1. Section 088000   
   Glazing
   1. PART 1  GENERAL
      1. REFERENCE STANDARDS
         1. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
         2. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
         3. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
         4. ASTM C1036 - Standard Specification for Flat Glass; 2021.
         5. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
         6. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
         7. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
         8. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
         9. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
         10. GANA (SM) - GANA Sealant Manual; 2008.
         11. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
         12. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
         13. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.
      2. SUBMITTALS
         1. See Section 013000 - Administrative Requirements for submittal procedures.
         2. Product Data on Insulating Glass Unit, Glazing Unit, Plastic Sheet Glazing Unit, Plastic Film, and \_\_\_\_\_\_ Glazing Types:  Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
         3. Product Data on Glazing Compounds and Accessories:  Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
         4. Warranty Documentation:  Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
      3. WARRANTY
         1. See Section 017800 - Closeout Submittals for additional warranty requirements.
         2. Insulating Glass Units:  Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
   2. PART 2  PRODUCTS
      1. MANUFACTURERS
         1. Glass Fabricators:
            1. GGI - General Glass International; \_\_\_\_\_:  www.generalglass.com/#sle.
            2. Thompson I.G., LLC:  www.thompsonig.com/#sle.
            3. Trulite Glass & Aluminum Solutions, LLC:  www.trulite.com/#sle.
         2. Float Glass Manufacturers:
            1. Cardinal Glass Industries; \_\_\_\_\_:  www.cardinalcorp.com/#sle.
            2. Guardian Glass, LLC; \_\_\_\_\_:  www.guardianglass.com/#sle.
            3. Vitro Architectural Glass (formerly PPG Glass); \_\_\_\_\_:  www.vitroglazings.com/#sle.
      2. PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES
         1. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
            1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
            2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
            3. Glass thicknesses listed are minimum.
         2. Weather-Resistive Barrier Seals:  Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
            1. In conjunction with weather barrier related materials described in other sections, as follows:
         3. Thermal and Optical Performance:  Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
            1. Center of Glass U-Value:  Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
            2. Center of Glass Solar Heat Gain Coefficient (SHGC):  Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
            3. Solar Optical Properties:  Comply with NFRC 300 test method.
      3. GLASS MATERIALS
         1. Float Glass:  Provide float glass based glazing unless otherwise indicated.
            1. Annealed Type:  ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
            2. Kind FT - Fully Tempered Type:  Complies with ASTM C1048.
            3. Fully Tempered Safety Glass:  Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
      4. INSULATING GLASS UNITS
         1. Manufacturers:
            1. Glass:  Any of the manufacturers specified for float glass.
         2. Insulating Glass Units:  Types as indicated.
            1. Durability:  Certified by an independent testing agency to comply with ASTM E2190.
            2. Coated Glass:  Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
            3. Spacer Color:  Black.
            4. Edge Seal:

Color:  Black.

* + - * 1. Purge interpane space with dry air, hermetically sealed.
        2. Capillary Tubes:  Provide tubes from air space for insulating glass units without inert type gas that have a change of altitude greater than 2500 feet between point of fabrication and point of installation to permit pressure equalization of air space.

Capillary Tubes:  Tubes to remain open and be of length and material type in accordance with insulating glass fabricator's requirements.

* + - 1. Type IG-1 - Insulating Glass Units:  Vision glass, double glazed.
         1. Applications:  Exterior glazing unless otherwise indicated.
         2. Space between lites filled with air.
         3. Outboard Lite:  Annealed float glass, 1/4 inch thick, minimum.

Tint:  Clear.

Coating:  Self-cleaning type, on #1 surface.

Coating:  Low-E (passive type), on #2 surface.

* + - * 1. Inboard Lite:  Annealed float glass, 1/4 inch thick, minimum.

Tint:  Clear.

* + - * 1. Total Thickness:  1 inch.
        2. Thermal Transmittance (U-Value)​, Summer - Center of Glass​:  ​.38​​, maximum​.
        3. Visible Light Transmittance (VLT):  ​.6​​​ percent​, nominal​.
        4. Solar Heat Gain Coefficient (SHGC):  ​.7​​, nominal​.
    1. BASIS OF DESIGN - INSULATING GLASS UNITS
       1. Basis of Design - Insulating Glass Units:  Vision glazing, with low-e coating.
          1. Applications:  Exterior insulating glass glazing unless otherwise indicated.
          2. Space between lites filled with air.
          3. Total Thickness:  1 inch.
          4. Thermal Transmittance (U-Value), Summer - Center of Glass:  \_\_\_\_\_, nominal.
          5. Coated Glass:  Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
          6. Spacer Color:  Black.
          7. Edge Seal:
          8. Color:  Black.
          9. Purge interpane space with dry air, hermetically sealed.
          10. Capillary Tubes:  Provide tubes from air space for insulating glass units without inert type gas that have a change of altitude greater than 2500 feet between point of fabrication and point of installation to permit pressure equalization of air space.

Capillary Tubes:  Tubes to remain open and be of length and material type in accordance with insulating glass fabricator's requirements.

* + - * 1. Basis of Design - Guardian Glass, LLC:  www.guardianglass.com/#sle.
        2. Outboard Lite:  1/4 inch thick pane, minimum of the type specified below.

Standard Glass:  Heat-strengthened float glass,1/4 inch.

Coating:

Low-E Coating:  SunGuard SN 68 on #2 surface.

* + - * 1. Inboard Lite:  Annealed float glass, 1/4 inch thick.

Coating:  No coating on inboard lite.

Glass:  Clear.

* + 1. GLAZING UNITS
       1. Type G-3 - Monolithic Safety Glazing:  Non-fire-rated.
          1. Applications:

Glazed lites in doors, except fire doors.

Glazed sidelights to doors, except in fire-rated walls and partitions.

Other locations required by applicable federal, state, and local codes and regulations.

Other locations indicated on drawings.

* + - * 1. Glass Type:  Fully tempered safety glass as specified.
        2. Tint:  Clear.
        3. Thickness:  1/4 inch, nominal.
        4. Glazing Method:  Dry glazing method, gasket glazing.
    1. ACCESSORIES
       1. Setting Blocks:  Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II.  Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
       2. Glazing Splines:  Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
  1. PART 3  EXECUTION
     1. VERIFICATION OF CONDITIONS
        1. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
        2. Verify that the minimum required face and edge clearances are being provided.
        3. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
     2. PREPARATION
        1. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
        2. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
        3. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.
     3. INSTALLATION, GENERAL
        1. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
        2. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
        3. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
     4. INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)
        1. Application - Exterior and/or Interior Glazed:  Set glazing infills from either the exterior or the interior of the building.
        2. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
        3. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
        4. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

1. END OF SECTION