## SECTION 085113 - ALUMINUM WINDOWS (Architectural)

*\*TO FINISH YOUR SPECIFICATION: 1. Please read, react to, then delete comments in* ***red*** *or \*stars\*. 2. Please add or delete options in* ***green*** *or (parentheses). 3. Please replace preceding standards with options in* ***blue*** *[brackets] or delete options in* ***blue*** *[brackets]. 4. Finally, please revise paragraph numbers and/or letters, as necessary.\**

*\*BEFORE USING YOUR FINISHED SPECIFICATION: Permit Peerless to review your edits to confirm your selected options do not restrict your desired operation or reduce the tested performance.\**

**PART 1 - GENERAL**

1.01 SECTION INCLUDES

1. Material: aluminum windows as on the drawings and specified in this section.
2. Installation: labor, tools, and material needed to install aluminum windows.
3. Glass and glazing.

(1.02 PRODUCTS SUPPLIED BUT NOT INSTALLED)

*\*Enter description, e.g., extra vents to be supplied and stored for the future\**

(1.03 PRODUCTS INSTALLED BUT NOT SUPPLIED)

*\*Enter description, e.g., louver supplied by others to be installed in new window\**

1.04 RELATED SECTIONS - Section 079200 – Joint Sealants

1.05 REFERENCES

1. AAMA - American Architectural Manufacturers Association - *www.aamanet.org*
2. AAMA/WDMA/CSA 101/I.S.2/A440-08 “NAFS - North American Fenestration Standard/Specification for windows, doors, and skylights”
3. AAMA 502-12 "Voluntary Specification for Field Testing of Newly Installed Fenestration Products"
4. AAMA 611-12 "Voluntary Specification for Anodized Architectural Aluminum"
5. AAMA 701/702-11 "Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals”
6. AAMA 904-09 “Voluntary Specification for Multi-bar Hinges in Window Applications”
7. AAMA 910-10 “Voluntary ‘Life Cycle’ Specifications and Test Methods for AW Class Architectural Windows and Doors”
8. AAMA 1503-09 "Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections"
9. AAMA 2605-13 “Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels”
10. AAMA CW-10-12 "Care and Handling of Architectural Aluminum from Shop to Site"
11. ASTM - American Society for Testing and Materials – *www.astm.org*
12. ASTM E283-12 "Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen"
13. ASTM E330-14 "Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference"
14. ASTM E331-09 "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference"
15. ASTM E547-09 "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential"
16. ASTM E2190-10 "Standard Specification for Insulating Glass Unit Performance and Evaluation"
17. ASTM F588-07 “Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact”
18. IGCC – Insulating Glass Certification Council – *www.igcc.org*
19. NFRC – National Fenestration Rating Council – *www.nfrc.org*
	1. NFRC 100-2010 “Procedure for Determining Fenestration Product U Factors”
	2. NFRC 102-2010 “Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems”
20. SGCC – Safety Glazing Certification Council – *www.sgcc.org*
	1. ANSI Z97.1-09 “American National Standard for Safety Glazing Materials used in Buildings – Safety Performance Specifications and Methods of Test”
	2. 16 CFR 1201 “Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials – codified at Title 16, Part 1201 of the Code of Federal Regulations 2011 Edition”

1.06 SYSTEM DESCRIPTION

1. AAMA Designation: AW-PG100-AP.
2. Windows: 2-1/2" frame depth; extruded aluminum with integral structural thermal break installed by the window manufacturer in the frame and vent members; equal-leg [flange] [prime/nailing fin] frame; exterior and interior finishes applied by the window manufacturer; frames and vents assembled by the window manufacturer.
3. Thermal break: The thermal break separating the exterior and interior aluminum extrusions shall be a mechanical crimp-in-place system utilizing multi-directional glass fiber reinforced polyamide nylon struts with locking mechanical connections to the aluminum extrusions. The thermal break shall not be compromised by hardware or metal fasteners.
4. Configuration: project in vent; [vent-to-vent with a vertical integral mullion in one master frame;] [vent-to-fixed with a vertical integral mullion in one master frame;] [vent-under-vent with a horizontal integral mullion in one master frame;] [vent-under-fixed with a horizontal integral mullion in one master frame;] [vent-over-fixed with a horizontal integral mullion in one master frame;] vent hinged at the bottom and pulls in from the top to open.
5. Glazing: exterior ExxonMobil Santoprene™ foam gasket; 1" insulating glass; two weep holes under each glass pocket for drainage; foam backer rod and silicone heel bead forming an internal seal; interior Santoprene™ bulb gasket threaded into aluminum glazing beads; glass description in paragraph 2.04; glazed by the window manufacturer.

1.07 PERFORMANCE REQUIREMENTS

1. Conformance to AW-PG100-AP specifications in AAMA/WDMA/CSA 101/I.S.2/A440-08 when tests are performed on the prescribed 60" x 36" minimum test size with the following test results:
2. Air Infiltration: after the AAMA 910-10 life cycle test, not to exceed AAMA 101 standard of maximum .1 cfm/square foot when tested per ASTM E283-12 at a static air pressure difference of 6.24 psf.
3. Water Penetration: after the AAMA 910-10 life cycle test, no uncontrolled water leakage when tested per ASTM E331-09 and ASTM E547-09 at a static air pressure difference of 15 psf.
4. Uniform Deflection: no more than L/175 when tested per ASTM E330-14 at a static air pressure difference of 100 psf.
5. Uniform Structural Load: no glass breakage or permanent damage to fasteners, and maximum .2% permanent deformation of the span of any frame member when tested per ASTM E330-14 at a static air pressure difference of 150 psf.
6. Forced Entry Resistance: latching devices shall provide reasonable security against forced entry and the test window shall achieve a Grade 40 when tested per ASTM F588-07.
7. Thermal AAMA Testing: per AAMA 1503-09, on a 59" x 24" test size glazed with 1” insulating glass made with 1/4” soft coat low E coating on surface #2, plain air in the airspace made with a stainless steel spacer, and 1/4” clear glass, with the following test results:
8. Condensation Resistance Factor: minimum 57 frame CRF and 66 glass CRF.
9. Thermal Transmittance: maximum .47 BTU/HR/SQ.FT/°F U value.
10. Thermal NFRC Testing: per NFRC 102-2010 on a 59” x 24" test size glazed with 1” insulating glass made with 1/4” soft coat low E coating on surface #2, plain air in the airspace made with a stainless steel spacer, and 1/4” clear glass, with the following test result: Standardized Thermal Transmittance to be maximum 0.43 BTU/HR/SQ.FT/°F.
11. Thermal NFRC Simulation: thermal computer simulation per NFRC 100-2010 on a 60” x 36" test size glazed with 1” insulating made with 1/4” soft coat low E coating on surface #2, argon gas in the airspace made with a stainless steel spacer, and 1/4” clear glass, with the following test result: Standardized Thermal Transmittance to be maximum 0.400 BTU/HR/SQ.FT/°F.

1.08 SUBMITTALS

1. Shop drawings: window location chart; typical window elevations; details of assemblies, hardware, and glazing details for units glazed by the window manufacturer.
2. Product data: test reports from an AAMA-accredited laboratory; manufacturer's specifications.
3. Samples: each specified finish for aluminum; other samples as requested.

1.09 QUALITY ASSURANCE

1. Submit for prebid approval ten days prior to bid opening valid test reports or waiver from an AAMA-accredited laboratory conforming to test results in Paragraph 1.07, and a sample window representing the bid window except for color.
2. Acceptance will be by addendum only as no verbal approvals will be allowed.
3. Submit bid on prequalified products in prebid written addendum. Bidder must identify manufacturer and model of product on which the bid is based.
4. Furnish a valid AAMA “Authorization for Product Certification” or waiver indicating that the windows for the project conform to AAMA/WDMA/CSA 101/I.S.2/A440-08.
5. Furnish visible, permanent IGCC certification labels indicating compliance with ASTM E 2190-10 on the insulating glass units.
6. Furnish visible, permanent SGCC certification labels indicating conformance to ANSI Z97.1-09 and/or 16 CFR 1201 on tempered glass lites, if included on the project, and laminated glass lites, if included on the project.
7. Manufacturer's warranties:
8. Windows: warrant for one year against defects in material or workmanship under normal use.
9. Insulating glass units: warrant seal for ten yearsagainst visual obstruction from film formation or moisture collection between internal glass surfaces, excluding that caused by glass breakage or abuse.
10. Paint finish: PPG Industries Duranar® organic finish conforming to AAMA 2605-13: warrant for twenty years against chipping, peeling, blistering, cracking, chalking, or fading.

(H. Project Survey: *\*Contact Peerless to register before project bid date\** by installer

 and manufacturer’s representatives; one year after date of completion; to

 recommend maintenance procedures.)

* 1. DELIVERY, STORAGE, AND HANDLING - Handle and protect windows and

 accessories in accordance with AAMA CW-10-12 until installation completion.

**PART 2 – PRODUCTS**

2.01 MANUFACTURERS

1. Peerless G111 Project In Thermal Aluminum Window
2. Other acceptable manufacturers who have demonstrated a successful history of manufacturing for *\*Enter number\** years equivalent products:
3. *\*Enter an equivalent manufacturer’s company name and model number\**
4. *\*Enter another equivalent manufacturer’s company name and model number\**

2.02 MATERIALS

1. Aluminum extrusions: extruded by the window manufacturer from commercial quality 6063-T5 alloy; free from defects impairing strength and durability.
2. Hardware: mounted in concealed extruded grooves to avoid penetrating frame or vent members with fasteners; two concealed stainless steel hinges conforming to AAMA 904-09 per vent to rotate the vent inward on horizontal axis; one single-action satin nickle [black] handle with multiple point locks per vent; [one key-operated black (silver) (white) handle with multiple point locks per vent;] [one custodial-operated satin nickle (black) (white) handle with multiple point locks per vent and security wrench tool;].
3. Weatherstrip: secured in extruded ports; Santoprene™ seals conforming to AAMA 702-11; flap seal single row mounted on the vent interior on the bottom rail, top rail, and stiles; double-tubular seal single internal row mounted on the head, sill and jamb frame members.

(D. Insect screens: full; mounted on the window frame exterior; 3/8” x 1-3/8” x .050”

 extruded tubular aluminum frame with the same finish as the window exterior in

 color and performance; corners mitered, gusset reinforced, and crimped; 18 x 16

 dark fiberglass [aluminum] mesh; flexible PVC spline.)

2.03 FABRICATION

1. Frame: double tubular head, sill, and jambs mitre cut and fastened with two zamac corner gussets per corner; double tubular integral mullion, if required, fastened with two zamac gussets per frame member without penetrating the frame member with fasteners; corners sealed by the window manufacturer with polyethylene foam gaskets.
2. Vents: double tubular horizontal and vertical vent rails and stiles mitre cut and fastened with two zamac corner gussets per corner; corners sealed by window manufacturer with polyethylene foam gaskets.
3. Water control: continuous compression gasket within the internal frame to utilize pressure equalization and to allow water to drain by gravity through exterior weep slots covered with weep flaps and weep hoods finished to match window.

2.04 INSULATING GLASS UNITS

### Materials

1. Spacer: tubular stainless steel.
2. Spacer color: stainless metal color.
3. Primary seal: polyisobutylene.
4. Secondary seal: silicone.
5. Airspace fill: plain air. [argon.]

### Performance

1. Dual-seal durability: conformance to ASTM E 2190-10; visible, permanent IGCC certification label.

(2. Other: *\*Enter center-of-glass U value, SHGC, and VT data as required\**)

1. Exterior glass lite
2. Thickness: 1/8". [3/16".] [1/4".]
3. Tint: clear. [bronze.] [gray.] [green.]
4. Type: annealed. [tempered.] [laminated. *\*Enter interlayer and lite descriptions\**]

(4. Coating: low E coating on #2 surface; Cardinal Glass 270 or Cardinal Glass

 366 or equivalent.)

1. Interior glass lite
2. Thickness: 1/8". [3/16".] [1/4".]
3. Tint: clear. [obscure. *\*Enter pattern\**]
4. Type: annealed. [tempered.] [laminated. *\*Enter interlayer and lite descriptions\**]

(4. Coating: low E coating on #3 surface; Cardinal Glass 270 or Cardinal Glass

 366 or equivalent.)

(5. Coating: low E coating on #4 surface; Cardinal Glass i89 or equivalent.)

1. Glass surface protection: Factory-apply removeable protective clear Cardinal Glass Preserve™ film on insulating glass exterior and interior surfaces for protection during window installation and building construction.

2.05 FINISH ON **EXTERIOR** ALUMINUM EXTRUSIONS

1. Application: on clean extrusions free from serious surface blemishes; on exposed surfaces visible when installed product's operating vents are closed.

*\*Enter information for the exterior finish from one of the three finishes listed below\**

*\*Enter the following for an AAMA 2605 70% fluoropolymer paint finish\**

1. Coating: PPG Duranar® with resin containing 70% fluoropolymer; thermosetting; alternative finishes will not be acceptable.
2. Quality standard: conforming to AAMA 2605-13, including 10 years Florida exposure and 4000 hours humidity tests.
3. Pretreatment: five-stage; zinc chromate conversion coating.
4. Application: electrostatic spray by a PPG Approved Duranar® Applicator and appropriate oven bake process.
5. Coating quantity: minimum one primer coat and one color coat.
6. Dry film thickness: minimum 1.2 mils on exposed surfaces, except inside corners and channels.
7. Color: chosen from manufacturer's standards.

*\*Or enter the following for an AAMA 611 clear anodize finish\**

1. Coating: clear anodize.
2. Quality standard: conforming to AAMA 611-12.
3. Thickness: AAM10C22A41 Class I - .7 mils #215. [AAM10C22A31 Class II - .4 mils #204.]

*\*Or enter the following for an AAMA 611 color anodize finish\**

1. Coating: color anodize.
2. Quality standard: conforming to AAMA 611-12.
3. Thickness: AAM10C22A44 Class I - .7 mils.
4. Color: #313 dark bronze. [#311 light bronze.] [#312 medium bronze.] [#315 black.]

2.06 FINISH ON **INTERIOR** ALUMINUM EXTRUSIONS

1. Application: on clean extrusions free from serious surface blemishes; on exposed surfaces visible when installed product's operating vents are closed.

*\*Enter information for the interior finish from one of the three finishes listed below\**

*\*Enter the following for an AAMA 2605 70% fluoropolymer paint finish\**

1. Coating: PPG Duranar®™ with resin containing 70% fluoropolymer; thermosetting; alternative finishes will not be acceptable.
2. Quality standard: conforming to AAMA 2605-13, including 10 years Florida exposure and 4000 hours humidity tests.
3. Pretreatment: five-stage; zinc chromate conversion coating.
4. Application: electrostatic spray by a PPG Approved Duranar® Applicator and appropriate oven bake process.
5. Coating quantity: minimum one primer coat and one color coat.
6. Dry film thickness: minimum 1.2 mils on exposed surfaces, except inside corners and channels.
7. Color: chosen from manufacturer's standards.

*\*Or enter the following for an AAMA 611 clear anodize finish\**

1. Coating: clear anodize.
2. Quality standard: conforming to AAMA 611-12.
3. Thickness: AAM10C22A41 Class I - .7 mils #215. [AAM10C22A31 Class II - .4 mils #204.]

*\*Or enter the following for an AAMA 611 color anodize finish\**

1. Coating: color anodize.
2. Quality standard: conforming to AAMA 611-12.
3. Thickness: AAM10C22A44 Class I - .7 mils.
4. Color: #313 dark bronze. [#311 light bronze.] [#312 medium bronze.] [#315 black.]

(2.07 MUNTINS)

1. Material: extruded aluminum; with exposed surfaces finished to match window color; concealed fasteners; designed for unrestricted expansion and contraction.
2. Design: muntin bar cross-section profile and material chosen from manufacturer’s standards.
3. Patterns: grid patterns to be designated by architect.
4. Location: exterior. (internal: encapsulated between the two glass lites in the insulating glass unit to protect them from damage and dirt buildup.) [true: dividing the insulating glass into small individual units.]

(2.08 INSTALLATION ACCESSORIES)

1. Material: extruded aluminum; nominal .062” wall; with exposed surfaces finished to match window color and finish performance; concealed fasteners; required weatherseals; designed for unrestricted expansion and contraction.
2. Exterior: (snap-in sill panning leg.) (wrap around panning.) (preset panning.) (snap-in nailing fin.) (snap-in flange.) (two-piece receptor with polyamide strip thermal break.) (10 psf subsill with polyamide strip thermal break and end dams sealed by the window manufacturer.)
3. Interior: (two-piece snap trim and trim clip.)
4. Mullions: (horizontal stack mullion with polyamide strip thermal break.) (vertical three-piece mullion with polyamide strip thermal break.)
5. Other: (steel strap anchor.) (head expander with polyamide strip thermal break.) (sill angle.)

**PART 3 - EXECUTION**

3.01 PREPARATION - Prepare openings to be in tolerance, plumb, level, provide for

 secure anchoring, and in accordance with approved shop drawings.

3.02 INSTALLATION

1. Install windows in accordance with approved shop drawings and window manufacturer's recommendations with skilled craftspeople who have demonstrated a successful history of installing windows for *\*Enter number\** years.
2. Provide required support and securely fasten and set windows plumb, square, and level without twist or bow.
3. Apply sealant per sealant manufacturer's recommendations at joints, wipe off excess, and leave exposed sealant surfaces clean and smooth.

 (3.03 FIELD TESTING)

1. Test installed units in conformance with AAMA 502-12 minimum requirements for air and water infiltration with the window manufacturer, dealer, contractor, and owner present.
2. Select test units as directed by the owner's representative and use an AAMA-accredited laboratory provided by the owner or contractor.

3.04 ADJUSTING - Adjust windows as necessary for smooth and weathertight

 operation.

3.05 CLEANING

1. Peel the Preserve™ protective film from the window glass surfaces when the window installation is complete, leaving these surfaces ready for use without the need for glass cleaning.
2. Leave the installed windows clean and free of construction debris.

3.06 CARE PRIOR TO BUILDING COMPLETION - Protect surfaces of installed

 windows, in accordance with AAMA CW-10-12, from contact with

 contaminating substances resulting from surrounding construction.

END OF SECTION