**1 GENERAL:**

**1.1 DESCRIPTION:**

**.1** Furnish labor, materials and other services to complete the fabrication of new fiberglass windows, including all materials required for the supply and installation of the units in the manner, direction and performance shown on the design drawings and specified herein.

**.2** Fiberglass window framing to incorporate a drained and vented system with complete air, vapor and moisture seals, allowing water entering the framing to drain to the exterior.

**.3** Fiberglass inswing windows and doors to be glazed with an interior air seal using a continuous silicone heel bead from the IGU to the sash frame.

**.4** Fiberglass inswing windows and doors to incorporate a concealed hinge system with a continuous interior air seal, uninterrupted by any hardware.

**.5** Drawings and specifications for work of this section are based upon fiberglass windows manufactured by Cascadia Windows Ltd. #101 – 5350B 275 Street, Langley, BC, Canada (web: [www.cascadiawindows.com](http://www.cascadiawindows.com)).

**1.2 TESTING AND PERFORMANCE:**

**.1** Air Tightness:

.1 Laboratory Testing

.1 Air infiltration and exfiltration rates at a static air pressure differential of 1.6 psf (75 Pa) when tested in accordance with AAMA/WDMA/CSA 101/I.S.2/A440-11 and ASTM E283 to be not more than:

.1 Fixed Windows (interior or exterior glazed):
0.00 cfm/ft² (0.00 L/s.m²).

.2 Inward opening hopper-type windows:
0.03 cfm/ft² (0.13 L/s.m²).

.3 Inward opening tilt & turn-type (dual action) windows:
0.00 cfm/ft² (0.00 L/s.m²).

.4 Outward opening casement-type windows:
0.01 cfm/ft² (0.06 L/s.m²).

.5 Outward opening awning-type windows:
0.00 cfm/ft² (0.01 L/s.m²).

.6 Outward Swinging doors (single or double sash):
0.04 cfm/ft² (0.21 L/s.m²).

.7 Inward Swinging doors (single or double sash):
0.02 cfm/ft² (0.09 L/s.m²).

.8 Sliding doors (single or double sash):
0.01 cfm/ft² (0.07 L/s.m²).

**.2** Water Penetration Resistance:

.1 Laboratory Testing

.1 There shall be no water infiltration at a static air pressure differential as follows when tested in accordance with AAMA 101 and ASTM E331.

.2 Water penetration resistance test pressure for all vent types, including: Fixed windows, casement, awning, tilt & turn, hopper, inswing doors, outswing doors and sliding doors: 15 psf (720 Pa).

.2 Field Testing:

.1 Windows shall have no water infiltration at a cyclic static air pressure difference at 12 psf (575 Pa) when tested in accordance with AAMA 101 and ASTM E1105.

**.3** Structural Requirements:

.1 Performance Grade (PG) and Class of all windows and doors shall be:

.1 For fixed windows, CW-95 or higher

.2 For operable window (inswing or outswing), CW-45 or higher

.3 For swinging doors (inswing or outswing), CW-35 or higher

.2 Components and cladding design wind pressure (DP) for the project of: ## PSF (or #### Pa) – ASD calculation method (not factored). Use this design wind pressure for the design or mullions, reinforcing, and other spanning members.
[NOTE TO SPECIFIER: insert design wind pressure in the “##” field above. If this information is not available at the time of specification development, delete this line.]

.4 Design glass according to AAMA/WDMA/CSA 101/I.S.2/A440-11

.5 Design fiberglass according to AAMA/WDMA/CSA 101/I.S.2/A440-11.

.6 Design glazing and spanning window frame members, including any required reinforcing, in accordance with AAMA/WDMA/CSA 101/I.S.2/A440-11. There shall be no deflection in excess of L/175 of the span of any framing member.

.7 Allow for deflection of building structure. Ensure no structural loads are imposed on window assemblies. In lieu of other specific requirements the minimum requirements are as specified by the structural engineer.

**.4** Thermal Requirements

.1 The Thermal Transmittance U-Value shall be certified in accordance with the National Fenestration Rating Council (NFRC).

.1 Overall U-values, utilizing double glazed IG units:

.1 Windows - fixed and operable: 0.25 (Imperial) / 1.4 (Metric)
.2 Doors – inswing, outswing, and sliding: 0.23 (Imperial) / 1.3 (Metric)

.2 Overall U-values, utilizing triple glazed IG units, incorporating two LowE coatings:

.1 Fixed windows = 0.15 (Imperial) / 0.85 (Metric)
.2 Tilt & Turn windows = 0.15 (Imperial) / 0.85 (Metric)
.3 Hopper windows = 0.16 (Imperial) / 0.91 (Metric)
.4 Casement = 0.16 (Imperial) / 0.91 (Metric)
.5 Awning = 0.17 (Imperial) / 0.97 (Metric)
.6 Inswing, Outswing, and Sliding Doors = 0.15 (Imperial) / 0.85 (Metric)

.5 Energy Star: Windows must be ENERGY STAR® certified. Window manufacturer must provide required documentation and labeling.

**.6** Warranties

.1 Provide manufacturers standard express limited warranty on fiberglass frame components for a period of 20 years for workmanship and materials.

.2 Provide manufacturers standard express limited warranty on integral hardware for a period of 10 years for workmanship and materials.

.3 Provide manufacturers standard express warranty for the insulated glass units to cover premature hermetic seal failure (condensation between the lites at normal service temperatures) appearing within a period of 10 years from the date of substantial completion.

.4 Provide data for maintenance and cleaning in accordance with instructions under General Conditions.

**2 PRODUCTS.**

**2.1 MANUFACTURERS:**

**.1** Fiberglass Windows and Doors shall be manufactured by:

.1 Cascadia Windows and Doors – Langley, BC, Canada.

.2 Or other pre-approved manufacturer.

**2.2 MATERIALS:**

**.1** All frame and sash profiles are made from Pultruded Fiberglass.

.1 Pultrusions shall be manufactured with clamp-action equipment. No surface texture from rollers is permitted.

.2 Glass content average for pultruded profiles: 55% or more.

**.2** Fasteners shall be 300 series stainless steel, 400 series stainless steel, or Leland Industries DT2000 coated of sufficient size and quantity to perform their intended function.

.1 Fastener corrosion resistance shall be: 2000 hours minimum, when tested in accordance with ASTM B117.

**.3** Glazing tape: black, closed cell copolymer, polyethylene foam coated with an aggressive acrylic adhesive. All upward facing exterior horizontal joints to have an additional cap bead of neutral cure silicone.

**.4** Internal sealants for frame joints and continuous heel beads: 1199 DOW Corning sealant, or equal or better neutral cure silicone sealant.

**.5** Insulated Glazing Units: Insulated glazing unit certified by IGMA. Glass thickness shall be in accordance with applicable Building Codes, but not less than 4mm. All insulated glass units shall be argon filled and utilize soft coat metallic low-E coating(s). Edge construction to consist of a primary seal of polyisobutylene; a tubular low conductivity stainless steel spacer-bar with sealed corners, filled with desiccant; and a secondary seal of neutral cure silicone. Performance requirements indicated in this section are for center-of-glass.
[NOTE TO SPECIFIER: SELECT ONE GLAZING CONFIGURATION FROM THE LISTS OF DOUBLE AND TRIPLE GLAZING OPTIONS BELOW, AND DELETE THE REST]

.1Acceptable Low-E coated, insulated glazing units (double glazed):

.1Cardinal LowE 180, on #3 surface, argon filled. Center-of-Glass performance: U-0.26 (Imperial) / USI-1.5 (Metric), SHGC 0.68, VT 79%.

.3Cardinal LowE 270, on #2 surface, argon filled. Center-of-Glass performance: U-0.25 (Imperial) / USI-1.4 (Metric), SHGC 0.37, VT 70%.

.4Cardinal LowE 366, on #2 surface, argon filled. Center-of-Glass performance: U-0.24 (Imperial) / USI-1.4 (Metric), SHGC 0.27, VT 65%.

.5Cardinal LowE 340, on #2 surface, argon filled. Center-of-Glass performance: U-0.25 (Imperial) / USI-1.4 (Metric), SHGC 0.18, VT 39%.

.2Acceptable Low-E coated, insulated glazing units (triple glazed):

.1Cardinal LowE 180/180, on #2 & #5 surfaces, argon filled. Center-of-Glass performance: U-0.13 (Imperial) / USI-0.74 (Metric), SHGC 0.56, VT 70%.

.3Cardinal LowE 270/180, on #2 & #5 surfaces, argon filled. Center-of-Glass performance: U-0.13 (Imperial) / USI-0.74 (Metric), SHGC 0.33, VT 62%.

.4Cardinal LowE 366/180, on #2 & #5 surfaces, argon filled. Center-of-Glass performance: U-0.13 (Imperial) / USI-0.74 (Metric), SHGC 0.25, VT 57%.

.5Cardinal LowE 340/180, on #2 & #5 surfaces, argon filled. Center-of-Glass performance: U-0.13 (Imperial) / USI-0.74 (Metric), SHGC 0.16, VT 34%.

 .3 Tempered glass in insulated glazing units:

.1 Where required by local building code or bylaw, and additionally as indicated in the construction documents.

 **.6** Hardware

.1 All hardware to be supplied by a single manufacturer:

.1 Approved manufacturer: Roto Frank of America.

.2Casement and Awning windows: RotoSil nano corrosion resistant finish on hinge components and stainless steel multi-point lock back, stainless steel locking keepers, and stainless steel rotary crack operator with folding handle.

.3Tilt & Turn and Hopper windows: RotoSil nano corrosion resistant finish, multi-point locking hardware.

.4 Inswing and Outswing doors: RotoSil nano corrosion resistant finish, multi-point locking hardware, and exposed hinges for swing-only doors.

.5 Hardware finish: Colour to be selected from supplier’s standard range.

**.7** Finish

.1Hydro Tuff two-component waterborne polyurethane, meeting the requirements of AAMA-625.

.1 Interior Frame Finish: Architect to choose from manufacturer’s standard color range.

.2Exterior Frame Finish: Architect to choose from manufacturer’s standard color range.

**.8** Glazing Stop

.1Provide manufacturer pultruded fiberglass glazing stops as required by IGU thickness.

.2 Lock-in, screw-less type.

.3 No PVC materials shall be used for glazing stop or related accessories.

**3 EXECUTION.**

**3.1 FABRICATION:**

**.1** Fabricate framing from pultrusions of size and shape shown on shop drawings.

**.2** All framing joints shall be accurately machined, assembled, and sealed to provide neat weather-tight connections.

**.3** Provide interior heel bead as required for rain screen system.

**.4** All glazing pockets shall be vented, pressure equalized and drained to the exterior.

**3.2 INSTALLATION:**

**.1** Windows shall be installed, glazed and adjusted by experienced personnel in accordance with the manufacturer's instructions and approved shop drawings.

**.2** All items in this section shall be set level, square, plumb and at proper elevations and in alignment with other work.

**.3** Install windows in accordance with approved shop drawings.

**3.3 PROTECTION AND CLEANING:**

**.1** Windows shall be isolated and protected from concrete, mortar, plaster and other Building materials during and after installation until acceptance by the General Contractor. Thereafter, it shall be the responsibility of the General Contractor to maintain protection and provide final cleaning.

**END OF SECTION**