SECTION 085413 - FIBERGLASS WINDOWS

PART 1 – GENERAL

1. RELATED DOCUMENTS
	1. Drawings and general provisions if the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. SUMMARY
	1. Section includes fiberglass-framed windows.
	2. Related Requirements:

***Specifier Notes:*** *Insert appropriate section numbers and titles below for Window Flashing and Installation Sealants.*

* + 1. Division 1, Section 018113: Sustainable Design Requirements
		2. Division 1, Section 014000: Quality Assurance for Integrated Exterior Mock-Up requirements
		3. Division 7, Section 072726 - Fluid-Applied Membrane Air Barriers and Section 072723 Rigid Thermal Insulation Air Barriers for air barriers and flashings to be coordinated with windows.
		4. Division 7, Section 079200 - Joint Sealants for sealants required for window installation
1. REFERENCES

***Specifier Notes:*** *List standards referenced in this section, complete with designations and titles. This article does not require compliance with standards, but is merely a listing of those used.*

* 1. American Architectural Manufacturers Association (AAMA):
		1. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Doors.
		2. AAMA 613 - Voluntary Performance Requirements and Test Procedures for Organic Coatings on Plastic Profiles.
		3. AAMA 623 07 – Voluntary Specification, Performance Requirements and Test Procedures for Organic Coatings on Fiber Reinforced Thermoset Profiles
		4. AAMA 624 07 – Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Fiber Reinforced Thermoset Profiles
		5. AAMA 625 07 – Voluntary Specification, Performance Requirements and Test Procedures for Superior Performance Organic Coatings on Fiber Reinforced Thermoset Profiles
	2. American Architectural Manufacturers Association, Window and Door Manufacturers Association, and Canadian Standards Association (AAMA/WDMA/CSA)
		1. ANSI/AAMA/NWWDA 101/I.S.2 -97 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
		2. AAMA/WDMA/CSA 101/I.S.2/A440-05 – Standard/Specification for windows, doors, and unit skylights
		3. AAMA/WDMA/CSA 101/I.S.2/A440-08 – NAFS North American Fenestration Standard/Specification for windows, doors, and skylights
	3. American Society for Testing and Materials (ASTM):
		1. ASTM C 1036 - Flat Glass.
		2. ASTM C 1048 - Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.
		3. ASTM E 283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Difference Across the Specimen.
		4. ASTM E 547 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.
1. PREINSTALLATION MEETINGS
	1. Preinstallation Conference: Conduct conference at Project site.
	2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
	3. Review, discuss, and coordinate the interrelationship of fiberglass windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
	4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
	5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.
2. ACTION SUBMITTALS
	1. Product Data: For each type of product include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for fiberglass windows.

***Specifier Notes:*** *Edit the following as appropriate.*

* 1. LEED Submittals: Comply with Section 018113.
		1. MR Credit 2: BPDO – Environmental Product Declarations
			1. For fiberglass windows, if available: Product-specific declaration or Industry-wide EPD or product-specific EPD.
		2. Provide LBC DECLARE LABELS or LBC Bill of Materials form provided under Section \_\_\_\_\_ Part \_\_\_\_\_ “Attachments” listing all products to be permanently installed.
	2. Shop Drawings: For fiberglass windows.
		1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details showing window anchoring at wall connections.
	3. Samples: For fiberglass windows and components required, prepared on Samples of size indicated below:
		1. Exposed Finishes: 2 by 4 inches.
		2. Exposed Hardware: Full-size units.
	4. Product Schedule: For fiberglass windows. Use same designations indicated on Drawings.
	5. Quality Assurance / Control Submittals:
		1. Qualifications: Proof of manufacturers qualifications.
		2. U-Factor and structural ratings required for AAMA and NFRC labeling requirements.
		3. Installation Instructions – ref. AAMA Installation Masters
	6. Closeout Submittals: Reference Section 01 78 00 – Closeout Submittals: submit following items:
		1. Maintenance instructions.
		2. Warranties.
1. QUALITY ASSURANCE
	1. Manufacturer Qualifications: A manufacturer capable of fabricating fiberglass windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
		1. Member American Architectural Manufacturers Association (AAMA) and the National Fenestration Rating Council (NFRC).
		2. NAMI or IGCC Certified for fabrication of insulated glazing units with suspended film.
		3. Minimum 5 years experience fabricating insulated glazing units.
	2. Installer Qualifications: An installer acceptable to fiberglass window manufacturer for installation of units required for this Project.
	3. Product Certifications:
		1. US Passive House (PHIUS) Certified
		2. ILFI DECLARE Labeled
		3. AAMA/WDMA/CSA/I.S.2/A440 Certified
		4. NFRC Certified
	4. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
		1. Build mockup as part of Integrated Exterior Mock-Up. Approximate window size \_\_\_\_\_\_\_\_\_\_
		2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
		3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
	5. Regulatory Requirements:

***Specifier Notes:*** *Insert local regulatory requirements below.*

* + 1. [Egress per local code] [Limited opening]
1. DELIVERY, STORAGE, AND HANDLING
	1. Reference Section 01 66 00 – Product Storage and Handling Requirements.
	2. Delivery:
		1. Deliver materials to site undamaged in manufacturer's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
	3. Storage:
		1. Protect the windows and accessories from the elements, construction activities, and other hazards until the project is complete.
		2. Store materials in an upright position and in accordance with manufacturer's instructions.
		3. Store materials off ground and under cover.
		4. Protect materials from weather, direct sunlight, and construction activities.
	4. Handling: Protect materials and finish during handling and installation to prevent damage.
		1. Handle all fiberglass window units with glass cups instead of by the frames whenever possible and if unit is over 100 lbs.
		2. Protect materials and finish during handling and installation to prevent damage.
2. WARRANTY
	1. Manufacturer's Warranty: Manufacturer agrees to repair or replace fiberglass windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
		1. Failure to meet performance requirements.
			1. Structural failures including excessive deflection, water leakage, and air infiltration.
			2. Faulty operation of movable sash and hardware.
			3. Deterioration of materials and finishes beyond normal weathering
			4. Failure of insulating glass.
		2. Warranty Period: 10 years

PART 2 - PRODUCTS

1. MANUFACTURERS
	1. Products: Subject to compliance with requirements, provide the following:
		1. Alpen Zenith Series Fiberglass Windows

***Specifier Notes:*** *Additional product descriptors may be added to description above, such as: Fixed High Profile; Fixed Low Profile; Casement; Awning; PHIUS Certified; DECLARE Labeled etc.*

* 1. Fiberglass Windows: Subject to compliance with project requirements, manufacturers offering products which may be incorporated in the work include the following:
		1. Alpen High Performance Products; 335 Centennial Pkwy, Ste A, Louisville, CO 80027; [www.ThinkAlpen.com](http://www.ThinkAlpen.com). Main: 303-834-3600
		2. Manufacturer’s Representative:

Luke Albin, Architectural Consultant

Office: 617-817-8282

Email: lalbin@thinkalpen.com

* 1. Approved Substitutions: Reference Section 01 25 13 – Product Substitution Procedures
1. WINDOW PERFORMANCE REQUIREMENTS
	1. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
	2. Structural Performance: Provide products meeting AAMA/WDMA/CSA 101/I.S.2/A440 performance Class:
		1. Fixed High Profile: CW-35 (72” x 96”) or CW-45 (60” x 60”)
		2. Fixed Low Profile: CW-45 (72” x 96”) or CW-70 (60” x 60”)
		3. Casement: CW-50 (36” x 60”)
		4. Awning: CW-80 (47” x 32”)
		5. Fixed Ribbon Window: CW-55 (80” x 80”)
	3. Window Air Leakage, ASTM E 283: Window air leakage when tested at 1.57 psf (25 mph) shall be ≤0.02 cfm/ft2 of frame.
	4. Window Water Penetration, ASTM E 547: No water penetration through window when tested in accordance with ASTM E547 (and ASTM E331) when tested at a test pressure consistent with the minimum specified DP for the Performance Class of the product as defined in Section 2.2
	5. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of:
		1. Fixed: [U-0.27 BTU/hr.ft2.F] [U-0.20 BTU/hr.ft2.F] [U-0.15 BTU/hr.ft2.F]
		2. Operable: [U-0.27 BTU/hr.ft2.F] [U-0.21 BTU/hr.ft2.F] [U-0.17 BTU/hr.ft2.F]
	6. Solar Heat-Gain Coefficient (SHGC): NFRC 200 whole-window SHGC maximum of 0.30 unless indicated otherwise on window schedule for orientation.

***Specifier Notes:*** *Choose appropriate U-value and SHGC from the following:*

|  |  |  |
| --- | --- | --- |
|  | *Dual Pane* | *TGT = Thinglass Triple* |
|  |  | *U-Value* | *SHGC* |
| *FIXED HIGH PROFILE [Low Profile]*  | *3H Super:*  | *0.25 [0.27]* | *0.52 [0.58]* |
|  | *3M Super:*  | *0.25 [0.26]* | *0.33 [0.37]* |
|  | *3L Super:*  | *0.24 [0.26]* | *0.22 [0.58]* |
|  | *5H TGT:* | *0.19 [0.20]* | *0.48 [0.53]* |
|  | *5M TGT:* | *0.19 [0.20]* | *0.31 [0.34]* |
|  | *5L TGT:* | *0.18 [0.19]* | *0.20 [0.22]* |
|  | *HighGain-6 TGT:* | *0.14 [0.15]* | *0.46 [0.51]* |
|  | *Balanced -6 TGT:* | *0.14 [0.14]* | *0.28 [0.32]* |
|  | *Solarcontrol -6 TGT:*  | *0.14 [0.14]* | *0.20 [0.22]* |
|  |  |  |  |
| *CASEMENT / AWNING:*  | *3H Super:*  | *0.27* | *0.44* |
|  | *3M Super:*  | *0.26* | *0.29* |
|  | *3L Super:*  | *0.25* | *0.19* |
|  | *5H TGT:* | *0.21* | *0.41* |
|  | *5M TGT:* | *0.21* | *0.27* |
|  | *5L TGT:* | *0.20* | *0.18* |
|  | *HighGain-6 TGT:* | *0.17* | *0.39* |
|  | *Balanced -6 TGT:* | *0.16* | *0.25* |
|  | *Solarcontrol -6 TGT:*  | *0.16* | *0.17* |
|  |  |  |  |

* 1. Passive House: Windows shall meet the following performances when calculated according to Passive House Institute US Orange Path and EN standards:
		1. U-value, window frame (Uf):
			1. Fixed Picture Windows: [High Profile: Uf-0.16 maximum] [Low Profile: U-0.22]
			2. Operable Windows: Uf-0.20 maximum
			3. Ribbon Windows: Uf-0.36 maximum
		2. Center-of-Glass U-value (Ug): [0.20 (dual pane)] [0.18 maximum (5- TGT)] [0.13 (6- TGT)]
		3. Solar Heat Gain Coefficient, Center of Glass (SHGCg): [0.27 – 0.61]
1. FIBERGLASS WINDOWS
	1. Operating Types: Provide the following operating types in locations indicated on Drawings:
		1. Fixed. [Low Profile] [High Profile]
		2. Casement: Project out.
		3. Awning: Project out.
	2. Frames and Sashes: Frames shall be and comprised pultruded fiberglass having a nominal wall thickness of 2.3mm (0.090”) and with minimum 60% glass content.
	3. Exposed Surfaces: Exposed interior and exterior fiberglass surfaces shall be painted with manufacturer's standard enamel coating.

***Specifier: Choose from highlighted options below***

* + 1. Frame and Sash Color, Exterior: [Choice of manufacturer’s full range of standard colors] OR [Custom Color]
		2. Frame and Sash Color, Interior: [Same as exterior] [White] OR [Custom color [insert custom color name/ID]]
		3. Insect Screen Frame Color: Selected from manufacturer’s standard colors.
	1. Insulating-Glass Units:
		1. Insulated Glass Units shall be IGCC/NAMI Certified to ASTM E2190
		2. Construction: Individual components shall comply with criteria specified in following paragraphs. Units shall be hermetically sealed and shall comply with ASTM E 2190.
		3. Components:
			1. Overall IG thickness: nominally 1-3/8”
			2. Exterior Glass: to be low-e coated float glass of nominal 1/8” (3mm) thickness or thicker as required by window size and performance requirements specified herein
				1. Strength: Annealed unless required to be tempered for code requirements. Where used, tempered glass shall per ASTM C 1048, complying with CPSC 16CFR-1201; ANSI Z 97.1
				2. Low-E coating to be: ***(Choose one)*** [Cardinal 272 (“-M” / Balanced)] OR Cardinal 366([“-L” / SolarControl)] OR [Cardinal 180 (“-H” / HighGain)]
			3. Middle Layer: : ***(Choose one)*** [N/A] OR [1.3mm Clear *Thinglass*™]
			4. Interior layer to be clear float glass of nominal 1/8” (3mm) thickness or thicker as required by window size and performance requirements specified herein
				1. Strength: Annealed unless required to be tempered for code requirements. Where used, tempered glass shall per ASTM C 1048, complying with CPSC 16CFR-1201; ANSI Z 97.1
				2. Low-E coating to be Cardinal 272 or Cardinal 180
			5. Gas Fill: Each cavity shall be filled with an inert gas / air mixture; units shall be equipped with gas-retention device for changes in elevation.
			6. Spacers: shall be ***(Choose one)*** Warm-Edge Superspacer, Color: Black;
			7. Edge Sealants:
				1. Primary: Polyisobutylene (PIB) sealant complying with ASTM E 774 for glass-to-spacer seals
				2. Secondary: Polyurethane or Hot Melt Butyl for perimeter moisture barrier
				3. Seal durability: conformance to ASTM E 774; visible ALI certification for CBA rating level. Perimeter seals shall maintain a hermetically-sealed, dehydrated condition for the duration of the product warranty.
		4. Provide Safety Glazing: Where safety glazing is required by code, provide glazing that complies with 16 CFR 1201, Category II.
	2. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
	3. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
		1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.
	4. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock fiberglass windows, and sized to accommodate sash weight and dimensions.

***Specifier: Eliminate the following section “Projected Window Hardware” if not required***

* 1. Projected Window Hardware:
		1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.
		2. Type and Style: As selected by Architect from manufacturer's full range of types and styles.
			1. Exposed Hardware Color and Finish: Amesbury Truth ***(Choose One:)*** [White] [Beige] [Coppertone] [Chestnut Bronze Metallic] [Low Gloss Black]
		3. Hinges: Manufacturer's heavy-duty hinges for sash weight and size indicated.
		4. Single-Handle Locking System: Operates positive-acting arms that pull sash into locked position. Provide one arm on sashes up to 27-1/2 inches tall and two arms on taller sashes.
		5. Provide multipoint locking on windows over 33” tall.
		6. Limit Devices: Concealed support arms with adjustable, limited, hold-open limit devices designed to restrict sash opening.
			1. Limit clear opening to 4 inches from outside edge of sill or outside edge of brick jamb for ventilation
	2. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
1. ACCESSORIES
	1. Dividers (False Muntins): Provide divider grilles in designs indicated for each sash lite.
		1. Simulated Divided Light Grids (SDLs): applied to interior and exterior glass surfaces
			1. Material: Aluminum
			2. Pattern: As indicated on Drawings.
			3. Profile: ***Choose one or more*** *[7/8” wide] [1-1/8” wide] [2” wide]*
			4. Color: Match window exterior color and finish.
2. INSECT SCREENS
	1. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
	2. Type and Location: Full, inside for project-out sashes.
	3. Aluminum Frames: Manufacturer's standard aluminum alloy. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable spline/anchor concealing edge of frame.
	4. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
	5. Finish for Interior Screens: Baked-on organic coating in color to match window exterior.
	6. Screen Mesh: ***Choose one:***

*Fiberglass 18-by-16 mesh. Color = Charcoal*

*Fiberglass “Better Vue” with 20-by-20 mesh. Color = Charcoal*

*Aluminum Wire Fabric: 18-by-16 mesh, coated aluminum wire. Color = [Natural bright (Silver)] or [Black].*

1. FABRICATION
	1. Fabricate fiberglass windows in sizes indicated. Include a complete system for installing and anchoring windows.
	2. Glaze fiberglass windows in the factory.
	3. Weather strip each operable sash to provide weathertight installation.
	4. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.
	5. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

1. EXAMINATION
	1. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
	2. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
	3. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
	4. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.
2. preparation
	1. Take field measurements to determine exact conditions and sizes required for system.
3. INSTALLATION
	1. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
	2. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
	3. Install window systems in accordance with window operator manufacturer’s and window manufacturer’s instructions.
	4. Install perimeter sealant backing materials, and installation as specified in Division 7, Section: Joint Sealants.
	5. Coordinate attachment and seal of perimeter air and vapor barrier materials.
	6. Install Flex Wrap by Dupont or approved equal at window heads and sills with overlaps at corners. Install StraightFlash by Dupont or approved equal at window jambs with overlaps at corners. Install strip at sill first, then sides, then top with positive water drainage. Moisture/air barrier at top to be outside of Flex Wrap for positive drainage.
	7. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
	8. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
	9. Provide thermal isolation where components penetrate or disrupt building insulation. Install non-expanding foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier on all sides.
	10. Flash all window heads with cap flashing.
	11. Lap moisture/air barrier over cap flashing to provide additional positive water drainage beneath siding.
4. Field quality control
	1. Division 1, Section: Quality Requirements: Field inspection.
	2. Inspect installation, attachment, and operation of window systems.
	3. Inspect sealant installation and window interface with adjacent construction.
5. ADJUSTING, CLEANING, AND PROTECTION
	1. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
	2. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
	3. Keep protective films and coverings in place until final cleaning.
	4. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.
	5. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.
	6. Remove visible labels and adhesive residue protective material from factory finished surfaces according to manufacturer’s instructions.
	7. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.
	8. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION 085413