

SECTION 088000 – GENERAL GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - a. Doors.
 - b. Aluminum framed entrances and storefronts.
 - c. Glazed aluminum curtain walls.
- B. Related Sections include the following:
 - 1. Division 8 Section "Hollow Metal Doors and Frames" for hollow metal doors and frames to receive general glazing.
 - 2. Division 8 Section "Aluminum Entrances and Storefronts" for aluminum storefront framing systems to receive general glazing.
 - 3. Division 8 Section "Glazed Aluminum Curtain Walls" for curtain wall systems to receive general glazing.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass or fabricated glass as defined in referenced glazing publications.
- B. Glazing Fabricators: Firms that produce fabricated glass products from primary glass as defined in referenced glazing publications.
- C. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.
- D. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- E. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to fabricator's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

- F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to fabricator's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
- G. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the fabricating process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to fabricator's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: Defective manufacturing, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; other defects in construction.
- B. Glass Design: Glass thicknesses indicated are minimums and are for detailing purposes only. Confirm glass thicknesses by analyzing Project design loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E1300 and ICC's International Building Code (applicable version) according to the following requirements:
 - a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.
 - b. Specified Design Snow Loads: As indicated on (Structural) Drawings, but not less than snow loads applicable to Project required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7, "Snow Loads".
 - c. Probability of Breakage for Vertical Glazing: 8 lites per 1,000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - d. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.

- e. 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.
 - f. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
 - g. Minimum Glass Thickness for Exterior Lites:
 - 1) Manufacturer's standard to meet wind load criteria, but not less than 6 mm.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. Performance Characteristics: Provide glass with performance properties specified based on manufacturer's published test data as determined according to procedures indicated below:
- 1. For monolithic glass lites, properties are based on units with lites 6 mm thick.
 - 2. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch-wide interspace.
 - 3. Center-of-Glass thermal and optical performance properties shall be based on data and calculations from the current LBNL Windows 7.3 computer program expressed as Btu/sq. ft. x h x deg °F.
 - 4. Fenestration Performance: Performance values that take into account the total fenestration (center-of-glass and framing members) normally identified with building energy codes such as ASHRAE-IESNA 90.1 and the IECC. Values can also be tested and certified by the National Fenestration Rating Council (NFRC).

1.5 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.6 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: Provide 12-inch-square samples of each glass product specified.
- C. Glazing Schedule: Use same designations indicated on Drawings and specified herein for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.
- E. Qualification Data: For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- F. Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants have been tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- G. Product Test Reports: From a qualified testing agency, indicating the specified products comply with requirements based on comprehensive testing of standard products. Provide product test reports for each glass product.
- I. Warranties: Special warranties specified in this Section.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations for Monolithic Float Glass: Obtain all monolithic float glass from one source from a single manufacturer.
- C. Source Limitations for Insulating Glass: Obtain all insulating-glass units from one source from a single fabricator using the same type of glass and other components for each type of unit specified.
- D. Source Limitations for Laminated Glass: Obtain all laminated glass units from one source from a single fabricator using the same type of glass and other components for each type of unit indicated.
- E. Source Limitations for Glazing Accessories: Obtain all glazing accessories from one source from a single manufacturer for each product and installation method indicated.
- F. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
 1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to the following publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: NGA "Glazing Manual", "Sealant Manual" and "Laminated Glass Design Guide."
 2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines."
 3. SIGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- H. Preinstallation Conference: Conduct conference at Project site in accordance with Division 1 Section "Project Meetings".
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.
- I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:
1. Insulated Glass Certification Council (IGCC)

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.9 PROJECT 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.

1.10 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.
- B. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass fabricator agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article within specified warranty period indicated below.
 1. Warranty Period: 10 years from date of Substantial Completion.

- C. Manufacturer's Special Warranty on Laminated Glass: Written warranty, made out to Owner and signed by laminated-glass fabricator agreeing to furnish replacements for laminated-glass units that deteriorate as defined in "Definitions" Article within specified warranty period indicated below
 - 1. Warranty Period: 5 years from date of Substantial Completion.
- D. Manufacturer's Special Warranty for Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass fabricator agreeing to furnish replacements for coated-glass that deteriorates as defined in "Definitions" Article within specified warranty period indicated below. 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: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as required by applicable glazing code.

2.2 MANUFACTURERS AND FABRICATION

- A. Available Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Monolithic Float Glass
 - a. Vitro Architectural Glass.
 - b. Guardian Glass, Inc.
 - c. Pilkington, Inc.
 - d. AGC.
- B. Available Fabricators: Subject to compliance with requirements, fabricators of the products specified include, but are not limited to, the following:
 - 1. Glass Enterprises, Inc.
 - 2. Viracon, Inc.
 - 3. Oldcastle Glass
 - 4. Trulite.

2.3 INSULATING GLASS

- A. Insulating Glass Units – General: Preamsembled units consisting of sealed lites of glass separated by a dehydrated interspace and complying with ASTM E2190 for Class CBA units and with requirements specified in this Article.

1. **Type IG-1 Insulated Glass:** Insulated glass units consisting of two lites of clear, annealed glass separated by a 1/2-inch sealed air space. Provide insulated units with low “E” coating. Unless otherwise noted, for use in the building’s perimeter openings **primarily facing North and East**. Refer to Schedules and Frame Elevations for applied use.

- a. Basis-of-Design Product: Subject to compliance with requirements, provide units fabricated with “Vitro Glass Solarban 60 Clear” or comparable product with the following characteristics:

- 1) Ultra Violet: 18%.
- 2) Visible Light Transmittance: 70%.
- 3) Total Solar Energy Transmittance: 34%.
- 4) Winter Night-time U Value: .29.
- 5) Summer Day-time U Value: .27.
- 6) Shading Coefficient: .45.
- 7) Solar Heat Gain Coefficient: .39.
- 8) Light to Solar Gain: 1.79.

- b. Insulating Glass Unit Make-up

- 1) Outboard Lite: “Vitro Glass Solarban 60 Clear”*, 1/4 inch-thick.
- 2) Low “E” coating on 2nd surface.
- 3) ***Glazing unit color and tint to match existing glazing.**
- 4) 1/2-inch-thick desiccant filled structural silicone spacer; Quanex Super Spacer TriSeal, GE3, black.
- 5) Inboard Lite: 1/4 inch-thick clear glass.
- 6) Overall Thickness: 1-inch.

2. **Type IG-2 Insulated Glass:** Insulated glass units consisting of two lites of clear, annealed glass separated by a 1/2-inch sealed air space. Provide insulated units with low “E” coating. Unless otherwise noted, for use in the building’s perimeter openings **primarily facing South and West**. Refer to Schedules and Frame Elevations for applied use.

- a. Basis-of-Design Product: Subject to compliance with requirements, provide units fabricated with “Vitro Glass Solarban 70 Clear” or comparable product with the following characteristics:

- 1) Ultra Violet: 6%.
- 2) Visible Light Transmittance: 64%.
- 3) Total Solar Energy Transmittance: 24%.
- 4) Winter Night-time U Value: .28.
- 5) Summer Day-time U Value: .26.
- 6) Shading Coefficient: .31.

- 7) Solar Heat Gain Coefficient: .27.
 - 8) Light to Solar Gain: 2.37.
- b. Insulating Glass Unit Make-up
- 1) Outboard Lite: "Vitro Glass Solarban 70 Clear"*, 1/4 inch-thick.
 - 2) Low "E" coating on 2nd surface.
 - 3) ***Glazing unit color and tint to match existing glazing.**
 - 4) 1/2-inch-thick desiccant filled structural silicone spacer; Quanex Super Spacer TriSeal, GE3, black.
 - 5) Inboard Lite: 1/4-inch-thick clear glass.
 - 6) Overall Thickness: 1-inch.
3. **Type IG-4 Insulated Acid Etched Glass:** Insulated glass units consisting of one lite of clear and one lite of acid etched glass, separated by a 1/2-inch sealed air space. Provide insulated units with low "E" coating. Unless otherwise noted, for use in the building's perimeter openings **where noted on Drawings, primarily facing South and West.** Refer to Schedules for applied use.
- a. ~~Basis-of-Design Product: Subject to compliance with requirements, provide units fabricated with "Vitro Glass Solarban 70 Clear" or comparable product with the following characteristics:~~
- 1) ~~Ultra Violet: 6%.~~
 - 2) ~~Visible Light Transmittance: 61%.~~
 - 3) ~~Total Solar Energy Transmittance: 22%.~~
 - 4) ~~Winter Night-time U Value: .28.~~
 - 5) ~~Summer Day-time U Value: .26.~~
 - 6) ~~Shading Coefficient: .31.~~
 - 7) ~~Solar Heat Gain Coefficient: .27.~~
 - 8) ~~Light to Solar Gain: 2.26.~~
- b. Insulating Glass Unit Make-up
- 1) ~~Outboard Lite: "Vitro Glass Solarban 70 Clear", 1/4 inch-thick.~~
 - 2) ~~Low "E" coating on 2nd surface.~~
 - 3) ~~1/2-inch-thick desiccant filled structural silicone spacer; Quanex Super Spacer TriSeal, GE3, black.~~
 - 4) ~~Inboard Lite: 1/4-inch-thick velour acid etched glass on 3rd surface.~~
 - 5) ~~Overall Thickness: 1-inch. -ADDENDUM NO. 1~~
4. **Type IG-5 Insulated Silicone-Coated Spandrel Glass:** Insulated glass units consisting of two lites of clear, annealed glass, separated by a 1/2-inch sealed air space. Provide insulated units with low "E" coating. Unless otherwise noted, for use in the building's perimeter openings **where noted on Drawings, primarily facing North and East.** Refer to Schedules for applied use.

- a. Basis-of-Design Product: Subject to compliance with requirements, provide “Vitro Glass Solarban 60 Clear” or comparable product and “ICD High Performance Coatings, Opaci-Coat 300” with the following characteristics.
 - 1) Ultra Violet: 0%.
 - 2) Visible Light Transmittance: 4%.
 - 3) Total Solar Energy Transmittance: 2%.
 - 4) Winter Night-time U-Value: .29.
 - 5) Summer Day-time U-Value: .27.
 - 6) Shading Coefficient: .35.
 - 7) Solar Heat Gain Coefficient: .30.
 - 8) Light to Solar Gain: .13.
 - b. Insulating Glass Unit Make-up
 - 1) Outboard Lite: “Vitro Glass Solarban 60 Clear”, 1/4-inch-thick.
 - 2) Low “E” coating on 2nd surface.
 - 3) 1/2-inch-thick desiccant filled structural silicone spacer; Quanex Super Spacer TriSeal, GE3, black.
 - 4) Inboard Lite: 1/4-inch-thick clear glass.
 - 5) Spandrel Coating: On 4th surface (Color to be determined by Architect).
 - 6) **Final color and appearance to match existing glazing units.**
 - 7) Overall Thickness: 1-inch
5. **Type IG-6 Insulated Silicone-Coated Spandrel Glass:** Insulated glass units consisting of two lites of clear, annealed glass, separated by a 1/2-inch sealed air space. Provide insulated units with low “E” coating. Unless otherwise noted, for use in the building’s perimeter openings **where noted on Drawings, primarily facing South and West.** Refer to Schedules for applied use.
- a. Basis-of-Design Product: Subject to compliance with requirements, provide “Vitro Glass Solarban 70 Clear” or comparable product and “ICD High Performance Coatings, Opaci-Coat 300” with the following characteristics.
 - 1) Ultra Violet: 0%.
 - 2) Visible Light Transmittance: 4%.
 - 3) Total Solar Energy Transmittance: 1%.
 - 4) Winter Night-time U-Value: .28.
 - 5) Summer Day-time U-Value: .26.
 - 6) Shading Coefficient: .24.
 - 7) Solar Heat Gain Coefficient: .21.
 - 8) Light to Solar Gain: .19.
 - b. Insulating Glass Unit Make-up
 - 1) Outboard Lite: “Vitro Glass Solarban 70 Clear”, 1/4-inch-thick.
 - 2) Low “E” coating on 2nd surface.
 - 3) 1/2-inch-thick desiccant filled structural silicone spacer; Quanex Super Spacer TriSeal, GE3, black.

- 4) Inboard Lite: 1/4-inch-thick clear glass.
 - 5) Spandrel Coating: On 4th surface (Color to be determined by Architect).
 - 6) **Final color and appearance to match existing glazing units.**
 - 7) Overall Thickness: 1-inch
6. Provide Kind FT (fully tempered) where safety glass is required by the applicable glazing codes.
 7. Locations: Insulating glass shall be used in all exterior windows, curtainwalls, storefronts/entrances, windows/vents and doors. At a minimum, insulating glass units in doors and sidelites (below the door head-height) and other locations indicated on Drawings or required by applicable code, shall consist of tempered glass.
- B. Sealing System: Dual seal, with primary and secondary sealants as follows:
1. Dual air seal of polyisobutylene (PIB), and secondary seal of silicone.

2.4 LAMINATED GLASS

- A. ~~Laminated Glass — General: ASTM C1172 and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. 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: Lamine glass with interlayers to comply with interlayer manufacturer's written recommendations.~~
 2. ~~Interlayer Thickness: Provide thickness not less than that indicated, and as needed to comply with requirements; one or multiple layers, formulated to absorb the majority of all naturally occurring ultraviolet (UV) radiation from sunlight and provide long term stability with built-in UV filtering.~~
 3. ~~Basis of Design Products: Subject to compliance with requirements, provide the following interlayer products, or comparable interlayer products by other manufacturers that meet the specified standard of quality:~~
 - a. ~~Polyvinyl butyral (PVB): Kuraray "Butacite."~~
 - b. ~~Acoustic: Kuraray "Acoustic."~~
 - c. ~~High Security: Kuraray "SentryGlas."~~
 4. **Type ILG-1 Insulated Laminated Safety Glass:** Insulated glass units consisting of one lite of 1/4-inch-thick clear tempered glass and one lite of 7/16-inch-thick laminated tempered glass (two 3/16 inch-thick lites of clear, tempered safety glass laminated with a high-security, .060 interlayer equal to Kuraray "SentryGlas"), separated by a 3/8 inch-thick sealed air space. Provide insulated units with low "E" coating. Primarily for use at the building's primary entrance points **where noted on Drawings primarily facing North and East.** Refer to Schedules for applied use.
 - a. ~~Basis of Design Product: Subject to compliance with requirements, provide units fabricated with "Vitro Glass Solarban 60 Clear" or comparable product, with the following characteristics:~~

- 1) Ultra Violet: ~~18%.~~
- 2) Visible Light Transmittance: ~~70%.~~
- 3) Total Solar Energy Transmittance: ~~34%.~~
- 4) Winter Night-time U Value: ~~.29.~~
- 5) Summer Day-time U Value: ~~.27.~~
- 6) Shading Coefficient: ~~.45.~~
- 7) Solar Heat Gain Coefficient: ~~.39.~~
- 8) Light to Solar Gain: ~~1.79.~~

b. ~~Insulating Glass Unit Make-up:~~

- 1) ~~Outboard Lite: "Vitro Glass Solarban 60 Clear," 1/4-inch-thick.~~
- 2) ~~Low "E" coating on 2nd surface.~~
- 3) ~~3/8-inch-thick desiccant-filled structural silicone spacer; Quanex Super Spacer TriSeal, GE3, black.~~
- 4) ~~Inboard Lite: 7/16-inch-thick clear laminated glass as follows:~~
 - a) ~~First Ply: Clear tempered glass, 3/16-inch-thick.~~
 - b) ~~Interlayer: High-Security, 0.060-inch-thick; clear.~~
 - c) ~~Second Ply: Clear tempered glass, 3/16-inch-thick.~~
 - d) ~~Overall Inboard Lite Thickness: 7/16-inch.~~
- 5) ~~Overall Thickness: 1 1/16-inch.~~

5. **Type ILG-2 Insulated Laminated Safety Glass:** ~~Insulated glass units consisting of one lite of 1/4-inch-thick clear tempered glass and one lite of 7/16-inch-thick laminated tempered glass (two 3/16-inch-thick lites of clear, tempered safety glass laminated with a high-security, .060 interlayer equal to Kuraray "SentryGlas"), separated by a 3/8-inch-thick sealed air space. Provide insulated units with low "E" coating. Primarily for use at the building's primary entrance points **where noted on Drawings primarily facing South and West.** Refer to Schedules for applied use.~~

a. ~~Basis of Design Product: Subject to compliance with requirements, provide units fabricated with "Vitro Glass Solarban 70 Clear" or comparable product, with the following characteristics:~~

- 1) ~~Ultra Violet: 6%.~~
- 2) ~~Visible Light Transmittance: 64%.~~
- 3) ~~Total Solar Energy Transmittance: 24%.~~
- 4) ~~Winter Night-time U Value: .28.~~
- 5) ~~Summer Day-time U Value: .26.~~
- 6) ~~Shading Coefficient: .31.~~
- 7) ~~Solar Heat Gain Coefficient: .27.~~
- 8) ~~Light to Solar Gain: 2.37.~~

b. ~~Insulating Glass Unit Make-up:~~

- 1) ~~Outboard Lite: "Vitro Glass Solarban 70 Clear," 1/4-inch-thick.~~
- 2) ~~Low "E" coating on 2nd surface.~~

- 3) ~~3/8-inch-thick desiccant-filled structural silicone spacer; Quanex Super Spacer TriSeal, GE3, black.~~
- 4) ~~Inboard Lite: 7/16-inch-thick clear laminated glass, as follows:~~
 - a) ~~First Ply: Clear tempered glass, 3/16-inch-thick.~~
 - b) ~~Interlayer: High Security, 0.060 inch-thick; clear.~~
 - c) ~~Second Ply: Clear tempered glass, 3/16-inch-thick.~~
 - d) ~~Overall Inboard Lite Thickness: 7/16-inch.~~
- 5) ~~Overall Thickness: 1 1/16-inch.~~ – **ADDENDUM NO. 1**

2.5 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 1. Neoprene, ASTM C864.
 2. EPDM, ASTM C864.
 3. Silicone, ASTM C1115.
 4. Thermoplastic polyolefin rubber, ASTM C1115.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; non-staining and non-migrating in contact with nonporous surfaces; with or without spacer rods as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C1281 and AAMA 800.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. VOC Content: For Sealants used inside weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, subpart D.
- C. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- D. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
- E. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.8 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze 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 standard, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where the length plus width is larger than 50-inches as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.5 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 088000