

15. Low-Maintenance Coating: Pyrolytic coating on first surface.

Retain subparagraph below if required.

16. Safety glazing required.

Samples for verification or mockups should be used for laminated glass that has the coating facing the plastic interlayer due to potential color shift.

- F. Low-E-Coated, Laminated Vision Glass Type : Two plies of clear **[annealed][heat-strengthened][fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
3. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.
4. Low-E Coating: **[Pyrolytic on second][Pyrolytic on third][Sputtered on second][Sputtered on third][Pyrolytic or sputtered on second or third] surface**.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

5. Winter Nighttime U-Factor: **<Insert value>** maximum.
6. Summer Daytime U-Factor: **<Insert value>** maximum.
7. Visible Light Transmittance: **<Insert number>** percent minimum.
8. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required.

9. Safety glazing required.

Samples for verification or mockups should be used for laminated glass that has the coating facing the plastic interlayer due to potential color shift.

- G. Reflective-Coated, Laminated Spandrel Glass Type : Two plies of **[heat-strengthened][fully tempered]** float glass.

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.

Pyrolytic coatings may be used on any surface of laminated glass. Sputtered coatings may only be used on second or third surface of laminated glass.

2. Coating Type: **[Pyrolytic][Sputter-coating (vacuum deposition process)]**.

Retain one color from options in "Coating Color" Subparagraph below. Not all sputtered-coating colors are suitable for monolithic applications and must be on second surface for monolithic applications.

3. Coating Color: **[Gold][Pewter][Silver]<Insert color>**.
4. Outer Ply: **[Clear][Tinted]** float glass.
5. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
6. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.

7. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.
8. Coating Location: **[First][Second][Third]** surface.

Insert performance properties, if required, in "Outdoor Visible Reflectance," "Winter Nighttime U-Factor," and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

9. Outdoor Visible Reflectance: **<Insert number>** percent maximum.
10. Winter Nighttime U-Factor: **<Insert value>** maximum.
11. Summer Daytime U-Factor: **<Insert value>** maximum.

3.3 INSULATING GLASS SCHEDULE

Copy paragraphs below and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

If thickness designations are indicated on Drawings or are determined solely by compliance with "Performance Requirements" Article, delete "Minimum Thickness of Each Glass Lite" subparagraphs below.

A. Clear Insulating Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Overall Unit Thickness: **[1 inch][5/8 inch]<Insert dimension>**.
3. Minimum Thickness of Each Glass Lite: **[3 mm][4 mm][5 mm][6 mm]<Insert thickness>**.
4. Outdoor Lite: **[Annealed][Heat-strengthened][Fully tempered]** float glass.
5. Interspace Content: **[Air][Argon]**.
6. Indoor Lite: **[Annealed][Heat-strengthened][Fully tempered]** float glass.

Insert performance properties, if required, in "Winter Nighttime U-Factor" and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

7. Winter Nighttime U-Factor: **<Insert value>** maximum.
8. Summer Daytime U-Factor: **<Insert value>** maximum.

Retain subparagraph below if required; "Fully tempered" option must be retained in "Outdoor Lite" and "Indoor Lite" subparagraphs if safety glazing is required.

9. Safety glazing required.

B. Low-Iron Insulating Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Overall Unit Thickness: **[1 inch][5/8 inch]<Insert dimension>**.

3. Minimum Thickness of Each Glass Lite: [3 mm][4 mm][5 mm][6 mm]<Insert thickness>.
4. Outdoor Lite: Low-iron [annealed][heat-strengthened][fully tempered] float glass.
5. Interspace Content: [Air][Argon].
6. Indoor Lite: Low-iron [annealed][heat-strengthened][fully tempered] float glass.

Insert performance properties, if required, in "Winter Nighttime U-Factor" and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

7. Winter Nighttime U-Factor: <Insert value> maximum.
8. Summer Daytime U-Factor: <Insert value> maximum.

Retain subparagraph below if required; "fully tempered" option must be retained in "Outdoor Lite" and "Indoor Lite" subparagraphs if safety glazing is required.

9. Safety glazing required.

C. Pyrolytic-Coated, Low-Maintenance Insulating Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: [Cardinal Glass Industries; Neat][Pilkington North America Inc.; Activ]<Insert manufacturer's name; product name or designation>.
2. Overall Unit Thickness: [1 inch][5/8 inch]<Insert dimension>.
3. Minimum Thickness of Each Glass Lite: [3 mm][4 mm][5 mm][6 mm]<Insert thickness>.
4. Outdoor Lite: Pyrolytic-coated, low-maintenance, clear [annealed][heat-strengthened][fully tempered] float glass.
5. Interspace Content: [Air][Argon].
6. Indoor Lite: [Annealed][Heat-strengthened][Fully tempered] float glass.

Insert performance properties, if required, in "Winter Nighttime U-Factor" and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

7. Winter Nighttime U-Factor: <Insert value> maximum.
8. Summer Daytime U-Factor: <Insert value> maximum.

Retain subparagraph below if required; "fully tempered" option must be retained in "Outdoor Lite" and "Indoor Lite" subparagraphs if safety glazing is required.

9. Safety glazing required.

D. Low-E-Coated, Clear Insulating Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: <Insert manufacturer's name; product name or designation>.

2. Overall Unit Thickness: [**1 inch**][**5/8 inch**]<Insert dimension>.
3. Minimum Thickness of Each Glass Lite: [**3 mm**][**4 mm**][**5 mm**][**6 mm**]<Insert thickness>.
4. Outdoor Lite: [**Annealed**][**Heat-strengthened**][**Fully tempered**][**Low-iron annealed**][**Low-iron heat-strengthened**][**Low-iron fully tempered**] float glass.
5. Interspace Content: [**Air**][**Argon**].
6. Indoor Lite: [**Annealed**][**Heat-strengthened**][**Fully tempered**][**Low-iron annealed**][**Low-iron heat-strengthened**][**Low-iron fully tempered**] float glass.
7. Low-E Coating: [**Pyrolytic on second**][**Pyrolytic on third**][**Sputtered on second**][**Sputtered on third**][**Pyrolytic or sputtered on second or third**] surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

8. Winter Nighttime U-Factor: <Insert value> maximum.
9. Summer Daytime U-Factor: <Insert value> maximum.
10. Visible Light Transmittance: <Insert number> percent minimum.
11. SHGC: <Insert value> maximum.

Retain subparagraph below if required; "Fully tempered" or "Low-iron fully tempered" option must be retained in "Outdoor Lite" and "Indoor Lite" subparagraphs if safety glazing is required.

12. Safety glazing required.

E. Pyrolytic-Coated, Low-Maintenance, Low-E-Coated, Clear Insulating Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: <Insert manufacturer's name; product name or designation>.
2. Overall Unit Thickness: [**1 inch**][**5/8 inch**]<Insert dimension>.
3. Minimum Thickness of Each Glass Lite: [**3 mm**][**4 mm**][**5 mm**][**6 mm**]<Insert thickness>.
4. Outdoor Lite: Pyrolytic-coated, low-maintenance, clear [**annealed**][**heat-strengthened**][**fully tempered**] float glass.
5. Interspace Content: [**Air**][**Argon**].
6. Indoor Lite: [**Annealed**][**Heat-strengthened**][**Fully tempered**] float glass.
7. Low-E Coating: [**Pyrolytic on third**][**Sputtered on second**][**Sputtered on third**][**Pyrolytic or sputtered on second or third**] surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

8. Winter Nighttime U-Factor: <Insert value> maximum.
9. Summer Daytime U-Factor: <Insert value> maximum.
10. Visible Light Transmittance: <Insert number> percent minimum.
11. SHGC: <Insert value> maximum.

Retain subparagraph below if required; "fully tempered" option must be retained in "Outdoor Lite" and "Indoor Lite" subparagraphs if safety glazing is required.

12. Safety glazing required.

F. Tinted Insulating Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Overall Unit Thickness: **[1 inch][5/8 inch]<Insert dimension>**.
3. Minimum Thickness of Each Glass Lite: **[3 mm][4 mm][5 mm][6 mm]<Insert thickness>**.
4. Outdoor Lite: Tinted **[annealed][heat-strengthened][fully tempered]** float glass.
5. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
6. Interspace Content: **[Air][Argon]**.
7. Indoor Lite: Clear **[annealed][heat-strengthened][fully tempered]** float glass.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

8. Winter Nighttime U-Factor: **<Insert value>** maximum.
9. Summer Daytime U-Factor: **<Insert value>** maximum.
10. Visible Light Transmittance: **<Insert number>** percent minimum.
11. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required; "fully tempered" option must be retained in "Outdoor Lite" and "Indoor Lite" subparagraphs if safety glazing is required.

12. Safety glazing required.

G. Low-E-Coated, Tinted Insulating Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Overall Unit Thickness: **[1 inch][5/8 inch]<Insert dimension>**.
3. Minimum Thickness of Each Glass Lite: **[3 mm][4 mm][5 mm][6 mm]<Insert thickness>**.
4. Outdoor Lite: Tinted **[annealed][heat-strengthened][fully tempered]** float glass.
5. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
6. Interspace Content: **[Air][Argon]**.
7. Indoor Lite: Clear **[annealed][heat-strengthened][fully tempered]** float glass.
8. Low-E Coating: **[Pyrolytic on second][Pyrolytic on third][Sputtered on second][Sputtered on third][Pyrolytic or sputtered on second or third] surface**.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

9. Winter Nighttime U-Factor: **<Insert value>** maximum.
10. Summer Daytime U-Factor: **<Insert value>** maximum.

11. Visible Light Transmittance: **<Insert number>** percent minimum.
12. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required; "fully tempered" option must be retained in "Outdoor Lite" and "Indoor Lite" subparagraphs if safety glazing is required.

13. Safety glazing required.

H. Ceramic-Coated, Insulating Vision Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Ceramic Coating Color and Pattern: **[As selected by Architect from manufacturer's full range][Match Architect's samples]<Insert one manufacturer's color and pattern designation if matching is required><Insert manufacturer's name; color and pattern designation>**.
3. Overall Unit Thickness: **[1 inch][5/8 inch]<Insert dimension>**.
4. Minimum Thickness of Each Glass Lite: **[3 mm][4 mm][5 mm][6 mm]<Insert thickness>**.
5. Outdoor Lite: **[Clear heat-strengthened][Clear fully tempered][Low-iron heat-strengthened][Low-iron fully tempered][Tinted heat-strengthened][Tinted fully tempered]** float glass.
6. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
7. Interspace Content: **[Air][Argon]**.
8. Indoor Lite: **[Clear heat-strengthened][Clear fully tempered][Low-iron annealed][Low-iron heat-strengthened][Low-iron fully tempered]** float glass.
9. Coating Location: **[Second][Third][Fourth]** surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

10. Winter Nighttime U-Factor: **<Insert value>** maximum.
11. Summer Daytime U-Factor: **<Insert value>** maximum.
12. Visible Light Transmittance: **<Insert number>** percent minimum.
13. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required; "Clear fully tempered," "Low-iron fully tempered," or "Tinted fully tempered" option must be retained in "Outdoor Lite" and "Clear fully tempered" or "Low-iron fully tempered" option must be retained in "Indoor Lite" Subparagraph if safety glazing is required.

14. Safety glazing required.

I. Reflective-Coated Insulating Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.

Consider retaining option in first subparagraph below if applicable; option is based on ASTM C1376.

2. Kind CV (coated vision glass) [, **except that Kind CO (coated overhead glass) may be used where lower edge of glass is more than 6 feet above the adjacent floor level or cannot be approached closer than 10 feet**].

Pyrolytic coatings may be used on any surface of insulating glass. Sputtered coatings may only be used on second or third surface of insulating glass.

3. Coating Type: **[Pyrolytic][Sputter-coating (vacuum deposition process)]**.

Retain one color from options in "Coating Color" Subparagraph below. Not all sputtered-coating colors are suitable for monolithic applications and must be on second surface for monolithic applications.

4. Coating Color: **[Gold][Pewter][Silver]<Insert color>**.
5. Overall Unit Thickness: **[1 inch][5/8 inch]<Insert dimension>**.
6. Minimum Thickness of Each Glass Lite: **[3 mm][4 mm][5 mm][6 mm]<Insert thickness>**.
7. Outdoor Lite: **[Clear annealed][Clear heat-strengthened][Clear fully tempered][Tinted heat-strengthened][Tinted fully tempered]** float glass.
8. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
9. Interspace Content: **[Air][Argon]**.
10. Indoor Lite: Clear **[annealed][heat-strengthened][fully tempered]** float glass.

Pyrolytic coatings may be used on any surface of insulating glass. Sputtered coatings may only be used on second or third surface of insulating glass.

11. Coating Location: **[First][Second][Third]** surface.

Insert performance properties, if required, in "Outdoor Visible Reflectance," "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

12. Outdoor Visible Reflectance: **<Insert number>** percent maximum.
13. Winter Nighttime U-Factor: **<Insert value>** maximum.
14. Summer Daytime U-Factor: **<Insert value>** maximum.
15. Visible Light Transmittance: **<Insert number>** percent minimum.
16. SHGC: **<Insert value>** maximum.

Retain "Low-Maintenance Coating" Subparagraph below only with sputter-coated clear float glass and only after verifying availability.

17. Low-Maintenance Coating: Pyrolytic coating on first surface.

Retain subparagraph below if required; either "Clear fully tempered" or "Tinted fully tempered" option must be retained in "Outdoor Lite" Subparagraph and "fully tempered" option retained in "Indoor Lite" Subparagraph if safety glazing is required.

18. Safety glazing required.

J. **[Ceramic][Silicone]** -Coated, Insulating Spandrel Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Coating Color: **[As selected by Architect from manufacturer's full range][Match Architect's samples]<Insert one manufacturer's color designation if matching is required><Insert manufacturer's name; color designation>**.
3. Overall Unit Thickness: **[1 inch]<Insert dimension>**.
4. Minimum Thickness of Each Glass Lite: **[5 mm][6 mm]<Insert thickness>**.

In "Outdoor Lite" Subparagraph below, retain one of six options for glass color and strength.

5. Outdoor Lite: **[Clear annealed][Clear heat-strengthened][Clear fully tempered][Low-iron annealed][Low-iron heat-strengthened][Low-iron fully tempered]** float glass.
6. Interspace Content: **[Air][Argon]**.

Retain "Clear heat-strengthened," "Low-iron heat-strengthened," "Clear fully tempered," or "Low-iron fully tempered" option in "Indoor Lite" Subparagraph below for ceramic-coated, insulating spandrel glass.

7. Indoor Lite: **[Clear annealed][Clear heat-strengthened][Clear fully tempered][Low-iron annealed][Low-iron heat-strengthened][Low-iron fully tempered]** float glass.
8. Coating Location: Fourth surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor" and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

9. Winter Nighttime U-Factor: **<Insert value>** maximum.
10. Summer Daytime U-Factor: **<Insert value>** maximum.

K. **[Ceramic][Silicone]** -Coated, Low-E, Insulating Spandrel Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Coating Color: **[As selected by Architect from manufacturer's full range][Match Architect's samples]<Insert one manufacturer's color designation if matching is required><Insert manufacturer's name; color designation>**.
3. Overall Unit Thickness: **[1 inch]<Insert dimension>**.
4. Minimum Thickness of Each Glass Lite: **[5 mm][6 mm]<Insert thickness>**.
5. Outdoor Lite: **[Clear heat-strengthened][Clear fully tempered][Low-iron heat-strengthened][Low-iron fully tempered]** float glass.
6. Interspace Content: **[Air][Argon]**.
7. Indoor Lite: **[Clear heat-strengthened][Clear fully tempered][Low-iron heat-**

- strengthened][Low-iron fully tempered]** float glass.
8. Low-E Coating: **[Pyrolytic on second][Pyrolytic on third][Sputtered on second][Sputtered on third][Pyrolytic or sputtered on second or third]** surface.
 9. Opaque Coating Location: Fourth surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor" and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

10. Winter Nighttime U-Factor: **<Insert value>** maximum.
11. Summer Daytime U-Factor: **<Insert value>** maximum.

L. **[Ceramic][Silicone]** -Coated, Tinted, Insulating Spandrel Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Coating Color: **[As selected by Architect from manufacturer's full range][Match Architect's samples]<Insert one manufacturer's color designation if matching is required><Insert manufacturer's name; color designation>**.
3. Overall Unit Thickness: **[1 inch]<Insert dimension>**.
4. Minimum Thickness of Each Glass Lite: **[5 mm][6 mm]<Insert thickness>**.
5. Outdoor Lite: Tinted **[annealed][heat-strengthened][fully tempered]** float glass.
6. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
7. Interspace Content: **[Air][Argon]**.

Retain "heat-strengthened" or "fully tempered" option in "Indoor Lite" Subparagraph below for ceramic-coated, tinted, insulating spandrel glass.

8. Indoor Lite: Clear **[annealed][heat-strengthened][fully tempered]** float glass.
9. Coating Location: Fourth surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor" and "Summer Daytime U-Factor" subparagraphs below to suit product(s).

10. Winter Nighttime U-Factor: **<Insert value>** maximum.
11. Summer Daytime U-Factor: **<Insert value>** maximum.

3.4 INSULATING-LAMINATED-GLASS SCHEDULE

Glass types in this article are primarily for sloped glazing and glazing that is required to be windborne-debris-impact resistant.

Copy paragraphs below and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

If thickness designations are indicated on Drawings or are determined solely by compliance with

"Performance Requirements" Article, delete "Minimum Thickness of Outdoor Lite" and "Minimum Thickness of Each Glass Ply" subparagraphs below.

A. Clear Insulating, Laminated Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Overall Unit Thickness: **[1-3/16 inch][1 inch][3/4 inch]<Insert dimension>**.
3. Minimum Thickness of Outdoor Lite: **[3 mm][4 mm][5 mm][6 mm]<Insert thickness>**.
4. Outdoor Lite: Clear **[heat-strengthened][fully tempered]** float glass.
5. Interspace Content: **[Air][Argon]**.
6. Indoor Lite: Clear laminated glass with two plies of **[annealed][heat-strengthened][fully tempered]** float glass.
 - a. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
 - b. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," and "SHGC" subparagraphs below to suit product(s).

7. Winter Nighttime U-Factor: **<Insert value>** maximum.
8. Summer Daytime U-Factor: **<Insert value>** maximum.
9. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required.

10. Safety glazing required.

B. Low-E-Coated, Clear Insulating Laminated Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Overall Unit Thickness: **[1-3/16 inch][1 inch][3/4 inch]<Insert dimension>**.
3. Minimum Thickness of Outdoor Lite: **[3 mm][4 mm][5 mm][6 mm]<Insert thickness>**.
4. Outdoor Lite: Clear **[heat-strengthened][fully tempered]** float glass.
5. Interspace Content: **[Air][Argon]**.
6. Indoor Lite: Clear laminated glass with two plies of **[annealed][heat-strengthened][fully tempered]** float glass.
 - a. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
 - b. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.
7. Low-E Coating: **[Pyrolytic on second][Pyrolytic on third][Sputtered on**

second][Sputtered on third][Pyrolytic or sputtered on second or third]
surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

8. Winter Nighttime U-Factor: **<Insert value>** maximum.
9. Summer Daytime U-Factor: **<Insert value>** maximum.
10. Visible Light Transmittance: **<Insert number>** percent minimum.
11. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required.

12. Safety glazing required.

C. Tinted, Insulating Laminated Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or designation>**.
2. Overall Unit Thickness: **[1-3/16 inch][1 inch][3/4 inch]<Insert dimension>**.
3. Minimum Thickness of Outdoor Lite: **[3 mm][4 mm][5 mm][6 mm]<Insert thickness>**.
4. Outdoor Lite: Tinted **[heat-strengthened][fully tempered]** float glass.
5. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
6. Interspace Content: **[Air][Argon]**.
7. Indoor Lite: Clear laminated glass with two plies of **[annealed][heat-strengthened][fully tempered]** float glass.
 - a. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
 - b. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

8. Winter Nighttime U-Factor: **<Insert value>** maximum.
9. Summer Daytime U-Factor: **<Insert value>** maximum.
10. Visible Light Transmittance: **<Insert number>** percent minimum.
11. SHGC: **<Insert value>** maximum.

Retain subparagraph below if required.

12. Safety glazing required.

D. Low-E-Coated, Tinted, Insulating Laminated Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: **<Insert manufacturer's name; product name or**

designation>.

2. Overall Unit Thickness: [1-3/16 inch][1 inch][3/4 inch]<Insert dimension>.
3. Minimum Thickness of Outdoor Lite: [3 mm][4 mm][5 mm][6 mm]<Insert thickness>.
4. Outdoor Lite: Tinted [heat-strengthened][fully tempered] float glass.
5. Tint Color: [Blue][Blue-green][Bronze][Green][Gray]<Insert color>.
6. Interspace Content: [Air][Argon].
7. Indoor Lite: Clear laminated glass with two plies of [annealed][heat-strengthened][fully tempered] float glass.
 - a. Minimum Thickness of Each Glass Ply: [3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>.
 - b. Interlayer Thickness: [0.030 inch][0.060 inch][0.090 inch].
8. Low-E Coating: [Pyrolytic on second][Pyrolytic on third][Sputtered on second][Sputtered on third][Pyrolytic or sputtered on second or third] surface.

Insert performance properties, if required, in "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

9. Winter Nighttime U-Factor: <Insert value> maximum.
10. Summer Daytime U-Factor: <Insert value> maximum.
11. Visible Light Transmittance: <Insert number> percent minimum.
12. SHGC: <Insert value> maximum.

Retain subparagraph below if required.

13. Safety glazing required.

E. Reflective-Coated, Insulating Laminated Glass Type :

Retain "Basis-of-Design Product" Subparagraph below to require a specific product.

1. Basis-of-Design Product: <Insert manufacturer's name; product name or designation>.

Consider retaining option in first subparagraph below if applicable; option is based on ASTM C1376.

2. Kind CV (coated vision glass) [, except that Kind CO (coated overhead glass) may be used where lower edge of glass is more than 6 feet above the adjacent floor level or cannot be approached closer than 10 feet].

Pyrolytic coatings may be used on first, second, or third surface of insulating laminated glass. Sputtered coatings are only used on second or third surface of insulating laminated glass.

3. Coating Type: [Pyrolytic][Sputter-coating (vacuum deposition process)].

Retain one color from options in "Coating Color" Subparagraph below. Not all sputtered-coating colors are suitable for monolithic applications and must be on second surface for monolithic

applications.

4. Coating Color: **[Gold][Pewter][Silver]<Insert color>**.
5. Overall Unit Thickness: **[1-3/16 inch][1 inch]<Insert dimension>**.
6. Minimum Thickness of Outdoor Lite: **[6 mm]<Insert thickness>**.
7. Outdoor Lite: **[Clear heat-strengthened][Clear fully tempered][Tinted heat-strengthened][Tinted fully tempered]** float glass.
8. Tint Color: **[Blue][Blue-green][Bronze][Green][Gray]<Insert color>**.
9. Interspace Content: **[Air][Argon]**.
10. Indoor Lite: Clear laminated glass with two plies of **[annealed][heat-strengthened][fully tempered]** float glass.
 - a. Minimum Thickness of Each Glass Ply: **[3 mm][4 mm][5 mm][6 mm][As indicated]<Insert thickness>**.
 - b. Interlayer Thickness: **[0.030 inch][0.060 inch][0.090 inch]**.
11. Coating Location: **[First][Second][Third]** surface.

Insert performance properties, if required, in "Outdoor Visible Reflectance," "Winter Nighttime U-Factor," "Summer Daytime U-Factor," "Visible Light Transmittance," and "SHGC" subparagraphs below to suit product(s).

12. Outdoor Visible Reflectance: **<Insert number>** percent maximum.
13. Winter Nighttime U-Factor: **<Insert value>** maximum.
14. Summer Daytime U-Factor: **<Insert value>** maximum.
15. Visible Light Transmittance: **<Insert number>** percent minimum.
16. SHGC: **<Insert value>** maximum.

Retain "Low-Maintenance Coating" Subparagraph below only with sputter-coated clear float glass and only after verifying availability.

17. Low-Maintenance Coating: Pyrolytic coating on first surface.

Retain subparagraph below if required.

18. Safety glazing required.

END OF SECTION 08 80 00