**1 GENERAL:**

A high-quality, commercial grade, thermally efficient, 4 1/2" deep fiberglass window and door system.

**1.1 DESCRIPTION:**

**.1** Furnish labor, materials and other services to complete the fabrication of new fiberglass windows and doors, 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 and door 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 interior glazed complete with a continuous silicone heel bead from the IGU to the sash frame. Note: Exterior glazed products do not require a continuous silicone heel bead.

**.4** Fiberglass windows, sliding doors and inswing doors to incorporate a concealed hinge system with a continuous interior air seal, uninterrupted by any hardware. Fiberglass outswing door standard hinge is an exposed hinge system.

**.5** Drawings and specifications for work of this section are based upon fiberglass windows and doors 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** Environmental Product Declaration (EPD):

.1 Type III EPD utilizing the 2023 Product Category Rules.

.2 Meet the ISO 14044, 2930:2017, and 14025:2006 standards.

.3 Third-party reviewed and verified.

**.2** 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 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 Outswing doors (single or double sash):
0.04 cfm/ft² (0.21 L/s.m²).

.7 Inswing 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).

**.3** Water Penetration Resistance:

.1 Laboratory Testing for windows and doors.

.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:15 psf (720 Pa).

.2 Field Testing:

.1 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.

**.4** Structural Requirements:

.1 Performance Grade (PG) and Class of all windows and doors shall be tested to AAMA/WDMA/CSA 101:

.1 For fixed windows, CW-95 or higher.

.2 For operable window (inward or outward) CW-45 or higher.

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

.4 For sliding doors (single sash), CW-PG45.

.2 Components and cladding design wind pressure (DP) for the project of: ASD calculation method shall be used for the design of mullions, reinforcing, and other spanning members.

.3 Design glass according to AAMA/WDMA/CSA 101/I.S.2/A440.

.4 Design fiberglass according to AAMA/WDMA/CSA 101/I.S.2/A440.

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

.6 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.

[NOTE TO SPECIFIER: Section 1.2.2 – 1.2.4 are based on specific AAMA/WDMA/CSA 101 test sizes. In addition to the tests referenced above, Cascadia Windows has numerous AAMA/WDMA/CSA 101 laboratory test results based on various test sizes for their various product types. Contact Cascadia Windows for further information, if required.]

**.5** 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 a 1” (25mm) nominal double glazed insulated glass unit, incorporating one soft coat metallic Low-E coating:

.1 Fixed windows = 0.24 (BTU/ hr\*ft2\*°F) / 1.38 (W/m2\*k)
.2 Tilt & Turn windows = 0.24 (BTU/ hr\*ft2\*°F) / 1.36 (W/m2\*k)
.3 Hopper windows = 0.24 (BTU/ hr\*ft2\*°F) / 1.37 (W/m2\*k)
.4 Casement = 0.24 (BTU/ hr\*ft2\*°F) / 1.36 (W/m2\*k)
.5 Awning = 0.24 (BTU/ hr\*ft2\*°F) / 1.37 (W/m2\*k)
.6 Inswing and outswing doors= 0.23 (BTU/ hr\*ft2\*°F) / 1.28 (W/m2\*k).

.7 Sliding door = 0.23 (BTU/ hr\*ft2\*°F) / 1.30 (W/m2\*k).

\*Note: U-values above are based on NFRC certified values using 6mm with LowE 366 on surface #2 – 13mm airspace with argon fill – 6mm.

.2 Overall U-values, utilizing a 1 ¾” (44mm) nominal triple glazed insulated glass unit, incorporating two soft coat metallic Low-E coatings:

.1 Fixed windows = 0.14 (BTU/ hr\*ft2\*°F) / 0.81(W/m2\*k)
.2 Tilt & Turn windows = 0.15 (BTU/ hr\*ft2\*°F ) / 0.85 (W/m2\*k)
.3 Hopper windows = 0.16 (BTU/ hr\*ft2\*°F) / 0.92 (W/m2\*k )
.4 Casement = 0.17 (BTU/ hr\*ft2\*°F) / 0.95 (W/m2\*k)
.5 Awning = 0.17 (BTU/ hr\*ft2\*°F) / 0.95 (W/m2\*k)
.6 Inswing, Outswing, and Sliding Doors = 0.15 (BTU/ hr\*ft2\*°F) / 0.83 (W/m2\*k)

\*Note: U-Values above are based on NFRC certified values using 6mm with Low E 366 on surface #2 – 13mm airspace with argon fill – 6mm clear – 13mm airspace with argon fill – 6mm with LowE 180 on surface #5.

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

\*Note: Energy Star certified windows are only available for triple glazing.

[NOTE TO SPECIFIER: Section 1.2.4 U-Values are NFRC certified values based on a standard high performance low E coating. Cascadia has numerous alternate Low-E coatings available, and air-filled options that are also NFRC certified. Please contact Cascadia Windows for further information, with respect to alternate NFRC certified values.]

**.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**  Acceptable Manufacturers: Cascadia Windows and Doors, Langley, BC, Canada.

.1 Universal Series™ Fixed, Operable Windows and Doors.

.2 Substitutions: Approved alternate manufacturers.

**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 THE APPLICABLE GLAZING CONFIGURATION(S) 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 (BTU/ hr\*ft2\*°F) / USI-1.47 (W/m2\*k), SHGC 0.64, VT 77%.

.2Cardinal LowE 270, on #2 surface, argon filled. Center-of-Glass performance: U-0.25 (BTU/ hr\*ft2\*°F) / USI-1.40 (W/m2\*k), SHGC 0.36, VT 67%.

.3Cardinal LowE 366, on #2 surface, argon filled. Center-of-Glass performance: U-0.24 (BTU/ hr\*ft2\*°F) / USI-1.36 (W/m2\*k), SHGC 0.27, VT 63%.

.4Cardinal LowE 340, on #2 surface, argon filled. Center-of-Glass performance: U-0.24 (BTU/ hr\*ft2\*°F) / USI-1.38 (W/m2\*k), SHGC 0.18, VT 38%.

.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 (BTU/ hr\*ft2\*°F) / USI-0.74 (W/m2\*k), SHGC 0.52, VT 67%.

.2Cardinal LowE 270/180, on #2 & #5 surfaces, argon filled. Center-of-Glass performance: U-0.13 (BTU/ hr\*ft2\*°F) / USI-0.72 (W/m2\*k), SHGC 0.32, VT 58%.

.3Cardinal LowE 366/180, on #2 & #5 surfaces, argon filled. Center-of-Glass performance: U-0.12 BTU/ hr\*ft2\*°F) / USI-0.71 (W/m2\*k), SHGC 0.24, VT 54%.

.4Cardinal LowE 340/180, on #2 & #5 surfaces, argon filled. Center-of-Glass performance: U-0.13 (BTU/ hr\*ft2\*°F) / USI-0.71 (W/m2\*k), SHGC 0.15, VT 33%.

 .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.

[NOTE TO SPECIFIER: SELECT ANY OF THE OPTIONAL ITEMS FROM THE BELOW LIST THAT MAY BE APPLICABLE TO YOUR PROJECT AND DELETE THE REST]

**.9** Optional Items

.1Juliet Guardrail – <https://www.cascadiawindows.com/files/file/64b2c244100e5/2307-v3-juliet-balcony-data-sheet.pdf>

.2 Custom colour frame finish. \*Virtually any colour can be matched or very closely matched.

.3 Grilles (also known as architectural louvres).

.4 Climb deterrent.

.5 Esthetic IGU options. \*Muntin bars, Simulated Divided Lites, bird friendly glass options, various low E coatings, etc.

.6 Esthetic spandrel options. \*spandrel glass, ACM panel, etc.

.7 Passive House Institute certified products.

.8 Passive House Institute US certified products.

.9 Living Building Challenge Declare Red List Free certified products.

\*Note – Please contact Cascadia for further information with respect any of the available options noted above.

**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**