

SECTION 08800 - GLASS AND GLAZING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Work under this section is subject to requirements of the Contract Documents including the General Conditions and Supplementary Conditions and applicable portions of Division 1 - General Requirements.
- B. The work consists of all labor, material and equipment necessary and required to complete all glass and glazing as shown on the drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

- A. Joint Sealers: Section 07900.
- B. Standard Steel Doors and Frames: Section 08111.
- C. Aluminum Windows: Section 08520.
- D. Framed mirrors: Section 10800.
- E. Wood Doors: Section 08210.
- F. Aluminum Curtain Wall: Section 08921.

1.03 QUALITY ASSURANCE

- A. Primary Glass shall comply with ASTM C 1036 for the quality hereinafter specified. Glass which does not fall within the accepted sample range will be subject to rejection by the Architect. In the event samples are not or cannot be provided, the Architect will determine the acceptability of glass relating to color or observable defects in each case.
- B. Safety Glass shall meet requirements of ASTM C 1036; ASTM C 1048; ANSI Z 97.1, and Safety Glazing Certification Council, shall conform to guidelines of Consumer Product Safety Commission 16 CFR-1201 for safety glazing.
- C. Heat strengthened glass shall comply with ASTM C 1036, and ASTM C 1048.
- D. Insulating Glass: Shall be tested in accordance with ASTM E 774 and E 773, shall conform to Insulating Glass Certification Council (CBA rating).
- E. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer for each kind of glass indicated and composed of primary glass obtained from a single source for each type and class required.
- F. Comply with recommendations and requirements of the "Glazing Manual" and "Sealant Manual" published by the Flat Glass Marketing Association, except that for insulating glass, comply with the manufacturer's recommendations when they are at variance with FGMA.

1.04 SUBMITTALS

- A. Manufacturer's Data, Glass: Submit 2 copies of manufacturer's specifications and installation instructions for each type of glass specified. Include test data substantiating that glass complies with specifications. Indicate by copy of transmittal that glazier has received copy of handling and glazing instructions.

- B. Manufacturer's Data, Glazing Materials: Submit 2 copies of manufacturer's specifications, and installation instructions for each type of glazing sealer and compound, gasket and associated miscellaneous materials required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the project specifications and is appropriate for the applications shown. Show by transmittal that one copy of each recommendation and instruction has been distributed to the glazier.
- C. Samples: Submit to Architect samples of each type of glass, glazing sealer and gasket.
 - 1. Provide two 12 inches × 12 inches samples of each type of glass specified.
 - 2. Provide two 12 inches long samples of glazing gaskets.
 - 3. Provide sample tube of each glazing sealer.
- D. Certificate: Submit certificates from respective manufacturers attesting that glass and glazing materials furnished for project comply with requirements.
 - 1. Separate certification will not be required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authorities having jurisdiction.
- E. Compatibility and Adhesion Test Report: Submit statement from sealer manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealers and interpreting test results relating to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.

1.05 DELIVERY, HANDLING AND STORAGE

- A. Deliver glazing materials to project site in manufacturer's unopened containers, fully identified with trade name, color, size, hardness, type, class and manufacturer's instructions.
- B. Deliver and store glass in accordance with manufacturer's recommendations, protected from weather, staining, damage and loss. During storage and handling of glass provide cushions at edges to prevent impact damage. Protect faces from scratches and abrasion.

1.06 JOB CONDITIONS

- A. The glazier must examine the framing and glazing channel surfaces, backing, removable stop design, and the conditions detrimental to the proper and timely completion of the work. Do not proceed with the glazing until unsatisfactory conditions have been corrected.

1.07 ENVIRONMENTAL CONDITIONS

- A. Do not perform glazing operations when temperature is below 40 degrees F, unless the manufacturer of the glazing materials specifically recommends application of his materials at lower temperatures. When the job progress or other conditions require glazing work when temperatures are below 40 degrees F (or below the minimum temperature recommended by the manufacturer), consult the manufacturer and establish the minimum provisions required to ensure satisfactory work. Record in writing to the manufacturer, with a copy to the Architect, the conditions under which such glazing work was performed and the provisions made to ensure satisfactory work.
- B. The glazier must examine the framing and glazing channel surfaces, backing, removable stop design and the conditions detrimental to the proper and timely completion of the work. Do not proceed with the glazing until unsatisfactory conditions have been corrected.

1.08 WARRANTY

- A. Manufacturer's Special Project Warranty on Insulating Glass: Provide written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for those insulating glass units developing manufacturing defects, with the F.O.B. point of manufacture, freight allowed project site, within the specified warranty period indicated below. Manufacturing defects are defined as failure of hermetic seal of air space beyond that due to glass breakage, as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coatings, if any, and other visual indications of seal failure or performance, provided that the manufacturer's instructions for handling, installing, protecting and maintenance of units have been complied with during the warranty period.

1. Warranty Period: 10 years after date of substantial completion.

1.09 SYSTEM DESCRIPTION

- A. Provide glass and glazing that has been produced, fabricated and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure including loss or breakage of glass, failure of sealers or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.

1. Normal thermal movement is defined as that resulting from an ambient temperature range of 120 degrees F and from a consequent temperature range within glass and glass framing members of 180 degrees F.
2. Deterioration of insulating glass is defined as failure of hermetic seal due to other causes than breakage which results in intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating, if any, resulting from seal failure and any other visual evidence of seal failure or performance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

1. Manufacturers of Clear and Tinted Float Glass:
 - a. AFG Glass.
 - b. Guardian Industries Corp.
 - c. PPG Architectural Glass.
 - d. Oldcastle Glass.
 - e. Pilkington Glass Ltd.
2. Manufacturers of Heat-Treated Glass:
 - a. Guardian Industries Corp.
 - b. North American Specialty Glass.
 - c. Oldcastle Glass.
3. Manufacturers of Insulating Glass:
 - a. AFG Glass.
 - b. Guardian Industries Corp.
 - c. Oldcastle Glass.

d. PPG Architectural Glass.

4. Manufacturers of other glass products shall be as specified.

2.02 GLASS MATERIALS

- A. Clear Float Glass (Type 1): Type I, Class 1, Quality q3 (glazing select), 1/4 inch thick, unless shown otherwise.
- B. Tinted Insulating Glass (Type 2): Provide 2 sheets of glass as follows, and 1/2 inch dry air or gas filled space with -20 degree F. dew point, with Class A sealant-type edge construction to maintain a hermetic seal.
1. Exterior Glass: Gray Tinted float glass, Low E Type I, Class 2, Quality q3, 1/4 inch thick.
 2. Interior Glass: Clear float glass (Type 1) Class 1, Quality q3, 1/4 inch thick.
 3. Edge Construction: Twin primary seals of polyisobutylene; tubular aluminum or galvanized steel spacer-bar frame with sealed or soldered sealed corners, and filled with dessicant; and secondary seal outside of bar, bonded to both sheets of glass and bar, of polysulfide, silicone or hot-melt butyl elastomeric sealant.
 4. Warranty: Provide manufacturer's standard 10-year product warranty on maintained hermetic seal.
 5. Insulating glass shall be manufactured by PPG Architectural Glass, or Guardian Industries Corp., or Oldcastle Glass.
- C. Spandrel Insulating Glass (Type 3): Provide 2 sheets of glass as follows, and 1/2 inch dry air or gas filled space with -20 degree F. dew point, with Class A sealant-type edge construction to maintain a hermetic seal.
1. Exterior Glass: Gray tinted float glass, Type I, Class 2, Quality q3, 1/4 inch thick.
 2. Interior Glass: Heat strengthened, ceramic coated (surface No. 3), Quality q3, 1/4 inch thick. Color of ceramic coating shall be gray. Spandrel glass shall be manufactured by PPG Architectural Glass, or Guardian Industries Corp., or Oldcastle Glass.
 3. Edge Construction: Twin primary seals of polyisobutylene; tubular aluminum or galvanized steel spacer-bar frame with sealed or soldered sealed corners, and filled with dessicant; and secondary seal outside of bar, bonded to both sheets of glass and bar, of polysulfide, silicone or hot-melt butyl elastomeric sealant.
 4. Warranty: Provide manufacturer's standard 10-year product warranty on maintained hermetic seal.
 5. Insulating glass shall be manufactured by PPG Architectural Glass, or Guardian Industries Corp., or Oldcastle Glass.
- D. Clear Tempered Glass (Type 4): Heat treated to 4 - 5 times annealed strength, 1/4 inch thick, unless shown otherwise. In general, provide clear tempered glass below 18 inches above all finish floors.
- E. Mirror Glass (Type 5):
1. Type 1, Class 1 of the following quality: Quality "q1" if less than 25 square feet. Quality "q2" if more than 25 square feet.
 2. Provide silvering, copper backing and protective coating conforming to FS DD-M-411.
 3. Provide 3/4 inch beveled edges and polished edges where indicated on drawings.

4. Provide “J” type frames, top and bottom, where shown.
- F. Mirror Mastic: An adhesive setting compound manufactured specifically for setting mirrors with support at bottom edge only, to be used in spot application of 1/8 inch to 1/2 inch thickness and with less than 25 percent of mirror back area in contact with mastic.
- G. Fire Rated Glass (Type 6): Shall be clear, polished; shall be of thickness required for rating indicated; shall be Firelite, manufactured by Nippon Electric Glass America, SGG Contraflam-N2, Manufactured by Saint-Gobain North America, or Pilkington Pyrostop, manufactured by Pilkington Fire Protection Glass. Fire rated glass shall be furnished complete with steel frames so that the assembly provides UL tested fire ratings indicated on drawings.
- H. Decorative Glass (Type 7): Shall be custom pattern glass in sizes, thickness and installation as called for in the drawings.
- I. Radiation Shielding Leaded Glass (Type 8); Clear leaded glass containing 48 percent lead oxide (by weight) and 15 percent barium. Thickness as required to provide radiation protection equivalent to that provided by sheet lead in partition in which lead glass is installed. Equivalencies based on 150 KV unless indicated otherwise.
1. Equivalency: 1.6 mm.
 2. Equivalency: 2.1 mm.
 3. Equivalency: 2.5 mm.
 4. Equivalency: 3.3 mm.
- J. Decorative Fire Rated Glass (Type 9) Shall be clear, polished; shall be of thickness required for rating indicated; shall be Firelite, manufactured by Nippon Electric Glass America, SGG Contraflam-N2, manufactured by Saint-Gobain North America, or Pilkington Pyrostop, manufactured by Pilkington Fire Protection Glass. Fire rated glass shall be furnished complete with steel frames so that the assembly provides UL tested fire ratings and custom pattern indicated on drawings.
- K. Integral miniblind glass window (Type 10); Provide two sheets of (Type 1) 1/4 inch thick glass with a 5/8 inch space in between and install 625 series 5/8 inch miniblind system between the glass sheets. System shall be as manufactured by Kawneer Sealair Architectural window series. Provide snap-in mounting clips at head, stationary hollow clips at bottom rail, standard tilt knob assembly mounted at bottom right of hollow metal frame. Extend flex cable and install rod in the hollow metal cavity for mechanical operation.
- L. Sliding Glass Pass-Through: Shall be furnished and installed complete including track assemblies and hardware. Glass panels shall be 1/4 inch thick clear float glass. Track assemblies shall have stainless steel rails and ball bearing rollers. Exposed edges of glass shall be ground and polished. Provide ground-in pulls unless shown otherwise. Provide key operated lock.
- 2.03 GLAZING MATERIALS
- A. Glazing Sealers:
1. General: Provide color of exposed sealer/compound indicated or if not otherwise indicated, as selected by Architect from manufacturer’s standard colors. Comply with manufacturer’s recommendations for selection of hardness, depending upon the location of each application, and performance requirements as indicated. Select materials, and variations or modifications carefully for compatibility with surfaces contacted in the installation.
 2. Glazing Tape: Pre-formed butyl tape, NAAMM SS-1B-68, 10 - 15 durometer hardness, paper release, color as selected by Architect, thickness and depth in

accordance with FGMA details.

3. Elastic Glazing Compound: Shall be DAP Inc.'s 1012 glazing compound, or Pecora Chemical Corp.'s M-242.
4. One-Part Silicone Glazing Sealer: Elastomeric sealer complying with FS TT-S-001543, Class A, non-sag. Provide acid type recommended by manufacturer where only non-porous bond surfaces are contacted; provide non-acid type recommended by manufacturer where one or more porous bond surfaces are contacted.

B. Glazing Gaskets:

1. Molded Neoprene Glazing Gaskets: Molded or extruded neoprene gaskets of the profile and hardness required for water-tight construction, comply with ASTM D 2000 designation 2BC 415 to 3BC 620, black.
2. Polyvinyl Chloride Glazing Gaskets: Extruded, flexible PVC gaskets of the profile and hardness shown, or as required for watertight construction, comply with ASTM D 2287.

C. Miscellaneous Glazing Materials:

1. Setting Blocks: Neoprene block 70-90 Shore A durometer hardness, tested for compatibility with specified glazed sealer.
2. Spacers: Neoprene block of 40-50 Shore A durometer hardness, adhesive backed on one face only and tested for compatibility with specified glazing sealer.
3. Cleaners, Primers and Sealers: Type recommended by sealer or gasket manufacturer.
4. Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealer, of size and hardness required to limit lateral movement, side-walking, of glass.
5. Compressible Filler Rods: Closed-cell or waterproof jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5 - 10 psi compression strength for 25 percent deflection.

2.04 FABRICATION

- A. Obtain sizes from shop drawings or by field measurement. Cut glass to fit each opening with minimum edge clearance and bite on glass as recommended by glass manufacturer. Do not nip glass edges. Factory cut heavy glass (3/8 inch and above). For glass to be cut at site, provide glass 2 inches larger (in both dimensions) than required, to facilitate cutting of clean-cut edges without the necessity of seaming or nipping. Do not cut, seam, nip or abrade tempered or heat-strengthened glass after tempering.
1. When glass will be precut to sizes obtained from shop drawings, take field measurements of each openings, before glazing, to verify adequate bite on the glass and minimum edge clearance. Openings which do not fall within the tolerances for which precut has been sized, shall be glazed only with glass specifically cut to fit such openings.

PART 3 - EXECUTION

3.01 CONDITION OF SURFACES

- A. Examine surfaces and adjoining construction, and conditions under which work is to be installed. Do not proceed with work until unsatisfactory conditions detrimental to the proper and timely completion of the work have been corrected.

3.02 PREPARATION

- A. Pre-Installation Meeting: Meet at the project site with the glass manufacturer's representative, sealer manufacturer's representative, glazier, and fabricator of framing or their supporting structure to receive glass. Review the glazing procedure applying glazing materials and installing removable stops. Evaluate suitability of specified compounds and sealers for anticipated weather conditions. Review coordination with other work.
- B. Clean glazing channels, stops and rabbets to receive glazing materials of obstructions and deleterious substances which might impair the work. Remove protective coating which might fail in adhesion or interfere with bond of sealers. Comply with manufacturer's instructions for final wiping of surfaces immediately before application of primer and glazing compounds or tapes. Wipe metal surfaces with zylol or toluol.
- C. Prime surfaces to receive glazing compounds in accordance with manufacturer's recommendations, using recommended primers.

3.03 INSTALLATION, GENERAL

- A. The installation of each light of exterior glass shall be watertight and airtight and capable of withstanding temperature changes, wind loading and impact from operation of doors, without failure of any kind including loss or breakage of glass, failure to seal, exudation of sealer and excessive deterioration of glazing materials. Wet seal exterior of glass units in framing.
- B. Inspect each piece of glass immediately before installation. Do not install any pieces which have damaged edges, scratches or abrasion or any other evidence of damage. Remove labels on glass before installation.
 - 1. Glass shall be handled and glazed carefully to prevent edge damage. A "rolling block" shall be temporarily fitted to the corner when used by glazier to rotate the unit. The "rolling block" minimizes the chances of damaging the corner of the unit by distributing the weight at the corner. Care shall be taken not to impact the metal framing or corrode the unit during installation.
- C. Glazing channel dimensions, as shown, provide for minimum bite on the glass, minimum edge clearance and adequate sealer thicknesses, with reasonable tolerance. Be responsible for the correct glass size for each opening, within the tolerances and dimensions established.
 - 1. The glazing rabbet shall provide for a minimum face clearance of 3/16 inch indoors with a minimum edge clearance of 1/4 inch. The nominal bite on the glass shall be in accordance with the glass manufacturer's recommendations.
- D. Comply with "Glazing Manual" by Flat Glass Marketing Association, except as shown and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the glass and glazing materials.
- E. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.
- F. Locate setting blocks at sill one quarter in from each end of the glass, unless otherwise recommended by the glass manufacturer. Use blocks of proper size to support the glass in accordance with manufacturer's recommendations.
 - 1. Glass should be set on 2 identical setting blocks (neoprene or E.P.D.M.). Setting blocks shall be centered at 1/4 points, and never less than 6 inches from the edges of the insulating unit to the end of the setting block. Setting blocks shall always be equidistant from the centerline of the glass.
 - 2. The length of each setting block shall be 6 inches. The setting blocks should be 1/16 inch less than full rabbet width and high enough to provide the recommended

nominal bite and minimum edge clearance for the glass. If the glass setting blocks exceed 3/4 inch thickness (height), the glass manufacturer shall be consulted.

- G. Provide spacers for all glass sizes larger than 50 united inches, to separate glass from stops, except where continuous glazing gaskets or felts are provided. Locate spacers no farther than 24 inches apart and no closer than 6 inches to a corner. Place spacers opposite one another.
- H. Set glass in a manner which produces greatest possible degree of uniformity in appearance.
- I. Do not use 2 different glazing materials in the same joint system unless the manufacturer of each material has stated in writing that his material is fully compatible with the other materials.
- J. Use masking tape or other suitable protection to limit coverage of glazing materials to the surface intended for sealers.
- K. Butt or lap ends of tapes in accordance with manufacturer's recommendations.
- L. Tool exposed surfaces of glazing materials to provide a slight wash away from the glass. Install exposed tapes and gaskets with a slight protrusion above stops in the final compressed condition.
- M. Install sealers as recommended by the sealer manufacturer.
- N. Voids and Filler Rods: Prevent exudation of sealer or compound by forming voids or installing filler rods in the channel at the heel of jambs and head (do not leave voids in the sill channels) except as otherwise indicated, depending on the light size, thickness and type of glass and complying with manufacturer's recommendations.
- O. Do not attempt to cut, seam, nip or abrade glass which is tempered, heat-strengthened or coated.
- P. Force sealers into channel to eliminate voids and to insure complete "wetting" or bond of sealer to glass and channel surfaces.
- Q. Tool exposed surfaces of glazing liquids and compounds to provide a substantial "wash" away from the glass. Install pressurized tapes and gaskets to protrude slightly out of the channel to eliminate dirt and moisture pockets.
- R. Clean and trim excess glazing materials from the glass and stops or frames promptly after installation and eliminate stains and discolorations.
- S. The compressive pressure on the glass face should be a minimum of 4 pounds per lineal inch of edge to provide some assurance of an adequate seal. The pressure on the glass surface should not exceed 10 pounds per lineal inch.
- T. The sealer depth shall be a minimum of 1/4 inch total to provide a watershed.
- U. Glazing materials shall be resilient, non-hardening and elastomeric sealers, tapes, or elastomeric gaskets. Oil-based glazing and putty compounds shall not be used. Alternate glazing sealers require Architect's written approval and may be suitable, but verify with the sealer manufacturer and glass manufacturer for compatibility of the sealers before use on the project.
- V. Glazing compounds shall not be thinned with chlorinated solvents (dry cleaning fluids) or benzene related compound such as toluene.
- W. When a heel bead is necessary, ensure compatibility between the glazing material and insulating glass seal. This compatibility shall be tested and so noted between the insulated glass manufacturer and the glazing sealer manufacturer.
- X. Glass shall be centered in the opening vertically and horizontally to literally float in the opening (no point loading). Shore A durometer hardness of the "rubber" shall be determined by the particular glass manufacturer involved. The bumper block shall be full channel width; shall be placed in the vertical channel, and be at least 3 inches in length. A nominal 1/8 inch clearance shall be allowed between the edge of the glass and the bumper.

3.04 CURE, CLEANING AND PROTECTION

- A. Cure glazing sealers and compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
- B. Clean excess sealer or compound from glass and framing members immediately after application, using solvents or cleaners recommended by manufacturers.
- C. Protect glass from breakage immediately upon installation. Use streamers or ribbons suitably attached to framing and held free to the glass. Do not apply warning markings directly to the glass.
- D. Protect glass and glazing materials during the construction period so that they will be without any indications of damage or deterioration at the time of acceptance. Cover glass to protect it from welding, and other activities that might abrade the surfaces.
- E. Remove and replace all glass which is broken, cracked, chipped or damaged in any way and from any source, vandalism or accidents until acceptance of project by Owner.
- F. Maintain glass in a reasonably clean condition during construction so that it will not become stained and will not contribute to the deterioration of glazing materials.
- G. Wash glass on both faces, not more than 4 days prior to acceptance. Comply with instructions and recommendations of the glass manufacturer and glazing materials manufacturer for cleaning in each case.

END OF SECTION 08800

