JE Berkowitz, LP
Architectural Glazing Guide Specification

Section 08 81 00 – Glazing

Note to Specification Writers, The specifications below are offered as desirable inclusions in the glazing specification and are not intended to be complete. An appropriate, qualified design professional must verify the suitability of a specific product for use in a particular application as well as review the final specification.

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Glass including, heat-treated glass, insulating glass units, silk-screened glass, spandrel glass and laminated glass.

B. Related Sections:

1. Drawings, General and Supplementary Conditions of the Contract, Division 1 and the following specifications sections apply to this section.
2. Section 08 41 00 – Entrances and Storefronts
3. Section 08 42 00 – Entrances
4. Section 08 43 00 – Storefronts
5. Section 08 44 00 – Curtainwalls and Glazed Assemblies
6. Section 08 50 00 – Windows
7. Section 08 60 00 – Skylights

1.02 REFERENCES

(Delete all reference standards that are not required and add any standards required by local or state standards. The Contracting Requirements or Division 1, Section 01420. References may establish the edition date of standards not otherwise indicated. Division 1 may include full names and addresses of the organization whose standards are referenced.)

A. United States

1. ANSI Z97.1 – American National Standard for Glazing Materials Used in Buildings – Safety Performance and Methods Test.
2. ASTM C162 – Standard Terminology of Glass and Glass Products.
3. ASTM C1036 – Standard Specification for Flat Glass.
4. ASTM C1048 – Standard Specification for Heat-Treated Glass – Kind HS, Kind FT Coated and Uncoated Glass.
5. ASTM C1172 – Standard Specification for Laminated Architectural Flat Glass.
6. ASTM C1376 – Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.
7. ASTM E1300 – Standard Practice for Determining the Minimum Thickness and Type of Glass Required to Resist a Specified Load.
8. ASTM E2188 – Standard Test Method for Insulating Glass Unit Performance.
9. ASTM E2189 – Standard Method for Testing Resistance to Fogging in Insulating Glass Units.
10. ASTM E2190 – Standard Specification for Insulating Glass Unit Performance and Evaluation.
11. CSPC 16 CFR 1201– Safety Standard for Architectural Glazing Materials.
12. Insulating Glass Manufacturers Alliance (IGMA) – Glazing Guidelines.
13. EN 14179-1:2005– European Heat Soaking Standard.
14. GANA Glazing Manual: Glass Association of North America.
15. GANA Sealant Manual: Glass Association of North America.
16. GANA Laminated Glass Design Guide: Glass Association of North America.
17. GANA/GTA 66-9-20 – Specification for Heat-Strengthened or Fully Tempered Ceramic Enameled Spandrel Glass for Use in Building Window/Curtainwalls and Other Architectural Applications.

18. ISO 9001 Certification.

1.03 DEFINITIONS

A. Sealed Insulating Glass Unit Surfaces & Coating Orientation
   1. Surface 1 – Exterior surface of outer pane (surface facing outdoors of outboard lite).
   2. Surface 2 – Interior surface of outer pane (surface facing indoors of outboard lite).
   3. Surface 3 – Exterior surface of inner pane (surface facing outdoors of inboard lite).
   4. Surface 4 – Interior surface of inner pane (surface facing indoors of inboard lite).

B. Performance Characteristics
   1. Center-of-Glass – Performance values that take only the center portion of a glass make-up into account and not the framing members (customarily found in Sweets catalog and used in Section 08800 architectural specifications).
   2. Center-of-Glass thermal and optical performance properties shall be based on data and calculations from the current LBNL Windows 5.2 computer program.
   3. 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. These values can also be tested and certified by the National Fenestration Rating Council (NFRC).

1.04 SYSTEM DESCRIPTION

A. Design Requirements
   1. Provide glazing systems capable of withstanding normal thermal movements, wind loads and impact loads, without failure, including loss due to ineffective manufacture, fabrication and installation: deterioration of glazing materials; and other defects in construction.
   2. Provide glass thickness and strengths (annealed, heat-strengthened, tempered or heat soaked) required to meet or exceed the following criteria based on project loads and in-service conditions per ASTM E1300.
      a) Minimum thickness of annealed or heat-treated glass products is selected, so that worst-case probability of failure does not exceed the following:
         1) 8 breaks per 1000 for glass installed vertically or not over 15 degrees from the vertical pane and under wind action.
         2) 1 break per 1000 for glass installed 15 degrees from the vertical plane and under action of snow and/ or wind.

1.05 SUBMITTALS

A. Submit 12-inch (305mm) square samples of each type of glass indicated and 12-inch (305 mm) long samples of each color required for each type of sealant or gasket exposed to view.
B. Submit manufacturer's product sheet and glazing instructions.
C. Submit compatibility and adhesion test reports from sealant manufacturer, indicating materials were tested for compatibility and adhesion with glazing sealant, as well as other glazing materials including insulating units.
D. Submit reports from fabricated glass manufacturer indicating that the glass meets the requirements of any security test. Reports specified on the drawings.
E. Mock-ups – Refer to Division 8 Section "Aluminum Framed Curtain Walls", "Aluminum Entrances and Storefronts", "Aluminum Windows"' and "All-Glass Entrances and Storefronts" for requirements applicable to mock-ups.

1.06 QUALITY ASSURANCE

A. Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or referenced standards.
   1. GANA Publications

2. AAMA Publications
3. IGMA Publications

B. Safety glass products in the United States comply with CPSC 16 CFR 1201 for Category II materials.
C. Insulating glass products are to be permanently marked either on spacers or at least one insulating unit component with appropriate label of inspecting and testing agency listed below:
    1. United States – Insulating Glass Certification Council (IGCC)
D. Manufacturer to be ISO 9001 Certified.

1.07 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's instruction for receiving, handling, storing and protecting glass and glazing materials.
B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
D. Exercise care to prevent damage to glass and damage/deterioration to coating on glass.

1.08 PROJECT SITE CONDITIONS

A. Field Measurement: When construction schedule permits, verify field measurements with drawing dimensions prior to fabrication of glass products.

1.09 WARRANTY

A. Provide a written 10-year limited warranty from date of manufacture for insulating glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, protecting and maintaining practices contrary to glass manufacturer's published instructions.
B. Provide a written 5-year limited warranty from date of manufacture for ceramic frit silk-screened and ceramic frit spandrel glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, protecting and maintaining practices contrary to glass manufacturer's published instructions.
C. Provide a written 5-year limited warranty for laminated glass. Warranty covers deterioration due to normal use and not handling, installing, protecting and maintaining practices contrary to glass manufacturer's published instructions.

PART 2 - GENERAL

2.01 MANUFACTURERS

A. Manufacture is used in the section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced glazing standards.
B. Acceptable manufacturer's include:
    1. JE Berkowitz, LP (1-800-257-7827)
    2. PPG Industries
    3. Guardian Industries
    4. Pilkington
    5. ACH (Formerly Visteon)

2.02 MATERIALS

A. MONOLITHIC FLOAT GLASS
    1. Glass Type:
    2. Glass Tint:
    3. Nominal Glass Thickness:
    4. Glass Strength: (Annealed, Heat-Strengthened, Tempered, Heat Soak)

5. Reflective Low-E Coating Orientation: N/A, Surface # __)
6. Performance Characteristics (Center-of-Glass):

(Note: Verify that the glass type thickness matches the Performance Characteristics listed below.)

   a. Visible Transmittance _____ %
   b. Visible Reflectance _____ %
   c. Winter U-value: _____
   d. Shading Coefficient (SC): _____
   e. Solar Heat Gain Coefficient (SHGC): _____

7. United States Requirements
   a. Annealed float glass shall comply with ASTM C1036 Type I, Class 1 (clear), Class 2 (tinted), Quality Q3
   b. Heat-Strengthened (HS) float glass and Tempered (FT) float glass shall comply with ASTM C1048, Type I, Class 1 (clear), Class 2 (tinted), Quality Q3.
8. Glass shall be annealed, heat strengthened or tempered as required by codes and specified on drawings.

B. TEMPERFECT™ HEAT-TREATED FLOAT GLASS
1. Glass to be heat-treated by horizontal (roller hearth) process with inherent roller-wave distortion parallel to the bottom edge of the glass as installed when specified.
2. Flatness Tolerances
   a. Roller-Wave or Ripple: The deviation from flatness at any peak shall be targeted not exceed 0.003" as measured per peak to valley for ¼" (6mm) thick glass. (Electronic read out per lite is required as a submittal of this fabrication tolerance)
   b. Bow and Warp: The bow and warp tolerances shall target a not exceed 1/32" per linear foot.
   c. (Fully tempered glass shall be heat soaked to EN 14179-1:2005- European Heat Soaking Standard)

C WINDUO™ SEALED INSULATING GLASS (IG) UNITS
1. Insulating Glass Unit Makeup:
   a. Outboard Lite
      1) Glass Type:
      2) Glass Tint:
      3) Nominal Glass Thickness:
      4) Glass Strength: (Annealed, Heat-Strengthened, Tempered, Heat Soak)
      5) Reflective Low-E Coating Orientation: N/A, Surface # __)
   b. Airspacer
      1) Nominal Thickness:
      2) Aluminum or (Azon Warm Edge) *Black, if project is structurally glazed with black silicone.
      3) Gas Fill: (Air or 90% Argon)
   c. Inboard Lite
      1) Glass Type:
      2) Glass Tint:
      3) Nominal Glass Thickness:
      4) Glass Strength: (Annealed, Heat-Strengthened, Tempered, Heat Soak)
      5) Reflective Low-E Coating Orientation: (N/A, Surface #__)
2. Performance Characteristics (Center of Glass):

(Note: Verify that the glass type thickness matches the Performance Characteristics listed below.)

   a. Visible Transmittance _____ %
   b. Visible Reflectance _____ %
   c. Winter U-value: _____
   d. Shading Coefficient (SC): _____
   e. Solar Heat Gain Coefficient (SHGC): _____

3. Provide hermetically sealed IG units with dehydrated airspace, dual air seal of (black/grey) polyisobutelyene (PIB), and a secondary seal of (black/ grey) silicone.
4. United States Requirements
   a. Insulating glass units are certified through the Insulating Glass Certification Council (IGCC) to ASTM E2190 (class "CBA") or to ASTM E2188.

C. ENVIROSPAN™ MONOLITHIC CERAMIC SILK-SCREENED GLASS

(Note: For ceramic frit silk-screened glass in an Insulating Glass Unit, use the format for Sealed Insulating Glass (IG Units substituting this section for the lite (outboard and inboard) that is to be silk-screened.)

1. Glass Type:
2. Glass Tint:
3. Nominal Glass Thickness:
4. Ceramic Frit Orientation: (Surface#___)
5. Silk-Screened Pattern: As selected by Architect from manufacturer's standards.
6. Ceramic Frit Color: As selected by Architect from manufacturer's standards.
7. United States Requirements:
   Heat-treated glass with ceramic coating applied by the silk-screen process and complying with ASTM C1048, Condition C (other coated glass), Type I (transparent glass, flat), Quality Q3 (glazing select) and with other requirements as specified.

D. ENVIROSPAN™ MONOLITHIC CERAMIC FRIT SPANDREL GLASS

(Note: For Ceramic Frit Spandrel Glass in an Insulating Glass Unit, use the format for Sealed Insulating Glass (IG) Units substituting this section for the lite (outboard or inboard) that is to have ceramic frit spandrel.)

1. Glass Type:
2. Glass Tint:
3. Nominal Glass Thickness:
4. Ceramic Frit Orientation: (Surface#___)
5. United States Requirements:
   a. Heat-treated glass with ceramic coating complying with ASTM C1048, Condition B (spandrel glass, one surface ceramic-coated), Type I (transparent glass, flat), Quality Q3 (Glazing select) with other requirements as specified.
   b. GANA/GTA 66-9-20, Specification for Heat-Strengthened or Fully Tempered Ceramic Enameled Spandrel Glass used for Building Window/Curtainwalls and

E JEB FUSION™ MONOLITHIC TWO-PLY LAMINATED GLASS

(Note: For Two-ply laminated Glass in an Insulating Glass Unit, use the format for Sealed Insulating Glass (IG) Units substituting this section for the lite (outboard or inboard) that is to be Two-Ply laminated).

1. Laminated Glass Makeup:
   a. Outer-Ply
      1) Glass Type:
      2) Glass Tint:
      3) Nominal Glass Thickness:
      4) Glass Strength: (Annealed, Heat-Strengthened, Tempered, Heat Soaked)
      5) Reflective (Low-E Coating Orientation: N/A, Surface # __)
   b. Interlayer
      1) Basis of Design: DuPont™ SentryGlas® Plus, as manufactured by Dupont Building Innovations 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805.
      (Select interlayer thickness, dependent upon the application and the requirements of the laminated glass. Sloped (overhead) glazing used for sound control typically utilizes a 0.060-inch thick interlayer. Security glazing, including impact resistant applications utilize a 0.060-inch, 0.090-inch or greater thickness of interlayer.)
      2) Basis of Design: DuPont™ Butacite® Polyvinyl Butyral, as manufactured by DuPont Building Innovations, 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805.
      (Select interlayer thickness, dependent upon the application and the requirements of the laminated glass. Typical safety glazing applications utilize a 0.030-inch interlayer: sloped (overhead) Glazing used for sound control typically utilize

a 0.030-inch or 0.060-inch thick interlayer. Security glazing, including impact resistant applications utilize a 0.060-inch, 0.090-inch or greater thickness of interlayer.)

3) Basis of Design: JE Berkowitz SentryGlas® Expressions™, as manufactured by JE Berkowitz, One Gateway Boulevard, Pedricktown, NJ 08067
4) *(Select interlayer thickness of 0.045 and no backer when glass plies are annealed. Select interlayer thickness of 0.060 and clear backer for clear JE Berkowitz Sentry Glass Expressions when glass plies are to be heat-treated. Select interlayer thickness of 0.060 inch and translucent white or soft white backer as required. Contact a JE Berkowitz Product Representative for assistance in selection of appropriate interlayer.)*
    a. Thickness: [0.030] [0.045] [0.060 inch] [0.090 inch] [0.100 inch] [other]
    b. Interlayer Tint:
    c. Interlayer Physical Properties:
        i. Young's Modulus: 43 kpsi, when tested in accordance with ASTM D5026.
        ii. Tensile Strength: 5.0 kpsi, when tested in accordance with ASTM D638.
        iii. Elongation: 400% when tested in accordance with ASTM D638.
        iv. Flex Modulus: 50 kpsi, when tested in accordance with ASTM D790.
        v. Heat Deflection Temperature at 0.46 MPa: 110°F, when tested in accordance with ASTM D648.

c. Inner-Ply
    1) Glass Type:
    2) Glass Tint:
    3) Nominal Glass Thickness:
    4) Glass Strength: (Annealed, Heat-Strengthened, Tempered, Heat Soaked)
    5) Reflective (Low-E coating Orientation: N/A, Surface # __)

E. Select appropriate sealants, tapes, gaskets and other glazing materials of proven compatibility with other materials that they contact. These include glass products, insulating glass unit seals and glazing channel substrates under installation and service conditions, as demonstrated by testing and field experience.

PART 3 - EXECUTIONS

3.01 EXAMINATION

A. Site Verifications and Conditions
    1. Verify that site conditions are acceptable for the installation of the glass.
    2. Verify openings for glazing are correctly sized within tolerance.
    3. Verify that a functioning weep system is present.
    4. Verify that the minimum required face and edge clearances are being followed.
    5. Do not proceed with glazing until satisfactory conditions have been followed.

3.02 PREPARATION

A. Protection
    1. Handle and store product according to manufacturer's recommendations.
    2. Remove coatings and other harmful materials that will prevent glass and glazing installation required to comply with performance criteria specified.

3.03 INSTALLATION

A. Install products using the recommendations from the manufacturer of glass, sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those in the "GANA Glazing Manual."
B. Verify that Insulating Glass (IG) Unit secondary seal is compatible with glazing sealants.
C. Install glass in prepared glazing channels and other framing members.
D. Install setting blocks in rabbets as recommended by referenced glazing standards in "GANA Glazing Manual" and "IGMA Glazing Guidelines."
E. Provide bite on glass, minimum edge and face clearances and glazing material tolerances recommended by "GANA Glazing Manual."
F. Provide weep system as recommended by "GANA Glazing Manual."
G. Set glass lites in each series with uniform pattern, draw, bow and similar characteristics.
H. Distribute the weight of glass unit along the edge rather than the corner.
I. Comply with manufacturers and referenced industry standards on expansion joints and anchors; accommodating thermal movement; glass openings; use of setting blocks, edge, face, and bite clearances; use of glass spacers; edge blocks and installation of weep systems.
J. Protect glass edge damage during handling and installation.
K. Prevent glass from contact with contaminating substances that result from construction operations, such as weld spatter, fireproofing or plaster.
L. Remove and replace glass that is broken, chipped cracked or damaged in any way.

3.04 CLEANING

A. Clean excess sealant or compound from glass and framing members immediately after application, using solvents or cleaners recommended by manufacturers.
B. Glass to be cleaned according to:
    1. GANA Glass Informational Bulletin GANA 01-0300 – "Proper Procedure for Cleaning Architectural Glass Products."
    2. GANA Glass Informational Bulletin GANA TD-02-0402 – "Heat Treated Glass Surfaces are Different."
C. Do not use razor blades, scrapers or metal tools to clean glass.

END OF SECTIONS