

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, equipment, tools, and services necessary for glass and glazing Work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 ASTM C920, Specification for Elastomeric Joint Sealants.
- .2 ASTM D2240, Test Method for Rubber Property - Durometer Hardness.
- .3 CAN/CGSB-12.1-M, Tempered or Laminated Safety Glass.
- .4 CAN/CGSB-12.3-M, Flat, Clear Float Glass.
- .5 CAN/CGSB-12.8, Insulating Glass Units.
- .6 CAN/CGSB-12.20-M, Structural Design of Glass for Buildings.
- .7 Glass Association of North America (GANA) Glazing Manual.

1.3 **DESIGN REQUIREMENTS**

- .1 Glass Design:
 - .1 Design glass using a probability of breakage of 8 lites per 1000 at the first application of design load.
 - .2 Design glass to CAN/CGSB-12.20-M. Perform stress analysis. Design units to accommodate live, dead, lateral, wind, seismic, handling, transportation, and erection loads.
 - .3 Perform a thermal stress analysis on each glass unit with Low-E coating and provide heat strengthening and/or tempered units as necessary to prevent thermal breakage.
 - .4 Perform a thermal stress analysis on each insulating thermal unit and provide heat strengthening and/or tempered units as necessary to prevent thermal breakage.
 - .5 Where required, design glazing units so as not to allow thermal stress fracture due to heat build-up behind insulating units.
- .2 Structural Glazing:
 - .1 Carry out design of structural silicone joints by rational analysis including all movements specified herein. Maximum stress shall not exceed 138 kPa (20 psi) in tension or shear for short term loading. Maximum stress in shear for long term loading due to the dead load of glass shall not exceed 7 kPa (1 psi) or the limit imposed by sealant manufacturer, whichever is less.
 - .2 The joint shall be essentially rectangular in shape and shall include no internal corners which could precipitate tearing or create high local stresses.

- .3 Single Source Responsibility for Sealants, Gaskets and Other Glazing Accessories: In order to ensure consistent quality of performance, provide all glazing sealants and seals from a single manufacturer.
- .4 Preconstruction Compatibility and Adhesion Testing: Submit to sealant manufacturer, samples of each glass, gasket, glazing accessory and glass-framing member that will contact or affect glazing sealants for compatibility and adhesion testing. Schedule submission of test samples to provide sufficient time for testing and analysis of results to prevent delay in the progress of work.

.3 Limit glass deflection to flexural limit of glass with full recovery of glazing materials.

.4 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

1.4 SUBMITTALS

.1 Shop drawings: Submit shop drawings in accordance with Section 01 10 10 for fabrication and erection of glazing elements indicating materials, thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.2 Samples:

.1 Submit following samples in accordance with Section 01 10 10.

.2 Submit one 300 x 300 mm sample of each type of insulating glass unit, complete with each different Low-E coating.

.3 Certificates: Submit manufacturer's certification that glass and glazing materials are compatible.

.3 Submit compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.

.4 Compatibility test report from manufacturer of insulating glass edge sealant, indicating that glass edge sealants were tested for compatibility with other glazing materials including sealants, setting blocks, edge blocks and any other material that contacts or can affect the edge seal.

.5 IGMA Compliance Audit: Submit in accordance with Section 01 10 10, a written certification of successful completion of a Compliance Audit within the last six months.

1.5 **QUALITY ASSURANCE**

- .1 Insulating glass unit fabricators shall be a certified member of the Insulating Glass Manufacturer's Alliance (IGMA). IGMA members must participate in the certification program and shall have successfully passed a Compliance Audit within the last six months.
- .2 Installers qualifications: Perform Work of this Section by a company that has a minimum of five years proven experience in the installation of glazing units of a similar size and nature.

1.6 **SITE CONDITIONS**

- .1 Glaze with compounds, sealants, or tapes only when glazing surfaces are at temperatures over 4°C, and when positive that no moisture is accumulating on them from rain, mist, or condensation.
- .2 When temperature of glazing surfaces is below 4°C, obtain from Consultant approval of glazing methods and protective measures which will be used during glazing operations.

1.7 **EXTENDED WARRANTY**

- .1 In accordance with Section 08 44 00.

2 Products

2.1 **ACCEPTABLE MANUFACTURERS**

- .1 Glass manufacturers:
 - .1 AGC Flat Glass.
 - .2 Cardinal Glass Industries.
 - .3 Guardian Industries.
 - .4 PPG Industries Ltd.
 - .5 Viracon Inc.

2.2 **MATERIALS**

- .1 All materials under Work of this Section, including but not limited to, primers, coatings, sealers, sealants, adhesives and cleaners are to have low VOC content limits.
- .2 Float glass (**FGL**): CAN/CGSB-12.3-M; clear, glazing quality, minimum 6 mm thick. Clear or tinted as indicated. Heat strengthened as required.
- .3 Tempered glass (**TGL**): CAN/CGSB-12.1-M, Type 2, Class B, Category II, clear, minimum 6 mm thick.

- .4 Laminated glass (**LGL**): CAN/CGSB-12.1, Category II, heat strengthening and/or tempered laminated glass as necessary to prevent thermal breakage consisting of top layer of 10 mm thick clear float glass, 0.8 mm thick clear PVB interlayer, and bottom layer of 10 mm thick clear float glass minimum thickness, at stair guardrails.
- .5 Insulating glass units: To CAN/CGSB-12.8-M and IGMA requirements utilizing approved metallic stainless steel edge spacer. Dual seal with a PIB primary seal and silicone secondary seal. Use perforated metallic stainless steel edge spacer for acoustical glass units.
- .6 Argon gas: 100% pure. Argon gas to be used to fill air space at all insulated glass units.
- .7 Low-E coating (Soft coat): High performance sputtered low-E coating. Provide insulating glass units with low-E coating edge deletion and low-E coating. Apply low-E coating to second surface unless otherwise indicated. 'EnergySelect 36' by AGC Flat Glass, 'Cardinal LoE-272' by Cardinal Glass Industries or 'SN 68' by Guardian Industries.
- .8 Glazing types:
 - .1 Type 1: TGL outside, air space, FGL inside. Standard throughout unless noted otherwise. 25 mm overall thickness.
 - .2 Type 2: Clear TGL outside, air space, TGL inside. At exterior doors. 25 mm overall thickness.
 - .3 Type 3: Clear LGL at glazed railing systems.
- .9 Glazing and rebate primers, sealants, sealers, and cleaners: Compatible with each other. Type as recommended by glass manufacturer.
- .10 Glazing sealant: Silicone sealant as recommended by glazing manufacturer. Verify compatibility with insulating glass unit secondary sealant.
- .11 Glazing Sealant (Structural Glazing):
 - .1 Silicone, One Part in accordance with ASTM C920, Type S or M, Grade NS, Class 25.
 - .2 Structural glazing tensile bead: 'Spectrem 2 Sealant' by Tremco or 'Dow 795' by Dow Corning.
 - .3 Structural glazing weather bead: 'Spectrem 2 Sealant' by Tremco or 'Dow 795' by Dow Corning.
 - .4 Structural glazing (factory glazed): Two-part, neutral cure silicone sealant, 'Proglaze II' by Tremco or 'Dow 983' by Dow Corning.
 - .5 Colour to later selection of Consultant.
- .12 Heel & toe bead: Silicone sealant as recommended by glazing manufacturer.
- .13 Glazing gasket: 'Visionstrip' by Tremco Ltd., extruded composite glazing seal, size as recommended by manufacturer.
- .14 Glazing tape: 'Polyshim II' glazing tape EPDM shim.

- .15 Glazing splines: Silicone, extruded shape to suit glazing channel retaining slot, colour as selected.
- .16 Setting blocks (regular): EPDM, 80 - 90 Shore A durometer hardness to ASTM D2240, sized to suit glazing method, glass unit weight and area.
- .17 Setting Block (Structural Glazing): Silicone setting blocks with Shore, Type A durometer hardness of 85, plus or minus 5 to ASTM D2240, sized to suit glazing method, glass unit weight and area.
- .18 Edge blocks: EPDM, 60-70 Shore A Durometer hardness, sized with 3 mm clearance from glass edge and spanning glass thickness(es). Capable of withstanding weight of glass unit, self adhesive on face.
- .19 Glass presence markers: Easily removable, non-residue depositing.
- .20 Screws, bolts and fasteners: Type 304 stainless steel.

2.3 **FABRICATION**

- .1 Verify glazing dimensions on Site.
- .2 Clearly label each glass lite with maker's name and glass type. Ensure labels are easily removable, non-residue depositing type. Do not remove labels until after Work is accepted by Consultant.
- .3 Fabricate glazing not less than 3 mm smaller than rebate size in either dimension; allow for edge spacers, shims, and setting blocks as necessary.
- .4 Work shall have smooth finished surfaces free from distortion and defects detrimental to appearance and performance.
- .5 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to the Consultant's acceptance.
- .6 Grind and polish a 1.5 mm arris to both edges of exposed glazing at locations where glazing is not encapsulated in framing and where edges are exposed to occupants.
- .7 Fabricate argon filled thermal units with air space filled minimum 90% with argon gas.

3 Execution

3.1 **EXAMINATION**

- .1 Verify that openings for glazing are correctly sized and within tolerance.

- .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 PREPARATION

- .1 Clean contact surfaces with solvent and wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- .3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION

- .1 Provide glazing in accordance with IGMA recommendations. Provide continuous contact between glazing tapes and gasket to the glazing.
- .2 Install glazing to the Work of Sections 08 44 00 and 08 56 88.
- .3 Provide neat, straight sight lines. Trim excess glazing material flush with top of stops and fixed leg of frames.
- .4 Remove protective coatings, glazing stops, clean rebate and glass contact surfaces with solvent, wipe dry.
- .5 Apply primer/sealer to contact surfaces, prior to glazing.
- .6 Apply glazing tape as per manufacturer's instructions including recommended corner sealant.
- .7 Use setting blocks at 1/4 points and spacers to centre glass unit in frame.
- .8 Install glazing in accordance with reviewed shop drawings and manufacturer's written instructions. Install glazing with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.
- .9 Apply a continuous heel bead of sealant around perimeter of inboard lite of the sealed unit and the metal framing.
- .10 Re-install glazing stops ensuring continuous contact and rattle-free installation. Do not distort glass. Trim tape protruding more than 2 mm above stop.
- .11 Install glazing gasket in accordance with manufacturer's recommendations.
- .12 Do not cut or abrade tempered, heat treated, or coated glass.
- .13 Install glass presence markers in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

- .14 Remove, dispose of, and replace broken, cut, abraded glass, and defective glass including but not limited to production dimples, 'tiger-stripping', chips, cracks, etc.
- .15 Exterior glass: Glaze units with gasket on exterior side and glazing tape on interior side. Seal gap between glazing and stop with sealant to depth equal to bite of frame. Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.
- .16 Exterior glass (Structural Glazing): Glaze units in accordance with reviewed shop drawings and in accordance with manufacturer's written instructions.

3.4 CLEANING

- .1 Immediately remove sealant and compound droppings from finished surfaces.
- .2 Remove labels, protective material, and glass presence markers from prefinished surfaces.
- .3 Clean glass surfaces with cleaning agents and methods in accordance with Manufacturer's written instructions.

END OF SECTION