SECTION 08 8000

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Glass for other sections referencing this Section.
2. Unframed mirrors.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA) 800 - Voluntary Specifications and Test Methods for Sealants.

B. American National Standards Institute (ANSI) Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.

C. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.

D. ASTM International (ASTM):
1. C509 - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
2. C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.
3. C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
4. C920 - Standard Specification for Elastomeric Joint Sealants.
5. C1036 - Standard Specification for Flat Glass.
6. C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT, Coated and Uncoated Glass.
7. C1115 - Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.
8. C1172 - Standard Specification for Laminated Architectural Flat Glass.
9. C1184 - Standard Specification for Structural Silicone Sealants.
10. C1281 - Standard Specification for Preformed Tape Sealants for Glazing Applications.
11. C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
12. E119 - Standard Test Method for Fire Tests of Building Construction and Materials.
13. E152 - Standard Test Method for Fire Test of Door Assemblies.
14. E163 - Standard Test Method for Fire Tests of Window Assemblies.
15. E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
16. E774 - Standard Specification for Sealed Insulating Glass Units.
17. E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
18. E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
19. F1233 - Standard Specification for Security Glazing Materials and Systems.

E. Glass Association of North America (GANA):
1. Engineering Standards Manual.
2. Glazing Manual.
3. Laminated Glass Design Guide.

F. Insulating Glass Manufacturers Alliance (IGMA):
1. IGMA TB-3001 - Sloped Glazing Guidelines.
2. SIGMA TM-3000 - Glazing Guidelines for Sealed Insulating Glass Units.

G. National Fenestration Rating Council (NFRC):

1. 100 - Procedure for Determining Fenestration Product Thermal Properties.
2. 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence.
3. 300 - Procedures for Determining Solar Optical Properties of Simple Fenestration Products.

1.3 SYSTEM DESCRIPTION

A. Glass Thicknesses:
1. Indicated thicknesses are minimums; select actual glass thicknesses by analyzing loads and conditions.
2. Size glass to withstand positive and negative wind pressure acting normal to plane in accordance with Building Code as measured in accordance with ASTM E330.
3. Provide glass in thicknesses and strengths to meet or exceed following criteria:
a. Comply with ASTM E1300.
b. Probability of breakage for vertical glazing: 8 lites per 1000 for lites set within 15 degrees of vertical and under wind load for load duration of 3 seconds.
c. Probability of breakage for sloped glazing: 1 lite per 1000 for lites set more than 15 degrees off vertical and under wind load for duration of 30 days.
d. Thickness of tinted glass: Provide same thickness for each tint color for all applications.

B. Thermal and Optical Performance Properties: Provide glass meeting specified performance properties, based on manufacturer's published test data for units of thickness indicated:
1. U-factor: Per NFRC 100 expressed as Btu/square foot x hour x degree F.
2. Solar heat gain coefficient: Per NFRC 200.
3. Solar optical properties: Per NFRC 300.

1.4 SUBMITTALS

A. Submittals for Review:
1. Product Data: Descriptive data and performance attributes for insulated glass.
2. Samples:
a. 12 x 12 inch glass samples.
b. 1/4 x 1/4 x 3 inch long sealant and glazing compound samples showing available colors.
B. Quality Control Submittals:
1. Test Report: Preconstruction adhesion and compatibility test report from glazing sealant manufacturer, based on submitted samples or acceptable data from previous testing of current formulations with similar products.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Minimum 5 years experience in work of this Section.

B. Regulatory Requirements: Provide tempered safety glass for locations subject to human impact as required by Building Code.

C. Perform Work in accordance with GANA Glazing Manual, SIGMA TM-3000 and SIGMA TB-3001.

D. Fire Rated Glass Assemblies: Conform to ASTM E119.

1.6 PROJECT CONDITIONS

A. Perform glazing when ambient temperature is above 40 degrees F.

B. Perform glazing on dry surfaces.

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1.7 WARRANTIES

A. Insulating Glass Units or laminated glass units: Provide manufacturer's 10 year warranty against material obstruction of vision through unit due to:
   1. Intrusion of dust or moisture.
   2. Internal condensation.
   3. Film formation on internal glass surfaces caused by failure of hermetic seal except failure caused in whole or in part by breakage or fracturing of any portion of glass surface.

B. Glass Coatings: Provide manufacturer's 10 year warranty against peeling, cracking, or deterioration of coating under normal conditions.

C. Mirrors: Provide manufacturer's 10 year warranty against silver spoilage resulting from manufacturing defects.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers - Glass:
   1. ACH Glass Operations. (www.versaluxglass.com)
   2. AFGD, Inc. (www.afgd.com)
   3. Guardian Industries Corp. (www.guardian.com)
   4. Pilkington Architectural. (www.pilkington.com)
   5. PPG Industries, Inc. (www.ppgglazing.com)
   6. Viracon, Inc. (www.viracon.com)

B. Acceptable Manufacturers - Plastic Glazing:
   1. Sheffield Plastics. (www.sheffieldplastics.com)
   2. Or equal

2.2 MATERIALS - GLASS

A. Clear Glass: ASTM C1036, Type 1 transparent flat, Class 1 clear.

B. Tinted Glass:
   1. Type: ASTM C1036, To match existing windows indicated on drawings.

C. Tinted Tempered Glass:
   1. Type: ASTM C1048, To match existing windows indicated on drawings.

D. Mirror Glass: ASTM C1036, Type I transparent flat, Class 1 clear mirror

2.3 MATERIALS - FIRE-RATED GLASS

A. Fire Rated Glass:
   1. Type: Specially tempered glass, clear, of fire resistance ratings indicated.

2.4 MATERIALS - PLASTIC GLAZING

A. Polycarbonate Sheet:
   1. Type: ANSI Z97.1; plastic compound, ultraviolet stabilized, non-yellowing.
   2. Color: To be selected by Owner from samples submitted by contractor.

2.5 ACCESSORIES

A. Setting Blocks: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 80 to 90 Shore A durometer hardness.

B. Spacers: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 50 to 60 Shore A durometer hardness.

C. Glazing Gaskets:
   1. Dense compression gaskets: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone or thermoplastic polyolefin rubber, molded or extruded shape to fit glazing channel retaining slot; black color.
   2. Soft compression gaskets: ASTM C509, Type II, black, molded or extruded, neoprene, EPDM, silicone or thermoplastic polyolefin rubber, of profile and hardness required to maintain watertight seal; black color.

D. Contact Sealant:
   1. Type: ASTM C1184, multi component, high modulus, neutral chemical curing silicone glazing and curtain wall sealant.
   2. Movement capability: 12 percent in extension and compression.
   3. Color: To be selected from manufacturer's full color range.

E. Contact Sealant:
   1. Type: Single component, medium modulus, neutral moisture curing silicone sealant; ASTM C1184 and ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G and A.
   2. Movement capability: 50 percent in extension and compression.
   3. Color: To be selected from manufacturer's full color range.

F. Weather-seal Sealant:
   1. Type: Single component, low modulus, neutral moisture curing silicone sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G and A.
   2. Movement capability: 50 percent in extension and compression.
   3. Color: To be selected from manufacturer's full color range.

G. Butt Joint Glazing Sealant: ASTM C920, Type S, Grade NS, Class 25; single component silicone, low modulus type, non sag, color to be selected from manufacturer's full color range.

H. Glazing Sealant: ASTM C920, Type S, Grade NS, Class 25; single component silicone, low modulus, non sag, color to be selected from manufacturer's full color range.

I. Sealant Backing: ASTM C1330, Type O, size and density to control glazing sealant depth and produce optimum glazing sealant performance.

J. Primer: As recommended by glazing sealant manufacturer.

K. Glazing Compound: Modified oil type, non hardening, knife grade consistency, color to be selected from manufacturer's full color range.

L. Mirror Adhesive: Adhesive setting compound, produced specifically for setting mirrors by spot application method.

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2.6 FABRICATION

A. Tempered Glass:
   1. Comply with ASTM C1048.
   2. Process in horizontal position so that inherent roller distortion will run parallel to building floor lines after installation.

B. Sealed Insulating Glass:
   1. Comply with ASTM E774 and ASTM E2190.
   2. Fabricate spacer bar frame of tubular aluminum filled with desiccant.
   3. Bond spacer bar frame to glass panes with twin primary seals.
   4. Fill space outside frame to glass edge with elastomeric sealant.

C. Fabrication Tolerances: ASTM C1036 and ASTM C1048.

D. Glass Identification:
   1. Apply manufacturer's label indicating type and thickness to each light of glass. Show position of exterior face when installed, where applicable.
   2. Etch manufacturer's label on each light of tempered glass.

E. Source Quality Control:
   1. Preconstruction adhesion and compatibility testing:
      a. Perform adhesion test including ultraviolet exposure through glass on production samples of metals and glass in accordance with ASTM C794.
      b. Test glass units, glazing materials, and glass framing members with specified finish for sealant compatibility, priming, and preparation requirements for optimum adhesion and performance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean glazing rabbets; remove loose and foreign matter.

B. Remove protective coatings on metal surfaces.

C. Clean glass just prior to installation.

3.2 INSTALLATION - GENERAL

A. Install glass in accordance with glass manufacturer's instructions.

B. Maintain manufacturer's recommended edge and face clearances between glass and frame members.

3.3 INSTALLATION - STRUCTURAL SILICONE GLAZING METHOD

A. Mask aluminum and glass surfaces adjacent to sealant pockets.

B. Install temporary glass retainers to align faces of glass.

C. Apply contact sealant; completely fill pockets. Tool joints and remove masking tape before sealant skim cure begins.

D. Allow sealant to cure minimum time required by manufacturer.

E. Remove temporary glass retainers.

F. Insert joint backing to fill void between glass unit edges and glass spacer.

G. Mask both sides of glass for full length of joint.

H. Apply weatherseal sealant; tool to smooth, slightly concave profile.

3.4 INSTALLATION - SILICONE GLAZING METHOD

A. Mask both sides of joint for full length.

B. Install temporary glass retainers to align faces of glass.

C. Provide temporary joint backing for one side of joint.

D. Apply sealant to completely fill spaces; tool to smooth, slightly concave surface.

E. Allow sealant to cure minimum time required by manufacturer. Remove temporary backing and fill voids with additional sealant.

3.5 INSTALLATION - GASKET GLAZING METHOD

A. Fabricate gaskets to fit openings; allow for stretching of gaskets during installation.

B. Set soft compression gasket against fixed stop or frame with bonded miter cut joints at corners.

C. Set glass centered in openings on setting blocks.

D. Install removable stops and insert dense compression gaskets at corners, working toward centers of glass, compressing glass against soft compression gaskets to produce weathertight seal.

E. Seal joints in gaskets.

F. Allow gaskets to protrude past face of glazing stops.

3.6 INSTALLATION - PRESSURE GLAZING METHOD

A. Set glass unit in opening as recommended by system manufacturer.

B. Tighten fasteners simultaneously at rate recommended by manufacturer to avoid unequal point pressures on glass.

C. Torque fasteners to achieve required pressure against glass. Do not over tighten.

3.7 INSTALLATION - SEALANT GLAZING METHOD

A. Apply sealant to full depth of permanent stops.

B. Press glass into sealant with slight lateral movement to ensure adhesion.

C. Apply sealant to full depth of removable stops. Secure stops in position, forcing contact with sealant bead and completely filling joint.

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3.8 INSTALLATION - SEALANT AND TAPE GLAZING METHOD

A. Apply tape to permanent stops, projecting slightly above sight line.

B. Press glass into contact with tape.

C. Install removable stops with spacer shims between stop and glass.

D. Fill gap between removable stop and glass with glazing sealant.

E. Trim protruding tape edges.

3.9 INSTALLATION - COMPOUND GLAZING METHOD

A. Locate and secure glass using glazing clips.

B. Fill voids between glass and stops with glazing compound; tool to straight line. Slope to exterior for watershed.

3.10 INSTALLATION - MIRRORS

A. Apply mirror adhesive in accordance with manufacturer's instructions to cover maximum 25 percent of back of mirror. Set mirror and press against substrate to ensure adhesive bond.

B. Leave minimum 1/8 inch open ventilation space between mirror and substrate over 75 percent of mirror area. Do not seal off ventilation space at edges.

C. Place plumb and level without distortion.

3.11 PROTECTION

A. After installation, mark glass with an 'X' using removable plastic tape.

END OF SECTION