PART 1 – GENERAL

1.1 RELATED WORK

.1 Glass and glazing of:

.1	Architectural Woodwork	Section 06 40 00
.2	Metal Doors and Frames	Section 08 11 00
.3	Aluminum Doors and Door Frames	Section 08 11 16
.4	Wood Doors	Section 08 14 16
.5	Aluminum Curtain Wall System	Section 08 44 13
.6	Architectural Drawings	

1.2 REFERENCES

.1 ASTM C162-05(2015), Standard Terminology of Glass and Glass Products.

.2 ASTM C542-05(2017), Standard Specification for Lock-Strip Gaskets.

.3 ASTM C864-05(2019), Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

.4 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.

.5 ASTM C1036-21, Standard Specification for Flat Glass.

.6 ASTM C1048-18, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

.7 ASTM C1115-17(2022), Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.

.8 ASTM C1172-19, Standard Specification for Laminated Architectural Flat Glass.

.9 ASTM C1184-18e1, Standard Specification for Structural Silicone Sealants.

.10 ASTM C1193-16, Standard Guide for Use of Joint Sealants.

.11 ASTM C1376-21a, Standard Specification for Pyrolitic and Vacuum Deposition Coatings on Flat Glass.

.12 ASTM C1401-14, Standard Guide for Structural Sealant Glazing.

.13 ASTM C1503-18, Standard Specification for Silvered Flat Glass Mirror.

.14 ASTM E1300-16, Standard Practice for Determining Load Resistance of Glass in Buildings.

.15 ASTM E2188-19, Standard Test Method for Insulating Glass Unit Performance.

.16 ASTM E2189-19, Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.

.17 ASTM E2190-19, Standard Specification for Insulating Glass Unit Performance and Evaluation.

.18 CAN/CGSB-12.1-2022, Safety Glazing.

.19 CAN/CGSB-12.8-2017 (R2022), Insulating Glass Units.

.20 CAN/ULC-S104-15 (R2020) Standard Method for Fire Tests of Door Assemblies.

.21 CAN/ULC-S106-15 (R2020) Standard Method for Fire Tests of Window and Glass Block Assemblies.

1.3 SAMPLES AND MOCK-UPS

.1 Submit samples in accordance with Section 01 33 00 - Shop Drawings, Product Data, Samples and Mock-ups.

.2 Submit 305 mm (12”) square samples of each type of glass indicated.

.3 Provide a full-scale glass mock of the largest project specific insulating glass unit for the Architect’s review, prior to full-scale fabrication.

1.4 DESIGN CRITERIA AND SUBMITTALS

.1 Tempered glass and laminated safety glass shall be designed to withstand factored loads in accordance with the Ontario Building Code (OBC 2012).

.2 **Glass acting as a guard shall be designed to withstand factored loads in accordance with The Ontario Building Code – latest edition, Part 4, Articles 4.1.5.14 and 4.1.5.16. Design must also conform with the requirements of ASTM E1300.**

As required by the Ontario Building Code 2012, Part 3, Section 3.3.1.17., any glass in an interior or exterior window shall act as a guard if it is located at a raised floor and where the difference in level is more than 600 mm, and if any part of window glazing is situated in any part less then 1070 mm above finish floor elevation (walking surface).

.3 Glass manufacturer shall retain and pay for a qualified Professional Engineer who is licensed to practice in the Province of Ontario, to verify and provide a written statement that the tempered and laminated glass shipped to the project site will withstand factored loads identified in Item 1.4.1 above. The written statement shall bear the stamp and signature of the Professional Engineer.

.4 Work of this section that functions to resist forces imposed by dead and live loads shall conform to requirements of jurisdictional authorities and the Ontario Building Code 2012.

.5 Window and curtain wall glass and supports acting as a guard shall be designed in accordance with the Ontario Building Code 2012, CAN/CGSB 12.1 and ASTM E1300. Make adequate provision for differential thermal and structural movement of component parts of system and fastenings, to prevent opening of joints, breakage of glass, undue stress on fastenings or other detrimental effects.

.6 Design glazing to withstand loads as calculated in accordance with the Ontario Building Code 2012 and ASTM E1300.

.7 Indicate analysis of glass including maximum deflection and allowable stresses from imposed dead/live loads and thermal loads.

.8 Shop drawings for glass identified in Items 1.4.1 and 1.4.2 above shall bear the stamp of a Professional Engineer licensed to practice engineering in the Province of Ontario experienced in this type of engineering. Subcontractor shall retain and pay for a qualified Professional Engineer who is licensed to practice in the Province of Ontario

.9 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Shop Drawings, Product Data, Samples and Mock-ups.

.1 Specifications and product data shall include:

.1 Type of glass and thickness

.2 U-Value

.1 Winter night

.2 Summer day

.3 Transmittance:

.1 Visible

.2 Solar

.4 Reflectance:

.1 Visible %out

.2 Visible %in

.5 Solar % out

.6 Shading Coefficient (SC)

.7 Solar Heat Gain Coefficient (SHGC)

.2 Manufacturer reports:

.1 Submit glass fabricator’s product information and structural calculations indicating compliance with glazing standards established by the Glass Association of North America (GANA). Submittal to include thermal stress and structural load analysis of the proposed glass types, configuration, and sizes.

.3 Submit sample glazing warranty.

.4 Submit type of Insulating Glass Unit spacer, type Low-E coating, and primary and secondary sealant.

.5 Performance criteria relative to roller wave distortion for heat strengthened and tempered glass:

.1 Heat-Treated Float Glass: ASTM C1048; Type 1; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicted.

.2 Fabrication process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

.1 Measurement Device: LiteSentrry measurement system, or equal.

.2 Roll Wave Criteria (horizontal): (90% surface): Maximum .003 Center / .008 Edges (Peak to Valley)

.3 Millidiopter Criteria: (90% surface) Maximum + or – 125 A overall, or the highest overall measurement from the approved visual mock-up that is less than + or – 125 A overall, whichever is less.

1.5 WARRANTIES

.1 From the date of the Certificate of Substantial Performance, the insulating glass units shall be warranted for a period of five (5) years against vision obstruction due to the formation of dust or film on the internal surfaces, caused by the failure of the hermetic seal other than through glass breakage.

.2 Provide a twenty (20) year written warranty against defects due to faulty materials and/or workmanship for material and installation of silicon sealants used at structural glazing. The warranty shall be submitted in writing and shall be made jointly and severally with the window Subcontractor and sealant manufacturer.

.3 Replace when so directed by the Architect, within the said periods, any and all portions of work which fail to perform according to the requirements of these specifications.

1.6 CLOSEOUT SUBMITTALS

.1 Submit closeout submittals in accordance with Section 01 78 00.

.2 Operation and maintenance data:

.1 Submit maintenance and cleaning instructions for glass and glazing for incorporation into the operating and maintenance manuals.

1.7 QUALITY ASSURANCE

.1 Qualifications:

.1 Manufacturers: Fabrication processes, including low emissivity and reflective coatings, insulating, laminated, silk-screening and tempering shall be manufactured by a single manufacturer with a minimum of ten (10) years of fabrication experience and meet ANSI / ASQC 9002 1994. Fabricator shall be certified by glass manufacturer.

.2 Installers / applicators / erectors: Provide the work of this section executed by specialist Subcontractor who shall be thoroughly trained and experienced in skills required, be completely familiar with referenced standards and requirements of the work of this section, and personally direct installation performed under this section.

.3 Glass with visible centre scuffing will be rejected from the project.

.4 Aspects of the work of this section are required to be prepared by a professional engineer. Refer to Section 01 33 00 for specific details and requirements in this regard.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Protect glass from edge damage, dust, and contaminants during handling and storage. For insulating units exposed to substantial altitude changes, comply with insulating glass manufacturers written recommendations for venting and sealing to avoid hermetic seal ruptures.

.2 Storage and protection: Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun or other causes.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Comply with recommendations in the publications below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section.

.1 GANA Glazing Manual.

.2 GANA Engineering Standards Manual.

.3 GANA Laminated Glazing Reference Manual.

.4 GANA Sealant Manual.

.2 Regulatory requirements:

.1 Fire rated glass:

.1 Each lite shall bear permanent, non-removable label by accredited and recognized independent testing agency certifying it for use in tested and rated fire protective assemblies.

.3 Glass strength:

.1 Provide glass products in the thickness and strengths required to meet or exceed the following criteria based on project loads and in-service conditions.

.1 Analysis shall comply with ASTM E1300 and Ontario Building Code 2012.

.2 Maximum lateral deflection; insulating glass units:

.1 For insulating glass units supported on four edges, limit centre-of-glass deflection at design wind pressure to not more than 1/175 times the long side length or 19 mm (3/4") maximum.

.2 For structural insulating glass units not supported on four edges, limit centre-of-glass deflection at design wind pressure to not more than 1/240 times the long-side length or 19 mm (3/4") maximum.

.2 Glass thicknesses and glass types specified, indicated, or scheduled in the Contract Documents are minimums required. Glass designer/engineer to modify as required to satisfy design and building code requirements, and requirements of authorities having jurisdiction, and any such modifications shall be clearly indicated on shop drawings.

.4 Thermal and optical performance: Provide glass products with performance properties specified or published by glass manufacturer where not specified. Performance properties to be manufacturer’s published data as determined according to the following procedures:

.1 Centre of glass U-Value: National Fenestration Rating Council (NFRC) 100 methodology using LBNL WINDOW 6.3 computer program.

.2 Centre of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 6.3 computer program.

.3 Visible light transmittance: NFRC 200 methodology.

.4 Solar optical properties: NFRC 300 or LBNL Optics.

.5 Glazing systems shall be capable of withstanding normal thermal movements, without failure, including loss due to defective manufacture, fabrication and installation; deterioration of glazing materials; and other defects in construction.

.6 Provide glass Products of uniform appearance, reflectivity, hue, shade, visible light transmittance, and colour when viewed from distance of 3 m (10 ft) to 30 m (100 ft) perpendicular to the glass or from 45° angle to the glass.

.7 Protect laminated glass interlayer from damage or discolouration resulting from contact with deleterious and incompatible sealants, substances, and materials. Comply with manufacturer’s recommended installation instructions.

2.2 GLASS MATERIALS

.1 Single source responsibility: Provide materials from a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source and manufacturing plant for each type and class required.

.2 Laminated Safety glass: to CAN/CGSB-12.1,

.1 Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations. Use materials that have a proven record of no tendency to bubble, discolour, or lose physical and mechanical properties after fabrication and installation.

.1 At exterior applications where edges are not protected: Provide laminated glass with ionoplast interlayer; DuPont 'SentryGlas'.

.2 Glass layers minimum 4 mm (3/16") thick unless otherwise indicated.

.3 Interlayer thickness: Provide thickness as needed to comply with requirements and not less than the following:

.1 Vertical glazing: not less than 0.76 mm (0.030") unless otherwise indicated.

.4 Interlayer colour: Clear unless otherwise indicated.

.5 Glass type: tempered, as required to suit design requirements.

.6 Laminated glass products to be fabricated free of foreign substances and air or glass pockets in autoclave with heat plus pressure.

.3 Tempered Safety Glass: to CAN/CGSB-12.1.

.1 Minimum thickness: 6 mm and 10 mm for display case doors.

.2 Fabrication process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

.3 For uncoated glass, comply with requirements for Condition A in accordance with ASTM C1048.

.4 For coated vision glass, comply with requirements for Condition C (other coated glass) in accordance with ASTM C1048.

.4 Heat strengthened glass: to ASTM C1048.

.1 Minimum thickness: 6 mm (1/4").

.2 Fabrication process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

.3 For uncoated glass, comply with requirements for Condition A in accordance with ASTM C1048.

.4 For coated vision glass, comply with requirements for Condition C (other coated glass) in accordance with ASTM C1048.

.5 Fire-Rated Glass: to CAN/ULC S-104 and S-106 and Impact Safety to ANZI-1.97, Category I and II, ULC Listed and Labelled for Canada. Surface Finish: Premium Grade, clear glass, polished.

.6 Mirrors:

.1 Mirrors shall conform to ASTM C1503, 6 mm thick polished tempered plate glass. For sizes refer to drawings. Frames shall be heavy gauge, type #304, polished, one (1) piece, stainless steel. Frame corners shall be mitred and square. Where indicated, provide integral type 304 stainless steel shelf.

.2 Provide stainless steel mounting clips and expansion anchors suitable for walls to which mirrors shall be fixed.

.3 Mirrors shall be 6 mm (1/4") thick tempered polished plate glass and shall have an integral scrim backing.

.7 Insulating glass units, with low-emissive coating and warm thermal edge spacer for aluminum curtain wall systems.

.1 Type A:

.1 LoE Reflective Insulating Glass SOLARBAN 60 (2) SOLEXIA

.2 Outdoor Lite: of minimum 6 mm thick, heat strengthened glass, SOLARBAN 60 (2) SOLEXIA

.3 Indoor Lite: of minimum 6 mm thick, tempered glass,

.4 LoE coating SOLARBAN 60 (2) SOLEXIA on second surface (2)

.5 Maximum U-Value

.1 Winter Night: 0.24

.6 Visible Light Transmittance (VLT):

.1 Visible: 61%

.7 Reflectance:

.1 Exterior %: 9

.2 Interior %: 12%

.8 Solar Heat Gain Coefficient (SHGC): 0.32

.9 Insulating glass units hermetically sealed, CAN/CGSB 12.8, minimum 13mm space filled with Argon.

.9 Warm edge spacer bar: extruded purpose-made plastic, Colour: Black.

.10 Where indicated on window schedule, provide:

.1 Ceramic frit coated glass on No. 1 surface

.2 Shall comply with ASTM C1048-04 Standard Specification for Heat-Treated Flatt Glass – Kind HS, Kind FT Coated and Uncoated, Condition B.

.3 Pattern and Colour:

.1 Prelco: Dots 30% - TSR-3118, 3 mm (1/8") diameter spaced 7 mm (9/32") center to center 30% coverage.

.2 Prelco Translucent Colour "Simulated Acid Etch" pattern PC-7009.

.11 Basis of Design: PPG - Vitro

.12 Acceptable Products:

.1 Guardian Glass

.2 AGC Glass North America

.3 Saint-Gobain Glass

.2 Type B:

.1 LoE Reflective Insulating Glass SOLARBAN 60 (2) SOLEXIA

.2 Outdoor Lite: of minimum 6 mm thick, heat strengthened glass, SOLARBAN 60 (2) SOLEXIA

.3 Indoor Lite: of minimum 12 mm thick, laminated 2 x 6 mm tempered clear glass with white 0.6 mm interlayer.

.4 LoE coating SOLARBAN 60 (2) SOLEXIA on second surface (2)

.5 Maximum U-Value

.1 Winter: 0.24

.6 Visible Light Transmittance (VLT):

.1 Visible: 61%

.7 Reflectance:

.1 Exterior %: 9

.2 Interior %: 12%

.8 Solar Heat Gain Coefficient (SHGC): 0.32

.9 Insulating glass units hermetically sealed, CAN/CGSB 12.8, minimum 13 mm space filled with Argon.

.10 Warm edge spacer bar: extruded purpose-made plastic, Colour: Black.

.11 Basis of Design: PPG - Vitro

.12 Acceptable Products:

.1 Guardian Glass

.2 AGC Glass North America

.3 Saint-Gobain Glass

.8 Insulating glass units, with low-emissive coating and warm thermal edge spacer for exterior aluminum doors.

.1 Type IG:

.1 Solar Control LoE Insulating Glass Units SOLARBAN 60 (2) Clear

.2 Outdoor Lite: of minimum 6 mm thick, tempered glass, SOLARBAN 60 (2) Clear

.3 Indoor Lite: of minimum 6 mm thick, tempered glass, clear

.4 LoE coating SOLARBAN 60 (2) Clear on second surface (2)

.5 Maximum U-Value

.1 Winter: 0.24

.6 Visible Light Transmittance:

.1 Visible: 70

.7 Reflectance:

.1 Exterior %: 13

.8 Solar Heat Gain Coefficient (SHGC): 0.39

.9 Insulating glass units hermetically sealed, CAN/CGSB 12.8-97, minimum 13mm space filled with Argon.

.10 Warm edge spacer bar: extruded purpose-made plastic, Colour: Black.

.11 Basis of Design: PPG – Vitro

.12 Acceptable Products:

.1 Guardian Glass

.2 AGC Glass North America

.3 Saint-Gobain Glass

.9 Spandrel glass units for exterior aluminum curtain wall systems.

.1 Type SP-1:

.1 Outdoor Lite: of minimum 6 mm thick, heat strengthened glass, colour SOLEXIA.

.2 Coating: OPACI-COAT-300, by ICD High Performance Coatings

.1 Coating colour to be selected by Architect from manufacturer's full range of colours to achieve colour to match vision insulating glass.

.10 Glass for interior use.

.1 Type G:

.1 For interior aluminum windows, interior doors and screens, non-fire rated hollow metal doors and frames.

.2 Minimum 6 mm thick, tempered safety glass, clear. 10 mm thick for display case doors.

.3 Basis of Design: PPG - Vitro

.4 Acceptable Products:

.1 Guardian Glass

.2 AGC Glass North America

.3 Saint-Gobain Glass

.2 Type GF:

.1 Fire-rated glass to CAN/ULC S-104 and S-106 and impact safety to ANSI-Z.97, Category I and II, 5 mm thick ceramic glass with approved applied safety film, ULC-Listed and labelled for Canada.

.2 Glazing tape FIBERFRAX Tape, closed cell PVC or Pemko FG3000590 as per ULC Listing.

.3 Acceptable Manufacturers:

.1 Pyran Platinum F by Glassopolis.

.2 Firelite NT Premium by TGP.

.3 Keralite Select F by Prescission Glass Services

.4 SuperClear 45-HS-LI by SAFTI FIRST

.3 Type F:

.1 For interior Gymnasium 113-1 doors and PM-5 window for Bureau 113B:

.2 10 mm thick, laminated safety glass of two (2) piles of 5 mm tempered glass with elastomeric inter layer to CAN/CGSB-12.1, Type 1, Class B, Category 11, and CAN/CGSB-12.4, colour clear.

.3 Basis of Design: PPG - Vitro

.4 Acceptable Products:

.1 Guardian Glass

.2 AGC Glass North America

.3 Saint-Gobain Glass

2.3 GLAZING AND SEALING COMPOUND MATERIALS

.1 Glazing Materials (Non-Fire Rated)

.1 Glazing materials; general: Select glazing sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

.2 Glazing gaskets: Moulded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

.1 Preformed, EPDM to ASTM C864.

.2 Preformed, EPDM, silicone compatible, to ASTM C864.

.3 Preformed silicone to ASTM C115.

.3 Setting blocks: Moulded or extruded material with Shore, Type A Durometer hardness of 85, plus or minus 5, made from one of the following:

.1 Preformed, EPDM to ASTM C864.

.2 Preformed, EPDM, silicone compatible, to ASTM C864.

.3 Preformed silicone to ASTM C1115.

.4 Spacers: Moulded or extruded blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated made from one of the following:

.1 Preformed, EPDM to ASTM C864.

.2 Preformed, EPDM, silicone compatible, to ASTM C864.

.3 Preformed silicone to ASTM C1115.

.5 Edge blocks: Moulded or extruded material of hardness needed to limit glass lateral movement (side walking) made from one of the following:

.1 Preformed, EPDM to ASTM C864.

.2 Preformed, EPDM, silicone compatible, to ASTM C864.

.3 Preformed silicone to ASTM C1115.

.6 Cleaners, primers and sealers: Type recommended by sealant or gasket manufacturer.

.7 Polyurethane foam glazing tape:

.1 High density, closed-cell, flexible, non-extruding tape, adhesive backed one side only; recommended by manufacturer for exterior applications with nominal pressure in glazing channel.

.2 Acceptable manufacturer: Norton Company.

.3 Acceptable Products: As recommended by manufacturer suitable for conditions of application and use.

.8 Structural glazing adhesive:

.1 One-part or two-part, neutral-cure elastomeric silicone sealant.

.2 ASTM C920 Type M or S, Grade NS, Class 12-1/2, 25, 50.

.3 ASTM C1184.

.4 SWRI Validation.

.5 Colour: as selected by Architect from manufacturer's full colour range.

.9 Silicone glazing (Weatherseal) sealant:

.1 Medium-modulus, neutral-curing silicone sealant; complying with ASTM C920, Type M or S, Grade NS, Class 25

.2 Acceptable Products:

.1 DOWSIL '790'.

.2 DOWSIL '795'.

.3 Pecora '864' or '890'.

.4 Sika 'SikasilWS-290'.

.5 Sika 'SikasilWS-295'.

.6 Tremco 'Spectrum 1'.

.7 Tremco 'Spectrum 2'.

.8 Momentive 'SilGlaze II'.

.10 Butt glazing joint sealant:

.1 Medium-modulus, neutral-curing silicone sealant; complying with ASTM C920-11, Type S, Grade NS, Application G, Class 25.

.2 Colour: as selected by Architect from full colour range.

.3 Acceptable Products:

.1 DOWSIL '999-A'.

.2 Momentive 'SCS1200'.

.3 Pecora '860'.

.4 Tremco 'Proglaze'.

.2 Glazing Accessories (fire rated)

.1 Glazing tape; fire-rated glass (non-wired):

.1 Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air and vapour seal.

.2 Silicone sealant: One-part neutral curing silicone, medium modulus sealant, to ASTM C920-11, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.

.1 Acceptable Products:

.1 DOWSIL '795'.

.2 Momentive 'Silglaze-II 2800'.

.3 Tremco 'Spectrem 2'.

.3 Setting blocks: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

.4 Cleaners, primers and sealers: Type recommended by manufacturer of glass and gaskets.

2.4 FABRICATION

.1 Factory sealed insulating glass units:

.1 Fabricate units to requirements of CAN/CGSB 12.8.

.2 Spacer core shall be straight and evenly set into glass units.

.3 Insulating glass units shall be manufactured to conform to IGMAC recommendations (Insulated Glass Manufacturers Association of Canada) and the manufacturer shall be a member of IGMAC. Sealed units shall bear IGMAC certification markings.

.4 Edge deletion line shall occur at the mid-point of the primary sealant.

.2 Grind, chamfer, and polish exposed glass edges, unless otherwise indicated.

PART 3- EXECUTION

3.1 EXAMINATION

.1 Examine framing, glazing channels, and stops, with glazing installer present, for compliance with the following:

.1 Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

.2 Inspect butt and mitre joints in framing. Seal joints found to be open with a compatible sealant prior to glazing.

.3 Glazing pockets and surfaces are free of dust, construction debris, and contaminants.

.4 Presence and functioning of weep systems.

.5 Minimum required face and edge clearances as per IGMA and GANA standards.

.6 Effective sealing between joints of glass-framing members.

.2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

.2 Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

.3 Clean contact surfaces with solvent and apply primers to surfaces to receive tapes and sealants in accordance with the manufacturer's instructions. Ensure surfaces are free of moisture and frost.

3.3 GLAZING – GENERAL

.1 Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

.2 Adjust glazing channel dimensions as required by conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

.3 Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

.4 Clean glazing rebate surfaces of traces of dirt, dust, or other contaminants.

.5 Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

.6 Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

.7 Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

.8 Provide spacers for glass lites where length plus width is greater than 1270 mm (50").

.1 Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

.2 Provide 3.2 mm (1/8") minimum bite of spacers on glass and use thickness equal to sealant width. Minimum sealant width of 4 to 5 mm.

.9 Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel.

.10 Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

.11 Set glass lites with proper orientation so that coatings face exterior or interior as specified.

.12 Glaze hollow metal doors and frames specified under work of Section 08 11 00 using tape glazing installation.

.13 Install fire rated glazing in accordance with fire rated glazing Product manufacturer's specifications and complying with current fire-resistance listing for each Product. Field cutting or tampering is not permissible.

.14 Structural sealant shall be applied per ASTM C1401.

3.4 TAPE GLAZING

.1 Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

.2 Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

.3 Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

.4 Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

.5 Do not remove release paper from tape until right before each glazing unit is installed.

.6 Centre glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centres of openings.

3.5 GASKET GLAZING (DRY)

.1 Allow gaskets to relax and cut compression gaskets to lengths recommended by gasket manufacturer to fit openings to suit frame dimensions.

.2 Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

.3 Installation with drive-in wedge gaskets: Centre glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centres of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

.4 Installation with Pressure-Glazing Stops: Centre glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

.5 Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

.1 Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

.2 Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

.3 Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 STRUCTURAL SILICONE GLAZING

.1 Prepare substrates and apply silicone sealant in accordance with manufacturer’s instructions and reviewed shop drawings.

.2 Structural silicone joint design shall be approved by sealant manufacturer.

.3 Inspect substrates to receive silicone sealant. Ensure:

.1 Metal framing surfaces to receive glazing are flat and smooth without slots, serrations, and other irregularities.

.2 Verify aluminum framing has alodine or anodized finish. Mill-finish or paint-finish or powdercoat paint-finish aluminum is not an acceptable substrate for structural silicone application.

.3 Ensure surfaces are clean, dry, and free of frost, dust, dirt, grease, oil, mildew, and other contaminants that might affect adhesion.

.4 Clean nonporous substrates with two-cloth solvent wipe in accordance with ASTM C1193.

.1 Pour cleaning solvent onto a clean cloth. Wipe vigorously to remove contaminants.

.2 Immediately wipe cleaned area with a separate cloth before solvent has evaporated.

.5 Primer: Apply primer to substrates determined by adhesion test.

.1 Pour primer into small, clean container. Use within 10 minutes to avoid contamination.

.2 Dip cloth into primer and wipe a thin film onto substrate. Use brush for inaccessible areas. Do not over-apply.

.3 Allow primer to dry. Apply sealant the same day surfaces are primed.

.4 Do not apply primer to sealant joint backing.

.6 Masking: Apply masking tape as required to protect adjacent surfaces, to ensure straight bead line, and facilitate cleaning.

.7 Application:

.1 Spacers and setting blocks: Install as indicated on drawings and reviewed shop drawings. Ensure joint openings and recesses are accurately sized.

.2 Sealant backing: Install without gaps, twisting, stretching, or puncturing backing material. Use gauge to ensure uniform depth to achieve correct profile, coverage, and performance.

.3 Bond breaker: Install on backside of joint where backing is not feasible.

.4 Mixing: Mix two-component sealants in accordance with manufacturer's instructions and recommended proportions. Use clean, airless mixing equipment. Do not hand or mechanically mix in open container that is subject entraining air in sealant.

.5 Temporary glass support: Use temporary fasteners, clips, two-sided adhesive, and other means to retain glass panels while sealant is applied and allowed to cure.

.6 Sealant:

.1 Use sealant-dispensing equipment to push sealant bead into opening. Fill joint opening to full and proper configuration. Apply in continuous operation. Ensure sealant fills entire joint and firmly contacts all surfaces.

.2 Tooling: Before skinning or curing begins, tool sealant with metal spatula.

.3 Provide concave, smooth, uniform, sealant finish. Eliminate air pockets and ensure complete contact on both sides of joint opening.

.4 Tool joints with one continuous stroke.

.5 Do not use water, soap, or alcohol to facilitate tooling.

.8 Complete horizontal joints prior to vertical joints. Lap vertical sealant over horizontal joints.

.9 Cleaning: Remove masking tape and excess sealant.

.1 Uncured sealant: Within 10 minutes of application, remove uncured sealant with solvent-dampened cloth, wearing solvent-resistant gloves.

.2 Completely cured sealant: Carefully cut or scrape away.

.10 Allow sealant to fully cure before adhesive is stressed. Use test specimens formed at time of sealant application to verify curing time. When cured, remove temporary glass supports.

.11 Ensure installed sealant is not painted as part of other construction operations.

.12 Quality control:

.1 Perform adhesion tests in accordance with manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant Joint Hand-Pull Tab.

.1 Perform 5 tests for first 300 m (984 ft) of applied silicone sealant and 1 test for each 300 m (984 ft) seal thereafter or perform 1 test per floor per building elevation minimum.

.2 For sealant applied between dissimilar materials, test both sides of joint.

.2 Sealants failing adhesion test shall be removed, substrates cleaned, sealants reinstalled, and re-testing performed.

.3 Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

3.8 FINISHING

.1 Immediately remove sealant and compound droppings from finished surfaces. Remove labels after work is completed.

3.9 CLEANING

.1 Clean glass just prior to and immediately after installation. Remove glazers' dirt and stains, then wash and polish all surfaces and leave thoroughly clean.

3.10 STRUCTURAL CERTIFICATION

.1 Upon completion of glass installation, provide a certificate that shall state that the work has been performed in accordance with requirements of the Ontario Building Code and Regulations of Authorities in Jurisdiction. The certificate shall bear the seal of a qualified Structural Engineer who is licensed to practice in the Province of Ontario.

END OF SECTION