SECTION 08800: 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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Doors.
   2. Storefront framing.

B. Related Sections include the following:

   1. Division 8 Section "Security Glazing."
   2. Division 8 Section "Decorative Glass."
   3. Division 8 Section "Mirrored Glass."
   4. Division 8 Section "Plastic Glazing" for acrylic and polycarbonate glazing in the form of monolithic and double-walled structured sheets.
   5. Division 8 Section "Structural-Sealant-Glazed Curtain Walls" for structural-sealant glazing requirements.

1.3 DEFINITIONS

A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.

B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

C. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for 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.

E. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer'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 manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project 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 E 1300, according to the following requirements:

   a. Specified Design Wind Loads: As indicated.
   b. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) 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.
   c. Specified Design Snow Loads: As indicated, 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."
   d. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

      1) Load Duration: 60 seconds or less.

   e. Probability of Breakage for Sloped Glazing: 1 lite per 1000 for lites set more than 15 degrees off vertical and under wind and snow action.

      1) Load Duration: 30 days.

   f. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.

      1) For monolithic-glass lites heat treated to resist wind loads.
      2) For insulating glass.
      3) For laminated-glass lites.

g. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.
h. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

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 (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Thermal and Optical Performance Properties: 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 laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch- (13-mm-) wide interspace.
4. Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
5. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.
6. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass and of 12-inch- (300-mm-) long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

C. Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass.

1. Each color of tinted float glass.
2. Each type of patterned glass.
3. Coated vision glass.
4. Ceramic-coated spandrel glass.
5. Each pattern and color of ceramic-coated vision glass.
6. Wired glass.
7. Fire-resistive glazing products.
8. Each type of laminated glass with colored interlayer.
9. Insulating glass for each designation indicated.
10. For each color (except black) of exposed glazing sealant indicated.

D. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

F. 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.

G. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

H. Product Test Reports: From a qualified testing agency indicating the following products comply with requirements, based on comprehensive testing of current products:

1. Tinted float glass.
2. Coated float glass.
3. Insulating glass.
4. Glazing sealants.
5. Glazing gaskets.

I. SWRI Validation Certificate: For each elastomeric glazing sealant specified to be validated by SWRI's Sealant Validation Program.

J. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

B. 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.

C. Source Limitations for Clear Glass: Obtain clear float glass from one primary-glass manufacturer.

D. Source Limitations for Tinted Glass: Obtain tinted, heat-absorbing, and light-reducing float glass from one primary-glass manufacturer for each tint color indicated.

E. Source Limitations for Coated Glass: Obtain coated glass from one manufacturer for each type of coating and each type and class of float glass indicated.

F. Source Limitations for Insulating Glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.

G. Source Limitations for Laminated Glass: Obtain laminated-glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.

H. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

I. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.

1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
2. Glass Testing Agency Qualifications: An independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

J. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.

1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
3. Test elastomeric glazing sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

K. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glass type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants.

1. Use manufacturer's standard test methods to determine whether priming and other specific preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.

    a. Perform tests under normal environmental conditions replicating those that will exist during installation.

2. Submit not fewer than nine pieces of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, laminated, and insulating units) as well as one sample of each glazing accessory (gaskets, tape sealants, setting blocks, and spacers).
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.

L. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

M. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

N. 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.

O. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines," and SIGMA TB-3001, "Sloped Glazing Guidelines."

P. 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. Insulating Glass Certification Council.
2. Associated Laboratories, Inc.
3. National Accreditation and Management Institute.

Q. Mockups: Before glazing, build mockups for each glass product indicated below to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Build mockups with the following kinds of glass to match glazing systems required for Project, including typical lite size, framing systems, and glazing methods:

a. Heat-strengthened coated glass.
b. Fully tempered glass.
c. Spandrel glass.

d. Laminated glass.
e. Coated insulating glass.

3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Obtain Architect's approval of mockups before starting fabrication.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed.
7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

R. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 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.

1.8 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. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.9 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Special Warranty on Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish replacements for those coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, 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 manufacturer agreeing to furnish replacements for laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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

D. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in schedules at the end of Part 3.

B. Products: Subject to compliance with requirements, provide one of the products indicated in schedules at the end of Part 3.

2.2 PRIMARY FLOAT GLASS

A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); class as indicated in schedules at the end of Part 3.

2.3 HEAT-TREATED FLOAT GLASS

A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

B. Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.

C. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent glass, flat); Quality q3 (glazing select); class, kind, and condition as indicated in schedules at the end of Part 3.

2.4 CERAMIC-COATED GLASS

A. Ceramic-Coated Vision Glass: Float glass with ceramic coating applied by silk-screened process and complying with ASTM C 1048, Condition C (other coated glass), Type I (transparent glass, flat), Quality q3 (glazing select); GTA 95-1-31, "Specification for Decorative Architectural Flat Glass"; and with other requirements specified in schedules at the end of Part 3.

B. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B (spandrel glass, one-surface ceramic coated), Type I (transparent glass, flat), Quality q3 (glazing select), and complying with other requirements specified in schedules at the end of Part 3.

1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.

2.5 COATED FLOAT GLASS

A. General: Provide coated glass complying with requirements indicated in this Article and in schedules at the end of Part 3.

1. Provide Kind HS (heat-strengthened) coated float glass in place of coated annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.
2. Provide Kind HS (heat-strengthened) coated float glass, except provide Kind FT (fully tempered) products where coated safety glass is indicated.

B. Pyrolytic-Coated Float Glass: Float glass with solar-reflective metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, complying with requirements specified in schedules at the end of Part 3.

C. Sputter-Coated Float Glass: Float glass with metallic-oxide or metallic-nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), complying with requirements specified in schedules at the end of Part 3.

D. Coated Spandrel Float Glass: Float glass complying with requirements specified in monolithic glass schedules at the end of Part 3 and the following:

1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.
2. Factory apply manufacturer's standard opacifier of the following material to coated second surface of lites, with resulting products complying with GTA 89-1-6.

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

2.6 WIRED GLASS

A. Wired Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Quality q8 (glazing); 6.4 mm thick; of form and mesh pattern indicated below:

1. Polished Wired Glass: Form 1 (wired, polished both sides), and as follows:

    a. Mesh m1 (diamond).
    b. Mesh m2 (square).

2. Patterned Wired Glass: Form 2 (patterned and wired), Mesh m1 (diamond).

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Polished Wired Glass:

    a. Ashai Glass Co./Ama Glass Corp.
    b. Central Glass Co., Ltd.
    c. Nippon Sheet Glass Co., Ltd.
    d. Pilkington Glass Ltd.

2. Patterned Wired Glass:

    a. AFG Industries, Inc.
    b. Ashai Glass Co./Ama Glass Corp.
    c. Central Glass Co., Ltd.
    d. Guardian Industries.
    e. Nippon Sheet Glass Co., Ltd.

2.7 PATTERNED GLASS

A. Patterned Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Form 3 (patterned), Quality q8 (glazing), Finish f1 (patterned one side); of pattern indicated in the Patterned-Glass Schedule at the end of Part 3.

B. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II (patterned glass, flat), Class 1 (clear), Form 3 (patterned), Quality q8 (glazing), Finish f1 (patterned one side); of pattern indicated in the Patterned-Glass Schedule at the end of Part 3.

2.8 LAMINATED GLASS

A. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified, including those in the Laminated-Glass Schedule at the end of Part 3.

B. Interlayer: Interlayer material as indicated below, clear or in colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

1. Interlayer Material: Polyvinyl butyral sheets.

2. Interlayer Material: Cured resin.
3. Interlayer Material: Polyvinyl butyral sheets or cured resin.

C. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:

1. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.
2. Laminate lites with laminated glass manufacturer's standard cast-in-place and cured transparent resin interlayer.

2.9 INSULATING GLASS

A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.

1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.

B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.

C. Sealing System: Dual seal, with primary and secondary sealants as follows:

1. Manufacturer's standard sealants.
2. Polyisobutylene and polysulfide.
3. Polyisobutylene and silicone.
4. Polyisobutylene and hot-melt butyl.
5. Polyisobutylene and polyurethane.

D. Spacer Specifications: Manufacturer's standard spacer material and construction.

E. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

1. Aluminum with mill or clear-anodized finish.
2. Aluminum with black color-anodized finish.
3. Aluminum with bronze color-anodized finish.
4. Aluminum with powdered metal paint finish in color selected by Architect.
5. Galvanized steel.
6. Stainless steel.
7. Desiccant: Molecular sieve or silica gel, or blend of both.
8. Corner Construction: Manufacturer's standard corner construction.

2.10 FIRE-RATED GLAZING PRODUCTS

A. Monolithic Ceramic Glazing Material: Proprietary product in the form of clear flat sheets of 3/16-inch (5-mm) nominal thickness weighing 2.5 lb/sq. ft. (12.2 kg/sq. m), and as follows:

1. Fire-Protection Rating: As indicated for the fire window in which the glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Textured on one surface, translucent.
3. Polished on both surfaces, transparent.
4. Unpolished on both surfaces, transparent.
5. Product: Subject to compliance with requirements, provide the following product manufactured by Nippon Electric Glass Co., Ltd. and distributed by Technical Glass Products:

    a. "Obscure FireLite" (textured).
    b. "Premium FireLite" (polished on both surfaces).
    c. "Standard FireLite" (unpolished on both surfaces).

B. Laminated Ceramic Glazing Material: Proprietary product in the form of two lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch (8-mm) nominal thickness; polished on both surfaces; weighing 4 lb/sq. ft. (19.5 kg/sq. m); and as follows:

1. Fire-Protection Rating: As indicated for the assembly in which the glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Polished on both surfaces, transparent.
3. Product: Subject to compliance with requirements, provide "FireLite Plus" manufactured by Nippon Electric Glass Co., Ltd. and distributed by Technical Glass Products.

C. Laminated Glass with Intumescent Interlayers: Proprietary product in the form of multiple lites of Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Kind FT (fully tempered) float glass laminated with intumescent interlayers; and as follows:

1. Fire-Protection Rating: As indicated for the assembly in which the glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Product: Subject to compliance with requirements, provide "PyroStop" distributed by Technical Glass Products.

D. Gel-Filled, Dual-Glazed Units: Proprietary product in the form of two lites of Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Kind FT (fully tempered) float glass; with a perimeter metal spacer separating lites and dual-edge seal enclosing a cavity completely filled with clear, fully transparent, heat-absorbing gel; and as follows:

1. Fire-Protection Rating: As indicated for the assembly in which the glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Product: Subject to compliance with requirements, provide "SuperLite II" by SAFTI Div., O'Keeffe's Inc.

E. Gel-Filled, Triple-Glazed Units: Proprietary product in the form of two outer lites and one inner lite of Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear),

Kind FT (fully tempered) float glass; each outer lite 6 mm thick; with a perimeter metal spacer separating lites and dual-edge seals, enclosing two cavities each completely filled with clear, fully transparent, water-base, heat-absorbing gel; and a 50.9-mm overall thickness.

1. Fire-Protection Rating: As indicated for the assembly in which the glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Product: Subject to compliance with requirements, provide "Pyrovue Commercial" by Advanced Glass Systems Corp.

2.11 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will 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. Colors of Exposed Glazing Sealants: Match Architect's samples.
4. Colors of Exposed Glazing Sealants: As indicated by manufacturer's designations.
5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.

B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

1. Additional Movement Capability: Where additional movement capability is specified in the Glazing Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.

C. Glazing Sealant for Fire-Resistive Glazing Products: Identical to product used in test assembly to obtain fire-protection rating.

2.12 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.13 GLAZING GASKETS

A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.

B. 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 C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

C. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. Neoprene.
2. EPDM.
3. Silicone.
4. Thermoplastic polyolefin rubber.
5. Any material indicated above.

2.14 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. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

D. 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.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.15 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 indoor and outdoor faces.

C. Grind smooth and polish exposed glass edges.

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, and adequate sealant thicknesses, 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. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. 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.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where the length plus width is larger than 50 inches (1270 mm) 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 and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. 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.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape 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.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 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.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system, unless otherwise indicated.

3.8 PROTECTION AND CLEANING

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.

3.9 MONOLITHIC FLOAT-GLASS SCHEDULE

A. Uncoated Clear Float Glass: Where glass as designated below is indicated, provide Type I (transparent glass, flat), Class 1 (clear) glass lites complying with the following:

1. Uncoated Clear Annealed Float Glass FG-[#]: Annealed or Kind HS (heat strengthened), Condition A (uncoated surfaces) where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with performance requirements.
2. Uncoated Clear Heat-Strengthened Float Glass FG-[#]: Kind HS (heat strengthened).
3. Uncoated Clear Fully Tempered Float Glass FG-[#]: Kind FT (fully tempered).

B. Uncoated Tinted Float Glass: Where glass as designated below is indicated, provide Class 2 (tinted, heat-absorbing, and light-reducing) glass lites complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. <INSERT NAME OF PRODUCT AND MFR>
b. <INSERT NAME OF PRODUCT AND MFR>
c. <INSERT NAME OF PRODUCT AND MFR>

2. Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"Ever-Green" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].
3. Visible Light Transmittance: <INSERT SINGLE PERCENTAGE OR RANGE>
4. Solar Heat Gain Coefficient: <INSERT SINGLE VALUE OR RANGE>
5. Outdoor Visible Reflectance: <INSERT SINGLE PERCENTAGE OR RANGE>
6. Uncoated Tinted Annealed Float Glass MG-[#]: Annealed or Kind HS (heat strengthened), Condition A (uncoated surfaces) where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with system performance requirements.
7. Uncoated Tinted Heat-Strengthened Float Glass MG-[#]: Condition A (uncoated surfaces), Kind HS (heat strengthened).
8. Uncoated Tinted Fully Tempered Float Glass MG-[#]: Condition A (uncoated surfaces), Kind FT (fully tempered).

C. Coated Clear Float Glass: Where glass as designated below is indicated, provide Class 1 (clear) glass lites complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. <INSERT NAME OF PRODUCT AND MFR>
b. <INSERT NAME OF PRODUCT AND MFR>
c. <INSERT NAME OF PRODUCT AND MFR>

2. Visible Light Transmittance: <INSERT SINGLE PERCENTAGE OR RANGE>
3. Winter Nighttime U-Value: <INSERT SINGLE VALUE OR RANGE>
4. Summer Daytime U-Value: <INSERT SINGLE VALUE OR RANGE>
5. Solar Heat Gain Coefficient: <INSERT SINGLE VALUE OR RANGE>
6. Outdoor Visible Reflectance: <INSERT SINGLE PERCENTAGE OR RANGE>
7. Coating Location: [**First surface**] [**Second surface**].
8. Coated Clear Annealed Float Glass MG-[#]: Annealed or Kind HS (heat strengthened), Condition C (other coated glass) where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with system performance requirements.
9. Coated Clear Heat-Strengthened Float Glass MG-[#]: Condition C (other coated glass), Kind HS (heat strengthened).
10. Coated Clear Fully Tempered Float Glass MG-[#]: Condition C (other coated glass), Kind FT (fully tempered).

D. Coated Tinted Float Glass: Where glass as designated below is indicated, provide Class 2 (tinted, heat-absorbing, and light-reducing) glass lites complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. <INSERT NAME OF PRODUCT AND MFR>
b. <INSERT NAME OF PRODUCT AND MFR>
c. <INSERT NAME OF PRODUCT AND MFR>

2. Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"Ever-Green" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].
3. Reflective Coating: [**Pyrolytic**] [**Sputtered**].

    a. Color: [**Gold**] [**Pewter**] [**Silver**].
    b. Location: [**First surface**] [**Second surface**].

4. Visible Light Transmittance: <INSERT SINGLE PERCENTAGE OR RANGE>
5. Winter Nighttime U-Value: <INSERT SINGLE VALUE OR RANGE>
6. Summer Daytime U-Value: <INSERT SINGLE VALUE OR RANGE>
7. Solar Heat Gain Coefficient: <INSERT SINGLE VALUE OR RANGE>
8. Outdoor Visible Reflectance: <INSERT SINGLE PERCENTAGE OR RANGE>
9. Coated Tinted Glass MG-[#]: Annealed or Kind HS (heat strengthened), Condition C (other coated glass) where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with system performance requirements.
10. Coated Tinted Heat-Strengthened Glass MG-[#]: Condition C (other coated glass), Kind HS (heat strengthened).
11. Coated Tinted Fully Tempered Glass MG-[#]: Condition C (other coated glass), Kind FT (fully tempered).
12. Coated Tinted Heat-Strengthened Spandrel Glass MG-[#]: Condition C (other coated glass), Kind HS (heat strengthened), with opacifier on coated second surface.

3.10 MONOLITHIC CERAMIC-COATED VISION GLASS SCHEDULE

A. Ceramic-Coated Vision Glass CVG-[#]: Where glass of this designation is indicated, provide ceramic-coated vision glass lites complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

    a. <INSERT NAME OF PRODUCT AND MFR>
    b. <INSERT NAME OF PRODUCT AND MFR>
    c. <INSERT NAME OF PRODUCT AND MFR>

2. Class 1 (clear).
3. Class 2 (tinted, heat absorbing, and light reducing).

    a. Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"EverGreen" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].

4. [**Kind HS (heat strengthened)**] [**Kind FT (fully tempered)**].
5. Coating Location: Second surface.
6. Ceramic Coating Color and Pattern: Match Architect's sample for appearance.
7. Ceramic Coating Color and Pattern: [**Match**] [**Provide**] the following: <INSERT ONE MFR'S COLOR AND PATTERN DESIGNATION IF MATCHING IS REQUIRED; OTHERWISE, INSERT COLOR AND PATTERN DESIGNATION FOR EACH PRODUCT NAMED ABOVE>
8. Ceramic Coating Color and Pattern: As selected by Architect from manufacturer's full range.

3.11 MONOLITHIC CERAMIC-COATED SPANDREL GLASS SCHEDULE

A. Ceramic-Coated Spandrel Glass CSG-[#]: Where glass of this designation is indicated, provide ceramic-coated spandrel glass lites complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

    a. <INSERT NAME OF PRODUCT AND MFR>
    b. <INSERT NAME OF PRODUCT AND MFR>
    c. <INSERT NAME OF PRODUCT AND MFR>

2. Class 1 (clear).
3. Class 2 (tinted, heat absorbing, and light reducing).

    a. Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"EverGreen" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].

4. [**Kind HS (heat strengthened)**] [**Kind FT (fully tempered)**].
5. Coating Location: Second surface.
6. Ceramic Coating Color: Match Architect's sample for appearance.
7. Ceramic Coating Color: [**Match**] [**Provide**] the following: <INSERT ONE MFR'S COLOR DESIGNATION IF MATCHING IS REQUIRED; OTHERWISE, INSERT COLOR DESIGNATION FOR EACH PRODUCT NAMED ABOVE>
8. Ceramic Coating Color: As selected by Architect from manufacturer's full range.

3.12 PATTERNED-GLASS SCHEDULE

A. Patterned Glass PG-[#]: Where glass of this designation is indicated, provide [**linear pattern p1**] [**geometric pattern p2**] [**random pattern p3**] [**annealed**] [**Kind FT (fully tempered)**] monolithic-glass lites complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

    a. Rain; AFG Industries, Inc.
    b. Flutex Textured; AFG Industries, Inc.
    c. Pattern 124; AFG Industries, Inc.
    d. Aquatex; AFG Industries, Inc.
    e. Flax; AFG Industries, Inc.
    f. Florex; AFG Industries, Inc.
    g. Hammered; AFG Industries, Inc.
    h. Industrex; AFG Industries, Inc.
    i. Leaf; AFG Industries, Inc.
    j. Pattern 62; AFG Industries, Inc.
    k. Velvex; AFG Industries, Inc.
    l. Smooth Rough; Guardian Industries.
    m. Spraylite; Guardian Industries.

3.13 LAMINATED-GLASS SCHEDULE

A. Laminated Glass LG-[#]: Where glass of this designation is indicated, provide glass lites complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

   a. <INSERT NAME OF PRODUCT AND MFR>
   b. <INSERT NAME OF PRODUCT AND MFR>
   c. <INSERT NAME OF PRODUCT AND MFR>

2. Kind LA, consisting of two lites of annealed float glass.
3. Inner Lite: Type I (transparent glass, flat) float glass.

   a. Class 1 (clear).
   b. Thickness: [**3 mm**] [**5 mm**] [**6 mm**] [**As indicated**].

4. Outer Lite: Type I (transparent glass, flat) float glass.

   a. Class 1 (clear).
   b. Class 2 (tinted, heat absorbing, and light reducing).

      1) Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"EverGreen" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].

   c. Thickness: [**3 mm**] [**5 mm**] [**6 mm**] [**As indicated**].

5. Plastic Interlayer: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] thick.

   a. Interlayer Color: [**Clear**] [**Blue-green**] [**Bronze light**] [**Gray**]. <RETAIN ONE COLOR OR INSERT ANOTHER>
   b. Visible Light Transmittance of Interlayer: <INSERT SINGLE PERCENTAGE OR RANGE>

6. Visible Light Transmittance: <INSERT SINGLE PERCENTAGE OR RANGE>
7. Winter Nighttime U-Value: <INSERT SINGLE VALUE OR RANGE>
8. Summer Daytime U-Value: <INSERT SINGLE VALUE OR RANGE>
9. Solar Heat Gain Coefficient: <INSERT SINGLE VALUE OR RANGE>
10. Outdoor Visible Reflectance: <INSERT SINGLE PERCENTAGE OR RANGE>

B. Laminated Glass LG-[#]: Where glass of this designation is indicated, provide glass lites complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

   a. <INSERT NAME OF PRODUCT AND MFR>
   b. <INSERT NAME OF PRODUCT AND MFR>
   c. <INSERT NAME OF PRODUCT AND MFR>

2. Kind LHS, consisting of two lites of heat-strengthened float glass.

3. Kind LR, consisting of two lites of heat-treated float glass, one of which is reflective glass.
4. Kind LT, consisting of two lites of fully tempered float glass.
5. Kind LD, consisting of two lites of float glass, one of which is ceramic-coated vision glass.
6. Inner Lite: Type I (transparent glass, flat) float glass.

    a. Class 1 (clear).
    b. [**Kind HS (heat strengthened)**] [**Kind FT (fully tempered)**].
    c. Thickness: [**3 mm**] [**5 mm**] [**6 mm**] [**As indicated**].

7. Outer Lite: Type I (transparent glass, flat) float glass.

    a. Class 1 (clear).
    b. Class 2 (tinted, heat absorbing, and light reducing).

        1) Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"EverGreen" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].

    c. [**Kind HS (heat strengthened)**] [**Kind FT (fully tempered)**].
    d. [**Condition A (uncoated surfaces)**] [**Condition C (other coated glass)**].
    e. Thickness: [**3 mm**] [**5 mm**] [**6 mm**] [**As indicated**].

8. Reflective Coating: [**Pyrolytic**] [**Sputtered**].

    a. Color: [**Blue**] [**Copper**] [**Gold**] [**Pewter**] [**Silver**].
    b. Location: [**Second surface**] [**Third surface**].

9. Silk-Screened Coating: Ceramic enamel on [**second surface**] [**third surface**] [**fourth surface**].

    a. Color and Pattern: Match Architect's sample for appearance.
    b. Color and Pattern: [**Match**] [**Provide**] the following: <INSERT ONE MFR'S COLOR AND PATTERN DESIGNATION IF MATCHING IS REQUIRED; OTHERWISE, INSERT COLOR AND PATTERN DESIGNATION FOR EACH PRODUCT NAMED ABOVE>
    c. Color and Pattern: As selected by Architect from manufacturer's full range.

10. Plastic Interlayer: [**0.030 inch (0.76 mm)**] [**0.060 inch (1.52 mm)**] thick.

    a. Interlayer Color: [**Clear**] [**Blue-green**] [**Bronze light**] [**Gray**]. <RETAIN ONE COLOR OR INSERT ANOTHER>
    b. Visible Light Transmittance of Interlayer: <INSERT SINGLE PERCENTAGE OR RANGE>

11. Visible Light Transmittance: <INSERT SINGLE PERCENTAGE OR RANGE>
12. Winter Nighttime U-Value: <INSERT SINGLE VALUE OR RANGE>
13. Summer Daytime U-Value: <INSERT SINGLE VALUE OR RANGE>
14. Solar Heat Gain Coefficient: <INSERT SINGLE VALUE OR RANGE>

15. Outdoor Visible Reflectance: <INSERT SINGLE PERCENTAGE OR RANGE>

3.14 INSULATING-GLASS SCHEDULE

A. Insulating Glass IG-[#]: Where glass of this designation is indicated, provide uncoated insulating-glass units complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. <INSERT NAME OF PRODUCT AND MFR>
b. <INSERT NAME OF PRODUCT AND MFR>
c. <INSERT NAME OF PRODUCT AND MFR>

2. Overall Unit Thickness and Thickness of Each Lite: [**25 and 6 mm**] [**As indicated**]. <RETAIN ONE AND DELETE OTHER, OR REVISE>
3. Interspace Content: [**Air**] [**Argon**].
4. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.

a. [**Annealed**] [**Kind HS (heat strengthened), Condition A (uncoated surfaces)**] [**Kind FT (fully tempered), Condition A (uncoated surfaces)**].

5. Outdoor Lite: Type I (transparent glass, flat) float glass.

a. Class 1 (clear).
b. Class 2 (tinted, heat absorbing, and light reducing).

1) Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"EverGreen" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].

c. [**Annealed**] [**Kind HS (heat strengthened), Condition A (uncoated surfaces)**] [**Kind FT (fully tempered), Condition A (uncoated surfaces)**].

6. Visible Light Transmittance: <INSERT SINGLE PERCENTAGE OR RANGE>
7. Winter Nighttime U-Value: <INSERT SINGLE VALUE OR RANGE>
8. Summer Daytime U-Value: <INSERT SINGLE VALUE OR RANGE>
9. Solar Heat Gain Coefficient: <INSERT SINGLE VALUE OR RANGE>

B. Low-E Insulating Glass IG-[#]: Where glass of this designation is indicated, provide low-emissivity insulating-glass units complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. <INSERT NAME OF PRODUCT AND MFR>
b. <INSERT NAME OF PRODUCT AND MFR>
c. <INSERT NAME OF PRODUCT AND MFR>

2. Overall Unit Thickness and Thickness of Each Lite: [**25 and 6 mm**] [**As indicated**]. <RETAIN ONE AND DELETE OTHER, OR REVISE>

3. Interspace Content: [**Air**] [**Argon**].
4. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.

    a. [**Annealed**] [**Kind HS (heat strengthened), Condition C (other coated glass)**] [**Kind FT (fully tempered), Condition C (other coated glass)**].

5. Outdoor Lite: [**Type I (transparent glass, flat) float glass**] [**Ceramic-coated vision glass**]. <RETAIN CERAMIC-COATED VISION GLASS ONLY IF CONDITION C AND SILK-SCREENED COATING ARE SPECIFIED FOR OUTDOOR LITE>

    a. Class 1 (clear).
    b. Class 2 (tinted, heat absorbing, and light reducing).

        1) Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"EverGreen" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].

    c. [**Annealed**] [**Kind HS (heat strengthened), Condition A (uncoated surfaces)**] [**Kind FT (fully tempered) Condition C (other coated glass)**]. [**Kind FT (fully tempered), Condition C (other coated glass)**]. <RETAIN CONDITION C IF CERAMIC-COATED VISION LITE REQUIREMENT IS SELECTED>

6. Low-Emissivity Coating: [**Pyrolytic on second surface**] [**Pyrolytic on third surface**] [**Sputtered on second surface**] [**Sputtered on third surface**].
7. Low-Emissivity Coated Film: Suspended in the interspace.
8. Low-Emissivity Coating or Film: [**Pyrolytic on second surface**] [**Pyrolytic on third surface**] [**Sputtered on second surface**] [**Sputtered on third surface**] or low-emissivity coated film suspended in the interspace.
9. Silk-Screened Coating: Ceramic enamel on second surface.

    a. Color and Pattern: Match Architect's sample for appearance.
    b. Color and Pattern: [**Match**] [**Provide**] the following: <INSERT ONE MFR'S COLOR AND PATTERN DESIGNATION IF MATCHING IS REQUIRED; OTHERWISE, INSERT COLOR AND PATTERN DESIGNATION FOR EACH PRODUCT NAMED ABOVE>
    c. Color and Pattern: As selected by Architect from manufacturer's full range. <CORRELATE WITH REQUIREMENTS SPECIFIED IN MONOLITHIC CERAMIC-COATED VISION GLASS SCHEDULE AND WITH LOCATION OF LOW-E COATING>

10. Visible Light Transmittance: <INSERT SINGLE PERCENTAGE OR RANGE>
11. Winter Nighttime U-Value: <INSERT SINGLE VALUE OR RANGE>
12. Summer Daytime U-Value: <INSERT SINGLE VALUE OR RANGE>
13. Solar Heat Gain Coefficient: <INSERT SINGLE VALUE OR RANGE>
14. Outdoor Visible Reflectance: <INSERT SINGLE PERCENTAGE OR RANGE>

C. Reflective Insulating Glass IG-[#]: Where glass of this designation is indicated, provide insulating-glass units complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. <INSERT NAME OF PRODUCT AND MFR>
b. <INSERT NAME OF PRODUCT AND MFR>
c. <INSERT NAME OF PRODUCT AND MFR>

2. Overall Unit Thickness and Thickness of Each Lite: [**25 and 6 mm**] [**As indicated**]. <RETAIN ONE AND DELETE OTHER, OR REVISE>
3. Interspace Content: [**Air**] [**Argon**].
4. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.

a. [**Annealed**] [**Kind HS (heat strengthened), Condition C (other coated glass)**] [**Kind FT (fully tempered), Condition C (other coated glass)**].

5. Outdoor Lite: Type I (transparent glass, flat) float glass.

a. Class 1 (clear).
b. Class 2 (tinted, heat absorbing, and light reducing).

1) Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"EverGreen" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].

c. [**Annealed**] [**Kind HS (heat strengthened), Condition A (uncoated surfaces)**] [**Kind FT (fully tempered), Condition A (uncoated surfaces)**].

6. Reflective Coating: [**Pyrolytic**] [**Sputtered**].

a. Color: [**Blue**] [**Copper**] [**Gold**] [**Pewter**] [**Silver**].
b. Location: [**Second surface**] [**Third surface**].

7. Visible Light Transmittance: <INSERT SINGLE PERCENTAGE OR RANGE>
8. Winter Nighttime U-Value: <INSERT SINGLE VALUE OR RANGE>
9. Summer Daytime U-Value: <INSERT SINGLE VALUE OR RANGE>
10. Solar Heat Gain Coefficient: <INSERT SINGLE VALUE OR RANGE>
11. Outdoor Visible Reflectance: <INSERT SINGLE PERCENTAGE OR RANGE>

D. Reflective and Low-E Insulating Glass IG-[#]: Where glass of this designation is indicated, provide insulating-glass units complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. <INSERT NAME OF PRODUCT AND MFR>
b. <INSERT NAME OF PRODUCT AND MFR>
c. <INSERT NAME OF PRODUCT AND MFR>

2. Overall Unit Thickness and Thickness of Each Lite: [**25 and 6 mm**] [**As indicated**]. <RETAIN ONE AND DELETE OTHER, OR REVISE>
3. Interspace Content: [**Air**] [**Argon**].
4. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.

a. [**Annealed**] [**Kind HS (heat strengthened), Condition C (other coated glass)**] [**Kind FT (fully tempered), Condition C (other coated glass)**].

5. Outdoor Lite: Type I (transparent glass, flat) float glass.

a. Class 1 (clear).
b. Class 2 (tinted, heat absorbing, and light reducing).

1) Tint Color: [**"Azurlite" by PPG Industries**] [**Blue**] [**Blue-green**] [**Bronze**] [**"EverGreen" by Pilkington Libbey-Owens-Ford**] [**Green**] [**Gray**].

c. [**Annealed**] [**Kind HS (heat strengthened), Condition A (uncoated surfaces)**] [**Kind FT (fully tempered), Condition A (uncoated surfaces)**].

6. Low-Emissivity Coating: [**Pyrolytic**] [**Sputtered**] on third surface.
7. Reflective Coating: [**Pyrolytic**] [**Sputtered**].

a. Color: [**Blue**] [**Copper**] [**Gold**] [**Pewter**] [**Silver**].
b. Location: [**First surface**] [**Second surface**] [**Third surface**].

8. Visible Light Transmittance: <INSERT SINGLE PERCENTAGE OR RANGE>
9. Winter Nighttime U-Value: <INSERT SINGLE VALUE OR RANGE>
10. Summer Daytime U-Value: <INSERT SINGLE VALUE OR RANGE>
11. Solar Heat Gain Coefficient: <INSERT SINGLE VALUE OR RANGE>
12. Outdoor Visible Reflectance: <INSERT SINGLE PERCENTAGE OR RANGE>

E. Ceramic-Coated Spandrel Insulating Glass IG-[#]: Where glass of this designation is indicated, provide insulating-glass units complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. <INSERT NAME OF PRODUCT AND MFR>
b. <INSERT NAME OF PRODUCT AND MFR>
c. <INSERT NAME OF PRODUCT AND MFR>

2. Construction: Provide units that comply with requirements specified for insulating-glass units designated IG-[#] except for indoor lite. <INSERT NUMBER IN PLACE OF [#] (OR DESCRIPTIVE TITLE, IF DESIGNATION IS NOT USED) THAT DESIGNATES INSULATING-GLASS UNITS FOR VISION LITES THAT SPANDREL GLASS CONSTRUCTION MUST MATCH>
3. Indoor Lite: Ceramic-coated spandrel glass.

a. [**Kind HS (heat strengthened)**] [**Kind FT (fully tempered)**].
b. Ceramic Coating Location: Fourth surface.
c. Color: Match Architect's sample for appearance.
d. Color: [**Match**] [**Provide**] the following: <INSERT ONE MFR'S COLOR DESIGNATION IF MATCHING IS REQUIRED; OTHERWISE, INSERT COLOR DESIGNATION FOR EACH PRODUCT NAMED ABOVE>
e. Color: As selected by Architect from manufacturer's full range.

3.15 GLAZING SEALANT SCHEDULE

A. Low-Modulus Nonacid-Curing Silicone Glazing Sealant GS-[#]: Where glazing sealants of this designation are indicated, provide products complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. 790; Dow Corning.
b. Silpruf; GE Silicones.
c. UltraPruf SCS2300; GE Silicones.
d. HiFlex 331; NUCO Industries, Inc.
e. NuFlex 309; NUCO Industries, Inc.
f. VP 275; Ohio Sealants, Inc.
g. 864; Pecora Corporation.
h. PSI-641; Polymeric Systems, Inc.
i. Omniseal; Sonneborn, Div of ChemRex, Inc.
j. Spectrem 1; Tremco.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Additional Movement Capability: [**50**] [**100**] percent movement in extension and 50 percent movement in compression for a total of [**100**] [**150**] percent movement. <RETAIN RELEVANT MOVEMENT PERCENTAGES WITH "ADDITIONAL MOVEMENT CAPABILITY" SUBPARA IN PART 2 "ELASTOMERIC GLAZING SEALANTS" ARTICLE>
5. Use Related to Exposure: NT (nontraffic).
6. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

a. Use O Glazing Substrates: [**Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and wood.**]

7. Applications: <DESCRIBE TYPES OF GLAZING APPLICATIONS WHERE THIS SEALANT IS REQUIRED>

B. Medium-Modulus Neutral-Curing Silicone Glazing Sealant GS-[#]: Where glazing sealants of this designation are indicated, provide products complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

a. 791; Dow Corning.
b. 795; Dow Corning.
c. HiFlex 393; NUCO Industries, Inc.
d. PSI-631; Polymeric Systems, Inc.
e. SM5731 Poly-Glaze; Schnee-Morehead, Inc.
f. SM5733 Poly-Glaze; Schnee-Morehead, Inc.
g. Spectrem 2; Tremco.
h. Tremsil 600; Tremco.

2. Type and Grade: S (single component) and NS (nonsag).

3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

    a. Use O Glazing Substrates: [**Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and wood.**]

6. Applications: <DESCRIBE TYPES OF GLAZING APPLICATIONS WHERE THIS SEALANT IS REQUIRED>

C. Medium-Modulus Neutral-Curing Silicone Glazing Sealant GS-[#]: Where glazing sealants of this designation are indicated, provide products complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

    a. 756 H.P.; Dow Corning.
    b. Silglaze II; GE Silicones.
    c. 895; Pecora Corporation.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement. <RETAIN WITH "ADDITIONAL MOVEMENT CAPABILITY" SUBPARA IN PART 2 "ELASTOMERIC GLAZING SEALANTS" ARTICLE>
5. Use Related to Exposure: NT (nontraffic)
6. Uses Related to Glazing Substrates: [**M,**] G, A, and, as applicable to glazing substrates indicated, O. <RETAIN M DESIGNATION IF APPLICABLE TO PRODUCTS RETAINED ABOVE>

    a. Use O Glazing Substrates: [**Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and wood.**]

7. Applications: <DESCRIBE TYPES OF GLAZING APPLICATIONS WHERE THIS SEALANT IS REQUIRED>

D. Acid-Curing Silicone Glazing Sealant GS-[#]: Where glazing sealants of this designation are indicated, provide products complying with the following:

1. Products: [**Provide one of the following**] [**Available products include the following**]:

    a. Chem-Calk 1200; Bostik Inc.
    b. 999-A; Dow Corning.
    c. Trademate Glazing; Dow Corning.
    d. Construction 1200; GE Silicones.
    e. Contractors SCS1000; GE Silicones.
    f. HiFlex 392; NUCO Industries, Inc.
    g. NuFlex 302; NUCO Industries, Inc.
    h. HM 270; Ohio Sealants, Inc.

i. 860; Pecora Corporation.
j. 863; Pecora Corporation.
k. PSI-601; Polymeric Systems, Inc.
l. OmniPlus; Sonneborn, Div. of ChemRex, Inc.
m. Proglaze; Tremco.
n. Tremsil 300; Tremco.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Glazing Substrates: G, A, and, as applicable to glazing substrates indicated, O.

   a. Use O Glazing Substrates: [**Coated glass, color anodic aluminum, and aluminum coated with a high-performance coating.**]

6. Applications: <DESCRIBE TYPES OF GLAZING APPLICATIONS WHERE THIS SEALANT IS REQUIRED>

END OF SECTION 08800