

**SECTION 08 80 00
GLAZING**

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies glass, 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. Sound resistant doors: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, and Section 08 14 00, WOOD DOORS.
2. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.
3. Section 08 51 13, ALUMINUM WINDOWS.
4. Section 08 44 13, GLAZED ALUMINUM CURTAIN WALLS.
5. Section 08 56 73, SOUND CONTROL WINDOWS

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 COR.

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.
 - c. Organic coated glass.

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 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.
2. Test in accordance with ASTM E 1300.
3. Thicknesses listed are minimum. Coordinate thicknesses with framing system manufacturers.

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.

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. Transparent (one-way vision glass) mirrors.
4. Glazing cushion.
5. Sealing compound.

E. Samples:

1. Size: 150 mm by 150 mm (6 inches by 6 inches).
2. Tinted glass.
3. Reflective glass.
4. Transparent (one-way vision glass) mirrors.

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. Protect sealed-air-space insulating glazing units from exposure to abnormal pressure changes, as could result from substantial changes in altitude during delivery by air freight. Provide temporary breather tubes which do not nullify applicable warranties on hermetic seals.
 - 2. Temporary protections: The glass front and polycarbonate back of glazing shall be temporarily protected with compatible, peelable, heat-resistant film which will be peeled for inspections and re-applied and finally removed after doors and windows are installed at destination. Since many adhesives will attack polycarbonate, the film used on exposed polycarbonate surfaces shall be approved and applied by manufacturer.
 - 3. Edge protection: To cushion and protect glass clad, polycarbonate, and Noviflex edges from contamination or foreign matter, the four edges shall be sealed the depth of glazing with continuous standard-thickness Santoprene tape. Alternatively, continuous channel shaped extrusion of Santoprene shall be used, with flanges extending into face sides of glazing.
 - 4. Protect "Constant Temperature" units including every unit where glass sheet is directly laminated to or directly sealed with metal-tube type spacer bar to polycarbonate sheet, from exposures to ambient temperatures outside the range of 16 to 24 C, during the fabricating, handling, shipping, storing, installation, and subsequent protection of glazing.

1.7 PROJECT CONDITIONS

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. Bullet resistive plastic material to remain visibly clear without discoloration for 10 years.
2. Insulating glass units to remain sealed for 10 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.
- C794-06.....Adhesion-in-Peel of Elastomeric Joint Sealants.
- C864-05.....Dense Elastomeric Compression Seal Gaskets,
Setting Blocks, and Spacers.
- C920-08.....Elastomeric Joint Sealants.
- C964-07.....Standard Guide for Lock-Strip Gasket Glazing.
- C1036-06.....Flat Glass.
- C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated
and Uncoated Glass.
- C1172-09.....Laminated Architectural Flat Glass.
- C1376-10.....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.
- D4802-02.....Poly (Methyl Methacrylate) Acrylic Plastic
Sheet.
- E84-09.....Surface Burning Characteristics of Building
Materials.

E1300-09.....Determining Load Resistance of Glass in
Buildings.

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. National Fire Protection Association (NFPA):

80-08.....Fire Doors and Windows.

F. National Fenestration Rating Council (NFRC)

G. Safety Glazing Certification Council (SGCC) 2009:

Certified Products Directory (Issued Semi-Annually).

H. Glass Association of North America (GANA):

Glazing Manual (Latest Edition)

Sealant Manual (2008)

I. American Society of Civil Engineers (ASCE):

ASCE 7-10.....Wind Load Provisions

PART 2 - PRODUCTS

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. Thickness, 6 mm (1/4 inch).

C. Tinted Heat reflective and low emissivity coated glass:

1. ASTM C1036, Type I, Class 2, Quality q3.

2. Color: Sealed Edge Units (SEU): Insulating Glass Unit Makeup, Basis
of Design.

3. Thickness, 6 mm (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. Thickness, 6 mm (1/4 inch).

B. Tinted Heat Strengthened Glass:

1. ASTM C1048, Kind HS, Condition A, Type I, Class 2, Quality q3.

2. Color: Sealed Edge Units (SEU): Insulating Glass Unit Makeup, Basis
of Design.

3. Thickness, 6 mm (1/4 inch).

C. Clear Tempered Glass:

1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
2. Thickness, 6 mm (1/4 inch).

2.3 COATED GLASS

A. Spandrel Glass:

1. ASTM C1048, Kind HS, Condition B, Type I.
2. Thickness, 6 mm (1/4 inch).

B. Reflective Tempered Glass:

1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3.
Color: Sealed Edge Units (SEU): Insulating Glass Unit Makeup, Basis of Design.
2. Thickness, 6 mm (1/4 inch).

C. Low-E Tempered Glass:

1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with low emissivity pyrolytic coating having an E of 0.15.
2. Apply coating to second surface of insulating glass units.
3. Thickness, as indicated.

D. Transparent Mirror (One-Way-Vision Glass):

1. ASTM C1036, Type I, Class 1, Quality q2 or Class 3, Quality q3; Grey Glass.
2. Thickness, 6 mm (1/4 inch).
3. Coated one face with a hard adherent reflective film of chromium or other coating of proven equivalent durability.
4. Visible light transmittance; eight percent, plus or minus two percent.
5. Visible reflectance; sixty percent, plus or minus five percent.
6. Light ratio; mirror side 10 or more; observer side one or less.
7. Assemble with coating covered and protected with a layer of clear glass not less than 3 mm (1/8 inch) thick.
8. Clean interface glass prior to assembly.
9. Tape edge to seal interface and hold panes together.

2.4 LAMINATED GLASS

- A. Two or more lites of glass bonded with an interlayer material for use in building glazing
- B. Use 1.5 mm (0.060 inch) thick interlayer for:
 1. Acoustical glazing.
 2. Heat strengthened or fully tempered glass assemblies.

2.5 TRANSLUCENT GLASS

- A. Basis of Design: Pulp Studio, Product reference number 2099;
www.pulpstudio.com, Alex Rosul, Rosul & Associates, 216.227.1801
- B. Description.
 - 1. Clear glass laminated with a translucent interlayer.
 - 2. Thickness, 5/16"

2.6 INSULATING GLASS UNITS

- A. Provide factory fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space and comply with ASTM E2190.
- B. Assemble units using glass types specified:
- C. Sealed Edge Units (SEU):
 - 1. Insulating Glass Unit Makeup
 - a. Basis of Design - SuperNeutral 68 by Guardian Sunguard.
 - 1) Light Transmittance - 49%
 - 2) Reflectance Out - 8
 - 3) Reflectance In - 11
 - 4) U-value - 0.29
 - 5) Shading Coefficient - 0.34
 - 6) Solar Heat Gain Coefficient - 0.30
 - 7) Color - Light Gray
 - 8) Outboard Light - Crystal Gray
 - 9) Inboard Light - Clear
 - 10) SEU Thickness - 1 inch
 - 11) Low-E Coating
 - b. Spacer
 - 1) Spacer frame, Basis of Design - Warm-Light Technology by Azon USA; www.warmedge.com, or equal with similar salient characteristics.
 - 2) Gas Fill: (Argon)
 - 2. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.
 - 3. 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.

2.7 GLASS FOR ALUMINUM WINDOWS

- A. Provide factory fabricated glass consisting of two panes of glass installed in aluminum window sash.

B. Glass types specified:

1. Glass for aluminum window sash.
 - a. Basis of Design - SuperNeutral 68 by Guardian Sunguard.
 - 1) Light Transmittance - 49%
 - 2) Reflectance Out - 8
 - 3) Reflectance In - 11
 - 4) Aluminum Window U-value - See Section 08 5113, Aluminum Windows
 - 5) Shading Coefficient - 0.34
 - 6) Solar Heat Gain Coefficient - 0.30
 - 7) Color - Light Gray
 - 8) Outboard Light - Crystal Gray
 - 9) Inboard Light - Clear
 - 10) Low-E Coating
2. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.
3. 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.

2.8 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: ASTM C864:
 1. Channel shape having a 6 mm (1/4 inch) internal depth.
 2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
 3. Lengths: One to 25 to 76 mm (one to three inches).

4. 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. 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.

F. Glazing Sealants: ASTM C920, silicone neutral cure:

1. Type S.
2. Class 25
3. Grade NS.
4. Shore A hardness of 25 to 30 Durometer.

G. Neoprene, EPDM, or Vinyl 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.

H. 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. Transparent (One-Way Vision Glass) Mirror: Use continuous channel glazing gasket.
- H. Laminated Glass:
 - 1. Tape edges to seal interlayer and protect from glazing sealants.
 - 2. Do not use putty or glazing compounds.
- I. Insulating Glass Units:
 - 1. Glaze in compliance with glass manufacturer's written instructions.

2. When glazing gaskets are used, they shall be of sufficient size and depth to cover glass seal or metal channel frame completely.
3. Do not use putty or glazing compounds.
4. Do not grind, nip, cut, or otherwise alter edges and corners of fused glass units after shipping from factory.

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

- A. Cut glazing spline to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.
- B. Place setting blocks at 1/3 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 REPLACEMENT AND CLEANING

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Resident Engineer.
- 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.

3.6 PROTECTION

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

3.7 GLAZING SCHEDULE

- A. Tempered Glass:
 1. Install in full and half glazed doors unless indicated otherwise.
 2. Install in storefront, windows, and door sidelights adjacent to doors.
 3. Use clear tempered glass on interior side lights and doors.
 4. Use SEU reflective tempered and clear tempered glass on glazed aluminum curtain walls, storefront, and sidelights.

- B. Clear Glass:
 - 1. Interior observation windows not specified otherwise.
 - 2. Interior pane of dual glazed windows not receiving tempered, laminated or organic coated glass, or other special glass indicated or specified.
- C. Tinted Glass: Exterior pane of dual glazed windows not receiving tinted tempered glass.
- D. Insulating Glass:
 - 1. Install SEU tinted tempered and clear tempered glass in storefronts, curtain walls adjacent to entrances or walks.
- E. Laminated Glass: Install as specified in doors, observation windows and interior pane of dual glazed windows where indicated.
- F. Transparent Mirror (One-Way-Vision Glass): Install in observation windows where indicated.
- G. Spandrel Glass: Install specified spandrel glazing where indicated.
- H. Pattern Glass (obscure):
 - 1. Install in interior pane of dual glazed windows of Toilet Rooms.

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