

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- .1 The work of this Section includes all labour, materials, equipment and tools required to provide a complete project for the following scope of work as indicated on the Contract Documents:
  - .1 All exterior window framing.
  - .2 All exterior and interior glazing, including sealed thermal units, spandrel glass, interior door and window glazing.
  - .3 Weather sealing of glazing systems specified in this Section. Work includes air vapour barrier membrane supply and installation at perimeter of window assemblies, spray foam insulation at perimeter of window assemblies, perimeter caulking at the interior face of all window assemblies.
  - .4 Exterior aluminum spandrel panels.
  - .5 Exterior and interior aluminum sills, trims and panels.
  - .6 Window operators complete with all hardware (including integral restrictors where required) and insect screens.
2. Work to be performed by this Contract specified in other Sections includes all labour, materials, equipment and tools required to provide a complete project for the following scope of work as indicated on the Contract Documents.
  - .1 Aluminum doors
  - .2 Glazing..

**1.2 RELATED SECTIONS**

- .1 Section 07 92 00 - Joint Sealing: caulking of joints between frames and other building components.
- .2 Section 07 27 00 - Air barriers - Performance
- .3 Section 08 11 16 - Aluminum Doors and Frames
- .4 Section 08 80 50 - Glazing
- .5 Section 08 90 00 - Louvres and Vents

1.3 REFERENCES

- .1 Aluminum Association (AA),
  - .1 AA DAF 45-[03(R2009)], Designation System for Aluminum Finishes.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.
  - .2 CAN/CGSB-79.1-M91, Insect Screens.
- .3 Canadian Standards Association (CSA) International
  - .1 CSA-A440-00/A440.1-00(R2005), A440-00, Windows / Special Publication A440.1-00, User Selection Guide to CSA Standard A440-00, Windows.
  - .2 CAN/CSA-Z91-02(R2008), Health and Safety Code for Suspended Equipment Operations.

1.4 QUALIFICATIONS

- .1 The work of this section shall be designed, fabricated and erected by a company with at least five years experience with projects of similar size and nature and with adequate plant equipment and skilled tradesman.

1.5 DESIGN CRITERIA

- .1 Windows: Conform to CSA-A440-00 including Appendix A.
  - .1 Accommodate thermal movement of component materials within service temperature range of -35 to +75 degrees Celsius without causing buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects.
- .2 Design connection details to accommodate movement in window system, and to accommodate movement between window system and building structure, caused by structural movements, without permanent distortion, damage, racking, breakage of seals, or water penetrations.
- .3 Provide for positive drainage of condensation occurring within wall construction and water entering at joints, to exterior face of wall in accordance with NRC "Rain Screen Principles" including:
  - .1 Provide pressure equalized cavity efficiently sealed to effectively deter penetration of water into the system.
  - .2 Make adequate provision to drain to the exterior any water or water vapour infiltration, exfiltration and to maintain the pressure equalized cavity.
  - .3 Provide adequate gasket and other seals for efficient control of air and vapour infiltration, exfiltration and maintenance of the pressure equalized cavity.
- .4 Design members to withstand dead load, earthquake and other live loads as calculated in accordance with Ontario Building Code to max. allowable deflection of 1/200 of clear span of

20mm, whichever is the lesser. Minimum acceptable wind load;  
1.00 kPa.

- .5 Limit deflection of any member, in direction parallel to wall plane, when member carries its full design load, not to exceed 75% of design clearance dimension between that member and panel, glass or any part immediately below it.
- .6 Limit air infiltration and exfiltration to maximum 0.18 litres/sec. per m<sup>2</sup> of glazing when tested to ASTM E283, at 75Pa pressure differential.
- .7 Exclude water penetration when tested to ASTM E331, at 0.72Pa pressure differential.
- .8 Provide thermal break for calculated temperature differential of 100 degrees Celsius when tested to CGSB 63-GP-12M.
- .9 Condensation: Nil at -25 degrees Celsius externally and +20 degrees Celsius internally with R.H. of 25% and nil before any of the exposed area of insulated glass reaches the dew point.
- .10 Conform to CSA-A440-00 except as otherwise called for.
- .11 Design all fixed windows that extend to less than 1m from the floor to withstand the lateral design loads for balcony guards in Part 4 of the Ontario Building Code. Windows shall be designed to comply with Article 4.1.5.14 of the O.B.C. where the distance from the window sill to exterior grade exceeds 1.8m

#### 1.6 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking.
- .3 Show waterproofing and condensation control methods.
- .4 Indicate connections of windows to structural components of building. Connections to be designed and shop drawings to be stamped by a professional engineer in the Province of Ontario.
- .5 Prior to substantial completion, the engineer who stamped the shop drawings shall submit a stamped letter confirming that the window systems have been installed as per the approved shop drawings.

- 1.7 SAMPLES
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Submit one representative model of each specified finish.
- 1.8 TEST REPORTS
- .1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications, for:
    - .1 Windows classifications .
    - .2 anodized finish,.
    - .3 Insect screens.
    - .4 Air tightness.
    - .5 Water tightness.
    - .6 Wind load resistance.
    - .7 Condensation resistance.
    - .8 Thermal performance.
    - .9 Sash strength and stiffness - Operable Casement Projecting.
    - .10 Ease of operation - windows with operable lights.
    - .11 Sash pull-off - vinyl windows.
    - .12 Forced entry resistance.
    - .13 Mullion deflection - combination and composite windows.
- 1.9 CLOSEOUT SUBMITTALS
- .1 Provide operation and maintenance data for windows for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- 1.10 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
  - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  - .3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
  - .4 Unused or damaged glazing materials are not recyclable and must not be diverted to municipal recycling programs.
  - .5 Divert unused or damaged wood materials from landfill to recycling reuse composting facility approved by Consultant.

- .6 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.
  - .7 Divert unused caulking material from landfill to official hazardous material collections site approved by Engineer Consultant.
  - .8 Plastic caulking tubes are not recyclable and must not be diverted for recycling with other plastic materials.
- 1.11 POST INSTALLATION CERTIFICATION
- .1 After installation, submit written certification, signed by the structural engineer responsible for the design indicated on the shop drawings, that all items have been installed in accordance with the stamped shop drawings.
- 1.12 DELIVERY AND STORAGE
- .1 Deliver material factory formed and ready for installation
  - .2 Handle, deliver, and store material in a manner so as to prevent soiling, marring of finished surfaces, twisting, denting and all other damages.
  - .3 Ship material with shop applied protection over finished surfaces and corners padded.
  - .4 Store at the site under cover and set above ground.
- 1.13 WARRANTY
- .1 The warranty period stated in General conditions, Warranty and relevant Supplementary Conditions, is with respect to this section of work, extended from one year to three years.
  - .2 Warranty shall specifically guarantee against leakage, defects, and malfunction under normal usage. Warrant against defects in the material and labour of the work of this section and warrant that the work will remain structurally sound free from distortion and deformation under load and that glazing splines and sealant will be free from deterioration from sunlight, weather and oxidation.
- PART 2 - PRODUCTS**
- 2.1 MATERIALS
- .1 Materials: to CSA-A440/A440.1 supplemented as follows:
  - .2 All windows by same manufacturer.
  - .3 Glass: as per Section 08 80 50

- .4 Screens: to CAN/CGSB-79.1.
  - .1 Heavy duty black aluminum mesh or vinyl mesh
  - .2 Insect screening mesh: count 18 x 14.
  - .3 Fasteners: tamper proof.
  - .4 Screen frames: aluminum or vinyl colour to match window frames.
  - .5 Mount screen frames for interior replacement.
  - .6 Provide screens for all operable windows.
- .5 Exterior metal sills: brake formed aluminum sheet metal of type and size as detailed; minimum 1.5 mm thick, complete with joint covers, jamb drip deflectors, chairs, anchors anchoring devices and end dams, and underlayment membrane of Thru-wall flashing.
- .6 Isolation coating: alkali resistant bituminous paint.
- .7 Steel attachments and reinforcements: to CAN3G 40.21-M87, grade 300W.
- .8 Bolts, screws and fasteners: Stainless steel, or cadmium plated corrosion-resistant steel of adequate strength for the purpose.
- .9 Thermal Isolators: High Performance thermal break of glass - reinforced nylon 6/6, polyamide nylon 6/6
- .10 Exterior and Interior Aluminum Trim Panels: Extruded aluminum or brake formed aluminum sheet metal to profiles and sizes indicated, min. 3mm thick.
- .11 Sealing Compound: Multi-component, polysulphide, chemical curing, high modulus, to CAN2-19.24-M90, Type 2, Movement Class 25, Class A, glazing.
- .12 Peripheral Sealants: In accordance with Section 07900. Colours as selected by Consultant.
- .13 Bedding Compound: To CGSB 19-GP-14-M76.
- .14 Zinc Rich Primer: To CGSB 1-GP-181M.
- .15 Backpan: 26ga. galvanized metal.
- .16 Insulation: Stonewool semi-rigid insulation to CAN/CGSB-S1.10-92, Type 2, Class 4, thickness 75mm min., insulation clips with self locking washers. RSI 0.77/25mm thickness.
- .17 Air vapour barrier perimeter seal: in accordance with Section 07

27 00.

- .18 Foam Insulation around Windows and Doors: CF 812 by Hilti
- .19 Louvers: Refer to Section 08 90 00 Louvers and Vents

2.2 WINDOWS

- .1 Framing: Extruded Aluminum, Aluminum Association Alloy AA6063-T5. Casement and awning operators. Minimum frame depth is 145mm.
  - .1 Acceptable manufacturers
    - .1 Quest
    - .2 Kawneer
    - .3 Alumico
    - .4 Prevost
    - .5 Alumicor
    - .6 Oldcastle
    - .7 Lessard
    - .8 Allan
    - .9 Alternative Products not listed above which have been approved prior to tender closing. All manufacturers must confirm proposed systems comply with project specifications and System Classification performance requirements listed under 2.3 of this section.

2.3 WINDOW TYPE AND CLASSIFICATION

- .1 Types:
  - .1 Projected: bottom projected with double glazing insulating glass.
  - .2 Fixed: with double glazing insulating glass.
  - .3 Screens: on ventilating portion of windows as indicated.
- .2 Classification rating: to CSA-A440/A440.1.
  - .1 Air tightness: A3.
  - .2 Water tightness: B7.
  - .3 Wind load resistance: C5.
  - .4 Condensation resistance: Temperature Index, I60
  - .5 Forced Entry: F2.
  - .6 Thermal performance: u value of 1.8 (maximum).

2.4 FABRICATION

- .1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:
- .2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal

measurement over 1800 mm.

- .3 Face dimensions detailed are maximum permissible sizes.
- .4 Brace frames to maintain squareness and rigidity during shipment and installation.
- .5 Finish steel clips and reinforcement with shop coat primer to CAN/CGSB-1.40 380 g/m<sup>2</sup> zinc coating to CAN/CSA-G164.

## 2.5 ALUMINUM FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
- .2 Exterior exposed aluminum surfaces:
  - .1 Exterior Surfaces: Duranar Charcoal UC109852
  - .2 Interior Surfaces: PPG Duracron K-11704 bone white
- .3 Exterior of exposed infill panel and trim surfaces: to match adjacent window finish

## 2.6 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of isolation coating:
  - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
  - .2 Concrete, mortar and masonry.
  - .3 Wood.

## 2.7 GLAZING

- .1 Glaze windows in accordance with CSA-A440/A440.1. Refer to Section 08 80 50

## 2.8 HARDWARE

- .1 Hardware: sash locks and aluminum handles to match interior finish and to provide security and permit easy operation of units.
- .2 Provide limiters on all operators to restrict the vent from opening more than 100mm and heavy duty screens to comply with OBC 3.7.2.2(3)(b).

## 2.9 AIR BARRIER AND VAPOUR RETARDER

- .1 Equip window frames with site installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
  - .1 Material: identical to, or compatible with, building air

- barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
- .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.
  - .3 Spray foam to fill shim space void at perimeter of windows.
  - .4 Caulking to interior perimeter of window frames to seal between window frame and air vapour barrier membrane.

### **PART 3 - EXECUTION**

#### **3.1 WINDOW INSTALLATION**

- .1 Install in accordance with CSA-A440/A440.1.
- .2 Arrange components to prevent abrupt variation in colour.
- .3 Set aluminum work plumb, square, level, free from warp, twist, and superimposed loads. Use only plastic horseshoe shims, no wood shims are permitted on this project.
- .4 Secure work adequately and accurately to structure in required position, in manner not restricting thermal or wind movement. Final anchor settings after alignment.
- .5 Anchor component parts to transmit loads and other stresses to anchorage system and hence to structure.
- .6 Field measure and cut to fit aluminum flashings and miscellaneous trim. Pack voids with semi-rigid insulation and perimeter shim spaces with urethane foam insulation.

#### **3.2 GLAZING**

- .1 Glaze in accordance with Section 08 80 50.

#### **3.3 INSULATION**

- 1 Comply with Section 07 21 13.
- .2 Adhere insulation into place in metal pans and secure. Impale on welded galvanized pins and retain with integral galvanized discs.

#### **3.4 PERIMETER OF DOORS AND WINDOWS**

- .1 Fill perimeter voids of windows, doors, and other exterior wall and roof penetrations and interruptions and as indicated on the drawings with foam in place insulation.

- .2 Ensure surfaces are free of dust, oil, grease, frost, loose debris. Provide temporary bracing required to prevent bowing of adjacent frames. Mask adjacent exposed surfaces against damage.
- .3 Provide adequate ventilation and protective apparel. Min. application temperature 5°C.
- .4 Fill gaps, cracks, holes with foam. Make allowance for expansion of foam. Install foam into gaps and shim space in layered application to ensure full depth of joint is sealed. Allow each layer to cure before next layer is applied. Cut back excess foam after curing. Tool foam only when tack free.

### 3.5 SILL INSTALLATION

- .1 Install through wall flashing membrane as per Section 07 27 00 below metal sills from window sill frame out and over edge of veneer cladding.
- .2 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece lengths at each location.
- .3 Secure sills in place with anchoring devices located at ends and evenly spaced 600 mm on centre in between.
- .4 Fasten expansion joint cover plates and drip deflectors with self tapping stainless steel screws.
- .5 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.
- .6 Install end dam flashings at ends of sills as detailed c/w return flange under sill.

### 3.6 CAULKING

- .1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
- .2 Apply sealant in accordance with Section 07 92 00 - Joint Sealing. Conceal sealant within window units except where exposed use is permitted by Consultant.
- .3 Apply spray foam insulation to fill voids around windows. Apply in multiple passes to ensure complete cavity is filled solid.

3.7 PROTECTION

- .1 During construction protect framing and glass against damage from plaster, mortar and other causes.
- .2 Protect pre-finished aluminum surfaces with protective coatings or wrappings until the installation of glazing commences. Ensure that method of protection does not damage finish.

3.8 CLEANING

- .1 Remove as work progresses, corrosive, hardening, or foreign matter or droppings resulting from the work.

**END OF SECTION**