

**SECTION 08 80 00
GLAZING**

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies glass, plastic, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

1.2 RELATED WORK

A. Factory glazed by manufacturer in following units:

1. Hollow Metal Doors: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
2. Wood Doors: Section 08 14 00, INTERIOR WOOD DOORS.
3. Aluminum Windows: Section 08 51 13, ALUMINUM WINDOWS.
4. Mirrors: Section 10 28 00, TOILET, BATH AND LAUNDRY ACCESSORIES.

1.3 LABELS

A. Temporary labels:

1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
2. Label in accordance with NFRC (National Fenestration Rating Council) label requirements.
3. Temporary labels shall remain intact until glass is approved by Contracting Officer's Technical Representative.

B. Permanent labels:

1. Locate in corner for each pane.
2. Label in accordance with ANSI Z97.1 and SGCC (Safety Glass Certification Council) label requirements.
 - a. Tempered glass.
 - b. Laminated glass or have certificate for panes without permanent label.

1.4 PERFORMANCE REQUIREMENTS

A. Building Enclosure Vapor Retarder and Air Barrier:

1. Utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
2. Maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

B. Glass Design:

1. Load Resistance: Meet requirements of ASTM E1300 and requirements of Contract Documents.
2. Factor of Safety: Minimum design factor of safety for glass shall be as follows:
 - a. Vertical Position: 2.5 (eight lites per thousand breakage maximum at design wind pressure).
 - b. Sloped and Horizontal Position: 5.0.
 - c. Center Deflection: 0.75 inch maximum, based on loading required for glass framing.
3. Glass Sizes: Dimensions of glazing rabbets indicated by Contract Documents are intended to provide for minimum bite on glass and minimum edge clearance under positive and negative wind loads, dead and live loads, vertical deflections, seismic forces, solar loads, temperature changes and impact loading for operating sash and doors, and adequate thicknesses for accessory glazing materials, with reasonable tolerances. Provide correct glass size, including bite on glass and edge clearances, for each opening, within established tolerances and dimensions and meeting performance requirements.

C. Glass Thickness:

1. Select thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with ASCE 7 or local applicable codes, whichever is more stringent.
2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
3. Test in accordance with ASTM E 330.
4. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.

D. Safety Glass:

1. General: Where safety glass is indicated by Contract Documents or required by codes and regulations of public authorities having jurisdiction over the Work, provide products which meet requirements of ANSI Z97.1 and CPSC 16CFR1201, Category II materials.
2. Label: Provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other

certification agency acceptable to authorities having jurisdiction over the Work.

3. Location: Provide safety glass in light openings of doors and door sidelights, and in other locations required by Contract Documents and as required by safety glazing regulations of public authorities having jurisdiction over the Work. In case of conflict, more stringent requirements shall govern.

C. Bullet resistance glass or plastic assemblies:

1. For blast resistant windows follow Unified Facilities Criteria, DOD Minimum Antiterrorism Standards for Buildings UFC4-010-01.

1.5 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Certificates:

1. Certificates stating that wire glass, meets requirements for safety glazing material as specified in ANSI Z97.1.
2. Certificate on shading coefficient.
3. Certificate on "R" value when value is specified.
5. Certificate that blast resistant glass meets the requirements of UFC4-010-01.

C. Warranty: Submit written guaranty, conforming to General Condition requirements, and to "Warranty of Construction" Article in this Section.

D. Manufacturer's Literature and Data:

1. Glass, each kind required.
2. Insulating glass units.
3. Elastic compound for metal sash glazing.
4. Putty, for wood sash glazing.
5. Glazing cushion.
6. Sealing compound.

E. Samples:

1. Size: 150 mm by 150 mm (6 inches by 6 inches).
2. Glass Types: Provide samples of each type:
 - a. Insulated glass unit.
 - b. Interior tempered glass
 - c. Laminated glass unit.

F. Preconstruction Adhesion and Compatibility Test Report: Submit glazing sealant manufacturer's test report indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.
- B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.
- C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

1.7 PROJECT CONDITIONS

A. Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.

1.8 WARRANTY

- A. Warranty: Conform to terms of "Warranty of Construction", FAR clause 52.246-21, except extend warranty period for the following:
 - 1. Coated Glass: 10 years.
 - 2. Tempered Glass: 5 years.
 - 3. Laminated glass units to remain laminated for 5 years.

1.9 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American National Standards Institute (ANSI):
 - Z97.1-04.....Safety Glazing Material Used in Building -
Safety Performance Specifications and Methods
of Test
- C. American Society for Testing and Materials (ASTM):
 - C1363-05.....Thermal Performance of Building Assemblies, by
Means of A Hot Box Apparatus
 - C542-05.....Lock-Strip Gaskets

- C716-06.....Installing Lock-Strip Gaskets and Infill
Glazing Materials
- C864-05.....Dense Elastomeric Compression Seal Gaskets,
Setting Blocks, and Spacers
- C920-05.....Elastomeric Joint Sealants
- C1036-06.....Flat Glass
- C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated
and Uncoated Glass
- C1172-03.....Laminated Architectural Flat Glass
- C1376-03.....Pyrolytic and Vacuum Deposition Coatings on
Flat Glass
- D635-06.....Rate of Burning and/or Extent and Time of
Burning of Self-Supporting Plastic in a
Horizontal Position
- E84-08.....Surface Burning Characteristics of Building
Materials.
- E330-02.....Structural Performance of Exterior Windows,
Curtain Walls, and Doors by Uniform Static Air
Pressure Difference
- E2190-08.....Insulating Glass Unit
- D. Code of Federal Regulations (CFR):
- 16 CFR 1201.....Safety Standard for Architectural Glazing
Materials; 1977, with 1984 Revision.
- E. Glazing Association of North America (GANA):
- GANA.....Glazing Manual
- FGMA.....Sealant Manual
- F. National Fenestration Rating Council (NFRC): Certified Products
Directory (Latest Edition)
- G. Safety Glazing Certification Council (SGCC): Certified Products
Directory (Issued Semi-Annually)
- H. Unified Facilities Criteria (UFC):
- 4-010-01-2007.....DOD Minimum Antiterrorism Standards for
Buildings

PART 2 - PRODUCT

2.1 GLASS

- A. Use thickness stated unless specified otherwise in assemblies.

B. Clear Glass:

1. ASTM C1036, Type I, Class 1, Quality q3.
2. Types:
 - a. Glass G-1A: Clear float glass, annealed minimum, 5mm (3/16 inch).
 - b. Glass G-1B: Clear float glass, annealed minimum, 6mm (1/4 inch).

2.2 HEAT-TREATED GLASS

A. Clear Heat Strengthened Glass:

1. ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
2. Types:
 - a. Glass G-1C: Clear float glass, heat strengthened minimum, 5mm (3/16 inch).
 - b. Glass G-1D: Clear float glass, heat strengthened minimum, 6mm (1/4 inch).
 - c. Glass G-1J: Clear float glass, heat strengthened minimum, 3mm (1/8 inch).

B. Clear Tempered Glass:

1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
2. Types:
 - a. Glass G-1E: Clear float glass, tempered, safety glass, 5mm (3/16 inch).
 - b. Glass G-1F: Clear float glass, tempered, safety glass, 6mm (1/4 inch).
 - c. Glass G-1G: Clear float glass, tempered, safety glass, 12mm (1/2 inch).
 - d. Glass G-1H: Clear float glass, tempered minimum 10 mm (3/8 inch).

2.3 COATED GLASS

- A. Low-E Glass: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects, for scope of work and glass types associated with window replacement information.
- B. Ceramic Coated Vision Glass: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects, for scope of work and glass types associated with window replacement.
- C. Ceramic Coated Spandrel Glass: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects, for scope of work and glass types associated with window replacement.

B. Low-E Glass:

1. ASTM C1048, Kind HS or Kind FT, Condition C, Type I, Class 1, Quality q3 with low emissivity pyrolytic coating having a transmittance of 0.59, unless otherwise noted.
2. Apply coating to second surface of insulating glass units.
3. Thickness, as indicated in schedule.

2.3 LAMINATED GLASS

- A. General: Preassembled glass units consisting of multiple plies of glass and plastic interlayer film as adhesive, laminated at factory by pressure-plus-heat process; meeting requirements of ASTM C1172.
1. Laminated glass units shall be safety glass, meeting requirements of ANSI Z97.1, CPSC 16CFR1201 and safety glazing regulations of public authorities having jurisdiction over the Work, and permanently labeled.
 2. Fabricate units to sizes and shapes required for installation, including any bored holes. Laminated glass units shall meet requirements of LSGA - Standards Manual. Laminated glass units shall be free of dirt, foreign material, air pockets and other defects, and to have uniform finish color and aesthetic appearance.
- B. Plastic Interlayer: Film of ionoplast (I) of color, transparency and thickness as scheduled, but 0.060 inch minimum thickness, and having capability for exposed edge conditions. Composition shall be such that film when in laminated glass unit and installed successfully withstands 20 years minimum exposure to sunlight, severe weather and temperature changes with no bubbles, discoloration, edge scalloping and loss of physical and mechanical properties.
1. Tear Strength: 600 foot pounds/cubic inch minimum when evaluated meeting requirements of ASTM D638.
 2. Tensile Strength: 5,000 psi minimum when evaluated meeting requirements of ASTM D638.
 3. Flexural Modulus: 50,000 psi minimum at 73 degrees Fahrenheit when evaluated meeting requirements of ASTM D790.
- C. Component Thickness: Component thicknesses may be varied when necessary to achieve performance requirements as acceptable to Architect. Glass plies shall be laminations of same thickness.

2.4 LAMINATED GLAZING ASSEMBLIES

- A. Clear Laminated Glass Unit, G-10:

1. Makeup:
 - a. Outdoor Lite:
 - 1) Glass Type: G-1J, clear float glass.
 - 2) Glass Tint: Clear.
 - 3) Nominal Thickness: 3 mm (1/8 inch) minimum.
 - 4) Glass Strength: Heat-strengthened minimum.
 - 5) Coating: N.A.
 - b. Interlayer: Plastic interlayer, 0.75 mm (0.030 inch) minimum thickness.
 - c. Inboard Lite:
 - 1) Glass Type: G-1J, clear float glass.
 - 2) Glass Tint: Clear.
 - 3) Nominal Thickness: 3 mm (1/8 inch) minimum.
 - 4) Glass Strength: Heat-strengthened minimum.
 - 5) Coating: N.A.
3. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.
4. Glass heat-treated by horizontal (roller hearth) process with inherent roller wave distortion parallel to the bottom edge of the glass as installed when specified.

2.4 INSULATING GLASS UNITS

- A. General: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects, for scope of work and glass types associated with window replacement.
2. Insulating Glass Unit, Blast-Resistant:
 - a. Makeup:
 - 1) Outboard Lite:
 - a) Glass type: clear glass with high-performance low-emissivity coating applied to the No. 2 surface.
 - b) Glass Tint: Clear.
 - c) Nominal Thickness: 6 mm (1/4 inch).
 - d) Glass Strength: Heat-strengthened Minimum.
 - e) Coating Orientation: NA
 - 2) Space:
 - a) Nominal Thickness: 12 mm (1/2 inch).
 - b) Gas Fill: Argon.
 - c) Spacer: Thermal barrier spacer.

- 3) Inboard Lite:
 - a) Glass Type:G-10, Clear laminated glass unit.
 - b) Glass Tint: Clear.
 - c) Nominal Thickness:6.75 mm (0.27 inch).
 - d) Glass Strength: Heat-strengthened Minimum.
 - e) Coating Orientation: NA.
- b. Performance Characteristics (Center of Glass):
 - 1) Visible Transmittance: 70%
 - 2) Ultraviolet Transmission: 19%
 - 3) Nighttime Winter U-value: 0.3
 - 5) Solar Heat Gain Coefficient (SHGC): 0.38
- c. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads and follow Unified Facilities Criteria, DOD Minimum Antiterrorism Standards for Buildings UFC4-010-01.

2.5 GLAZING ACCESSORIES

- A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work shall have a finish that will not corrode or stain while in service.
- B. Setting Blocks: ASTM C864:
 1. Channel shape; having 6 mm (1/4 inch) internal depth.
 2. Shore a hardness of 80 to 90 Durometer.
 3. Block lengths: 50 mm (two inches) except 100 to 150 mm (four to six inches) for insulating glass.
 4. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
 5. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.
- C. Spacers:
 1. ASTM C864.
 2. Channel shape having a 6 mm (1/4 inch) internal depth.
 3. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
 4. Lengths: One to 25 to 76 mm (one to three inches).
 5. Shore a hardness of 40 to 50 Durometer.
- D. Sealing Tapes:

1. Semi-solid polymeric based material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
 2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.
- E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops for use in hollow metal frames with stops.
- F. Glazing Clips: Galvanized steel spring wire designed to hold glass in position in rabbeted sash without stops, when glazing in wood frames.
- G. Glazing Gaskets: ASTM C864:
1. Firm dense wedge shape for locking in sash.
 2. Soft, closed cell with locking key for sash key.
 3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.
 4. Gasket shall be compatible with silicone sealant.
- H. Glazing Sealants: ASTM C920, silicone neutral cures, non-skinning:
1. Type S.
 2. Class 25
 3. Grade NS.
 4. Shore A hardness of 25 to 30 Durometer.
- I. Structural Sealant: ASTM C920, silicone acetoxo cure:
1. Type S.
 2. Class 25.
 3. Grade NS.
 4. Shore a hardness of 25 to 30 Durometer.
- J. Neoprene or EPDM, Glazing Gasket: ASTM C864.
1. Channel shape; flanges may terminate above the glazing channel or flush with the top of the channel.
 2. Designed for dry glazing.
- K. Color:
1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames shall match color of the finished aluminum and be nonstaining.
 2. Color of other glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted shall be black, gray, or neutral color.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verification of Conditions:
 - 1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.
 - 2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer's approved shop drawings.
- B. Advise Contractor of conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation: Do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Verify that wash down of adjacent masonry is completed prior to erection of glass and glazing units to prevent damage to glass and glazing units by cleaning materials.

3.2 PREPARATION

- A. For sealant glazing, prepare glazing surfaces in accordance with GANA-02 Sealant Manual.
- B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.
- C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.
- D. Verify that components used are compatible.
- E. Clean and dry glazing surfaces.
- F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

3.3 INSTALLATION - GENERAL

- A. Install in accordance with GANA-01 Glazing Manual and GANA-02 Sealant Manual unless specified otherwise.
- B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.
- C. Set glazing without bending, twisting, or forcing of units.
- D. Do not allow glass to rest on or contact any framing member.
- E. Glaze doors and operable sash, in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.

- F. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.
- G. Insulating Glass Units:
 - 1. General: Refer to window replacement document Section 08 51 13 - Aluminum Windows, prepared by HGA Architects.
 - 2. Glaze in compliance with glass manufacturer's written instructions.
 - 3. When glazing gaskets are used, they shall be of sufficient size and depth to cover glass seal or metal channel frame completely.
 - 4. Do not use putty or glazing compounds.
 - 5. Do not grind, nip, cut, or otherwise alter edges and corners of fused glass units after shipping from factory.
 - 6. Install with tape or gunnable sealant in wood sash.

3.4 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

- A. Cut glazing tape and gasket spline to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.
- B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Trim protruding tape edge.

3.5 INSTALLATION - WET METHOD (SEALANT AND SEALANT)

- A. Place setting blocks at 1/4 points and install glazing pane or unit.
- B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 600 mm (24 inch) intervals, 6 mm (1/4 inch) below sight line.
- C. Fill gaps between glazing and stops with silicone type sealant to depth of bite on glazing, but not more than 9 mm (3/8 inch) below sight line to ensure full contact with glazing and continue the air and vapor seal.
- D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.6 REPLACEMENT AND CLEANING

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Contracting Officer's Technical Representative.
- B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.
- C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.7 PROTECTION

- A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

3.8 GLAZING SCHEDULE

- A. Where laminated glass is required for blast-resistant windows, follow UFC4-010-01, DOD Minimum Antiterrorism Standards for Buildings.
- B. General: Each glass type is indicated in this Section by a designation. Glazing designations specified in this Section correspond to designations indicated in Drawings. Locations of glazing types are as indicated in Drawings.

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