

SECTION # 084113 – MULLED WINDOW SYSTEM

BY SOLAR INNOVATIONS, INC.

NOTE TO SPECIFIER:

This section is based on the products of Solar Innovations, Inc., which is located at:

31 Roberts Road
Pine Grove, PA 17963
Phone 800-618-0669; Fax 800-618-0743;
Email: skylight@solarinnovations.com
Website: www.solarinnovations.com

Solar Innovations, Inc. is a leading manufacturer of the highest quality aluminum and wood structures. Their comprehensive product line includes conservatories; greenhouses; solariums; skylights; pool and spa enclosures; folding and stacking glass walls; walkways; canopies; sliding, terrace, pivot, and lift slide doors; and more. Solar Innovations, Inc. strives to produce products tailored to each particular need, residential or commercial.

This specification includes Solar Innovations, Inc.'s custom mulled window systems that are available in any size, design, or color with custom and standard options at comparable prices. If you can imagine it, Solar Innovations, Inc. can build it.

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Mulled Window System

1.02 RELATED SECTIONS

*****Note to Specifier: Delete any sections below that are not relevant to this project, and add others as required.**

- A. Section 033000 – Cast-in-place Concrete – Openings in cast-in-place concrete
- B. Section 034500 – Precast Concrete Wall Panels: Opening in precast concrete wall panels.
- C. Section 048100 – Unit Masonry – Openings in masonry
- D. Section 054000 – Cold Formed Metal Framing: Framed Openings
- E. Section 061000 – Rough Carpentry: Framed Openings
- F. Section 062023 – Interior Finish Carpentry: Interior Wood Casing
- G. Section 072100 – Thermal insulation: Batt insulation at window perimeter

- H. Section 074600 – Siding and Trim
- I. Section 076200 – Flashing and Sheet Metal: Flashing associated with windows and doors
- J. Section 079200 – Joint Sealers

1.03 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date
- B. All reference amendments adopted prior to the effective date of this Specification shall be applicable to this Project
- C. All materials, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references:

*****Note to Specifier: Delete any references below that are not required by the project, and add others as required.**

1. AAMA 611 – Voluntary specifications for anodized architectural aluminum (revised).
2. AAMA 1503 – Voluntary test method for thermal transmittance and condensation resistance of windows, doors, and glazed wall sections
3. ASTM A36/A36M – Standard specification for carbon structural steel
4. ASTM B221/B221M – Standard specification for aluminum and aluminum-alloy extruded bars, rods, wires, profiles, and tubes
5. ASTM B241/B241M – Standard specification for aluminum and aluminum-alloy seamless pipe and seamless tubes
6. ASTM C1115 – Standard specification for dense elastomeric silicone rubber gaskets and accessories
7. ASTM C864 – Standard specification for dense elastomeric compression seal gaskets, setting blocks, and spacers
8. AWS D1 – Structural welding code
9. FGMA – Flat glass marketing association, glazing manual

1.04 PERFORMANCE REQUIREMENTS

*****Note to Specifier: Edit the following section to suit project requirements. Coordinate with manufacturer for the project location, wall size, and local building code to provide a system tailored to your needs.**

- A. Air Performance – Design, fabricate, assemble, and erect the aluminum glazed system to be permanently free of significant air leakage. Significant leakage shall be defined as a differential test pressure amounting to 20 percent of specified strength performance pressure required with operable windows doors, or joints (if any) sealed to prevent crack leakage.

- B. Structural Performance – Structural performance in accordance with ASTM-E330; with no glass breakage or permanent damage to fasteners, anchors, hardware, or actuating mechanisms
1. Normal wall deflection should not exceed 1/175 of clear span for span lengths of 13' 6" or less and 1/240 + 1/4" for all others. Restrict deflection to 3/4" maximum for individual glazing lites.
 2. Parallel to wall deflection should not exceed 175% of glass edge clearance. Restrict deflection to L/360 or 1/8" maximum. Restrict deflection to 1/16" maximum above doors and/or windows. It shall be permitted to increase the deflection to 1/8" if the door operation is not affected.
 3. Deflection of the entire assembly, including, but not limited to, glass, shall not exceed 1 1/2"

C. Thermal Performance – Tested values, certifications, and simulation protocols

1. Thermal characteristics

*****Note to Specifier: Thermal characteristics are available with performance values up to a U-Value – 0.21 and CRF - 60 based on glazing choices. Please note this is subject to glass availability and project specific requirements (Consult manufacturer).**

- a. U-value – ___
 - b. CRF – ___
2. U-Value – Unit to comply with the U-value NFRC rated, or simulated in accordance with NFRC 100 protocol, shown in manufacturers latest published data for the glazing and sill specified.
 3. Solar Heat Gain Coefficient – Unit to comply with the Solar Heat Gain Coefficient NFRC rated, or simulated in accordance with NFRC 200 protocol, shown in manufacturers latest published data for the glazing and sill specified.

1.05 SUBMITTALS

- A. Submit under the provisions of Section 013000 for review and approval for fabrication.
- B. Shop Drawings – Detailed drawings prepared specifically for the project by manufacturer. Include information not fully detailed in manufacturer's standard product data, including, but not limited to, wall elevations and detail sections of every typical composite member. Show opening dimensions, framed opening tolerances, profiles, product components, anchorages, and accessories.

1. Indicate fastener locations, glazing, and hardware arrangements.
 2. Include schedule identifying each unit, with marks or numbers referencing drawings.
 3. Must show all surrounding substrates and relevant conditions
 4. Must be drawn in the domestic USA, by the manufacturer of the system
- C. Product Data – Manufacturer’s data sheets on each product to be used, including:
1. Storage and handling requirements and recommendations
 2. Preparation instructions and recommendations
 3. Installation methods

*****Note to Specifier: Delete color section samples if colors have been pre-selected.**

- D. Color Samples – Two complete color chip sets representing manufacturer’s full range of stocked colors with a standard size of 2" x 3" (50mm x 75mm).
- E. Verification Samples – required samples for verification of system
1. Aluminum Finish – Two samples, minimum size of 2" x 3" (50mm x 75mm), representing actual material and color.
 2. Wood Finish – Two samples, minimum size of 2" x 5" (50mm x 127mm), representing actual product and color.
 3. Glazing – Two samples, minimum size of 12" x 12" (300mm x 300mm), representing specified glass, including coatings and/or frit pattern(s).

*****Note to Specifier: Assembly sample provided upon request only.**

4. Assembly Sample - One sample illustration connection details with a maximum size of 12" x 12" x 12". Glazing included as offered by glass supplier. Sample developed to best represent the specified product.

1.06 QUALITY ASSURANCE

- A. Manufacturer qualifications – company shall be a company specializing in the manufacturing of products specified in this section, including, but not limited to, greenhouses, doors, and operable vent systems. Manufacturer shall have at least fifteen (15) years of experience in fabrication and erection of window systems for projects of similar scope.
1. Manufacturer must use an extruded aluminum system comprised of domestically produced aluminum and is fabricated/assembled in the USA.
 2. Manufacturer must be recognized by NAMI.
 3. Manufacturer must be a member in good standing of the National Glass Association (NGA).

4. Manufacturing facility must have achieved Gold LEED certification.
- B. Installer Qualifications – Installer shall be experienced in performing the work of this section that has specialized in installation of work similar to that required for this project for a minimum of fifteen (15) years.

*****Note to Specifier: Include a mock-up if the project size and/or scope warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project and consult with product manufacturer prior to selection.**

C. Mock-ups

1. Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - a. Approximate size: _____
 - b. Finish areas designated by Architect
 - c. Do not continue with remaining work until workmanship, color, and sheen are approved by Architect.
 - d. Refinish mock-up area as required to produce acceptable work.
 - e. Incorporate accepted mock-up as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the jobsite freight prepaid.
- B. Store products in manufacturer's original unopened packaging, covered to protect factory finishes from damage, precipitation, and construction dirt until ready for installation
- C. Store materials off construction grounds in a secure location that is a dry, covered area and protected from weather conditions
- D. Inspect and report any freight damages to the manufacturer immediately.

1.08 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimal results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Perform structural silicone sealant work when air temperature is above 10° F (minus 12° C)

1.09 WARRANTY

- A. Provide manufacturer's limited warranty that all components are warranted for one (1) year for cases of normal use. Many components are also warranted by the original manufacturers for greater lengths of time. Reference original component manufacturers' warranties for complete information.

*****Note to Specifier: Delete warranty components that do not apply to the project.**

- B. Warranty Addendum – Manufacturer offers extended warranties and service contracts on a per job basis.

*****Note to Specifier: Delete warranties below that do not apply to the selected finish(es).**

C. Frame Finish

1. For anodized finishes provide a warranty of five (5) years.
2. For stock color AAMA 2605 finishes with 2-3 coats powder or liquid dependent on color and/or application, provide paint manufacturer's warranty for color and film integrity for at least fifteen (15) years from date of application.
3. For custom color AAMA 2605 finishes with 2-3 coats powder or liquid dependent on color and/or application, provide paint manufacturer's warranty for color and film integrity for at least fifteen (15) years from date of application.
4. For stock color AAMA 2604 finishes with 2 coats powder or liquid, provide warranty for color and film integrity for ten (10) years from date of application.
5. For custom color AAMA 2604 with 2 coats powder or liquid, provide paint manufacturer's warranty for cracking and pulling integrity for ten (10) years from date of application.
6. For custom AAMA 2603 finishes with 1 coat liquid only, thermosetting acrylic resin finishes, provide warranty for cracking and pulling integrity for five (5) years from date of application.
7. For stock color AAMA 2603 finishes with 1 coat liquid only, provide paint manufacturer's warranty for cracking and pulling integrity for at least five (5) years from date of application.
8. Custom warranty period, ___ years, to be approved and accepted in writing by Solar Innovations, Inc. based on project's scope and application

*****Note to Specifier: Under extreme conditions, warranties for glazing may be less than twenty (20) years. Verify conditions with manufacturer. Delete the following paragraph if not required or edit to suit conditions.**

- D. Flat Glazing- Provide glazing manufacturer's standard warranty against defective materials, delamination, seal failure, and defects in manufacturing for up to twenty (20) years prorated or as otherwise provided in or limited by the glass manufacturer's limited warranty.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Product based on Solar Innovations, Inc. Mulled Window Systems, as provided by:
Solar Innovations, Inc.
31 Roberts Road
Pine Grove, PA 17963
Phone 800-618-0669 / Fax: 800-618-0743
Email: skylight@solarinnovations.com
Website: www.solarinnovations.com

*****Note to Specifier: Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.**

- B. Substitution requests as per Section 016000
- C. Substitutions not permitted

2.02 MULLED WINDOW SYSTEM

***** Note to Specifier: Provide Mulled Window System assembled and glazed, complete with weather-stripping, glazing, operating hardware, and specified accessories. Window system shall be provided to fit the openings indicated on the Drawings and as follows.**

- A. Window Sizes
 1. Width _____
 2. Height _____
 3. As indicated on the Drawings.
- B. Operation/Configuration

1. Awning
2. Out-swing Casement
3. In-swing Casement
4. Fixed
5. Hopper

*****Note to Specifier: Delete all glass choices not incorporated into the project. Decorative option should be deleted if not required.**

C. Glazing

1. Single pane glazing options (define variances between sloped and vertical glazing as needed.)
 - a. 3/16" (5mm) float glass
 - b. 1/4" (7mm) float glass
 - c. Polycarbonate
 - d. Other: __
2. Double pane glazing options
 - a. 1" insulated glass unit
 - (1) Outboard glazing lite – 3/16" tempered clear glass with LoE 272 low-emissivity coating on surface two
 - (2) Air spacer – Stainless Steel spacer with dual seals of polyisobutylene/silicone and filled with argon gas
 - (3) Vertical inboard glazing lite – 3/16" tempered clear glass
3. Specialty glazing options (job specification sections can be provided for the following specialty glazing options.)

*****Note to Specifier: Discuss all specialty glazing options with the manufacturer to determine viability, benefits, and recommended installation locations.**

- a. Thermochromic Glass – glazing system that is ‘tinted’ via natural heat
 - b. Solera Glass – Install Solera light diffusion glazing system.
 - c. Lumira Polycarbonate – Lumira (formerly AeroGel) filled polycarbonate panels to control light diffusion and insulation characteristics.
4. Glazing Accessories
 - a. Decorative Mullions
 - b. Interior Grids – 3/16" x 5/8" (4.76mm x 15.87mm)
 - c. Simulated Divided Lites – 3/8" x 5/8" (9.52mm x 15.87mm)

d. Applied Grids

- (1) ¾" traditional grids
- (2) 1 ¼" traditional grids
- (3) 7/8" colonial grids
- (4) 7/8" ogee grid
- (5) ¾" low profile grid

e. Decorative Raised Panels

D. Framing Members – minimum .125 wall thickness required for all structural members.

*****Note to Specifier: Select the following paragraphs required and delete the others.**

- a. SI7411 – Awning window with extruded aluminum 2.527" (64.18mm) width
- b. SI7412 – Out-swing casement window with extruded aluminum frame with a thermal isolation separation 2.527" (64.18mm) width
- c. SI7413– Fixed window with extruded aluminum frame with a thermal isolation separation 2.527" (64.18mm) width
- d. SI7414– In-swing casement window with extruded aluminum frame with a thermal isolation separation 2.527" (64.18mm) width
- e. SI7416– Hopper window with extruded aluminum frame with a thermal isolation separation 2.527" (64.18mm) width

E. Perimeter weather gaskets – EPDM with solid strand cord

F. Hardware

a. Handles/Lock Sets

- (1) Contact manufacturer for handle set choices

2.03 MATERIALS

A. Aluminum – 6063-T52, 6063-T6, or 6061-T6 alloy and temper. Other alloys and tempers may be used for non-structural members provided they do not void the required warranties. Indicate alloys and tempers clearly on shop drawings and in structural calculations.

1. Framing Members – Thickness based on design loading, cross sectional configuration, and fabrication requirement.
2. Aluminum Flashing and Closures – Minimum of 0.040" (1mm) thick.
3. Snap-on Covers and Miscellaneous Non-structural trim – Minimum thickness recommended by the manufacturer.

- B. Insulated Panels – Expanded polystyrene; provide at all filler panels and sheet metal members.
- C. Glazing – See product section.
- D. Flashings – Sheet aluminum, same finish as for system components; secured with concealed fastening method or fastener with head finished to match; thickness as required for conditions encountered.

*****Note to Specifier: Delete the following when not required.**

- E. Thermal Insulbar® Separation – Manufacturer’s standard system to provide thermal separation between exterior and interior components.

*****Note to Specifier: Verify with manufacturer if internal reinforcing is required based on framing material, structure, size, and configuration.**

- F. Internal Reinforcing
 - 1. ASTM A 36/A 36M for carbon steel; or ASTM B 221/B 221M and ASTM B 241/B 241M for structural aluminum
 - 2. Shapes and sizes to suit installation
- G. Glazing Gaskets – Compression type design, replaceable, EPDM, complying with ASTM C864, with solid strand cord to prevent shrinkage.
 - 1. Completely compatible with glazing sealant to be used
 - 2. Profile and hardness as necessary to maintain uniform pressure for watertight seal
 - 3. Manufacturer’s standard black color
 - 4. Factory molded corners required at interior
- H. Setting Blocks, Edge Blocks, and Spacers – As required by manufacturer and compatible with insulated glass where required
- I. Structural Glazing Sealant – Manufacturer’s Standard; black
- J. Perimeter Sealant – Manufacturer’s Standard, color to match framing finish if available, otherwise color as selected from manufacturer’s standard range
- K. Anchors and Fasteners
 - 1. Aluminum and Stainless Steel of type which will not cause electrolytic action or corrosion
 - 2. Zinc cadmium-plated fasteners may be used if acceptable to manufacturer.
 - 3. Finish exposed fasteners to match aluminum frame

2.04 FRAME FINISH

*****Note to Specifier: Delete all but one of the following frame finishes. If more than one finish is required, indicate the locations where each is to be used on the architectural drawings.**

- A. Unfinished Aluminum: Mill
- B. Aluminum Finish: Anodized complying with AAMA 611
 - 1. Color: Clear (Class I)
 - 2. Color: Dark Bronze
- C. Aluminum Finish: AAMA 2605 finish
 - 1. Color: Manufacturer's standard bronze color
 - 2. Color: Manufacturer's standard Hartford green color
 - 3. Color: Manufacturer's standard white color
 - 4. Color: Manufacturer's standard sandstone color
 - 5. Color: Manufacturer's standard black color
 - 6. Color: Manufacturer's standard natural clay color
- D. Aluminum Finish: AAMA 2604 finish
 - 1. Color: Manufacturer's standard bronze color
 - 2. Color: Manufacturer's standard Hartford green color
 - 3. Color: Manufacturer's standard white color
 - 4. Color: Manufacturer's standard sandstone color
 - 5. Color: Manufacturer's standard black color
 - 6. Color: Manufacturer's standard natural clay color
- E. Aluminum Finish: AAMA 2603 finish
 - 1. Color: Manufacturer's standard bronze color
 - 2. Color: Manufacturer's standard Hartford green color
 - 3. Color: Manufacturer's standard white color
 - 4. Color: Manufacturer's standard sandstone color
 - 5. Color: Manufacturer's standard black color
 - 6. Color: Manufacturer's standard natural clay color

*****Note to Specifier: If a custom color or a different type of finish is required, verify availability with manufacturer and enter a description below.**

- F. Aluminum Liquid Finish: _____
- G. Aluminum Powder Finish: _____
- H. Aluminum Anodized Finish: _____
- I. Metal Cladding: _____

J. Wood Veneering: _____

- a. Manufacturer's standard water based sealer applied to minimize damage and discoloration during installation. Final sanding and finishing is by the other. It is the customer's responsibility to properly maintain the finish on the wood to preserve any warranty.
- b. ICA 3-coat clear sealer consisting of impregnating agent, base coat, and top coat.

2.05 FABRICATION

- A. Fabricate components in accordance with the shop drawings approved by the architect.
- B. All **major** fabrication shall be done at the manufacturing location and not onsite.
- C. Manufacturer shall remove all burrs and rough edges prior to finish application.
- D. Install all gaskets and tapes at factory, as reasonable.
- E. Disassemble only to the extent necessary for shipping and handling limitations.
- F. Manufacturer shall be notified of any field modification prior to the activity commencing.
- G. All welding shall comply with standards set forth by the American Welding Society.
- H. Grind exposed welds smooth and flush with adjacent surfaces before finishing; restore mechanical finish.
- I. Perform all work in a method that will meet or exceed industry standards.
- J. Isolation membrane materials shall be used to separate dissimilar metals to prevent galvanic corrosion/action between materials.
- K. Fabricate components to allow for accurate and rigid fit of joints and corners. Match components carefully ensuring continuity of line and design. Ensure joints and connections will be flush and weather tight. Ensure slip joints make full, tight contact and are weather tight.

*****Note to Specifier: Delete the following if internal reinforcing is not required for this project.**

- L. Fabricate components true to detail and free from defects impairing appearance, strength or durability.
- M. Provide contoured exterior horizontal or purlin glazing retainers to minimize water, ice, and snow buildup.
- N. Reinforce components at anchorage and support points, joints, and attachment points for interfacing work.
- O. Accurately size glazing to fit openings allowing for clearances as set forth by the "Glazing Manual" published by the Flat Glass Marketing Association (FGMA).

- P. Cut glass clean and carefully. Nicks and damaged edges will not be accepted. Replace all glass with damaged edges.

PART 3 EXECUTION

3.01 PREPARATION

- A. General contractor shall direct, supervise, and inspect all site work related to the Muller Window System.
- B. Do not begin installation until substrates have been properly prepared and approved by manufacturer. Substrate preparation shall be done in strict accordance with the approved shop drawings.
- C. If substrate penetration is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Thoroughly clean all surfaces and substrates prior to installation.
- E. Prepare surfaces using the method recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.02 INSTALLATION

- A. Installation of the Muller Window System shall be done in accordance with approved shop drawings and manufacturer's instruction and installation manual(s).
- B. Separate dissimilar materials using nonconductive tape, paint, or other material not visible in finished work.
- C. Provide attachments and shims to permanently fasten system to building structure.
- D. Maintain dimensional tolerances and alignment with adjacent work.
- E. Anchor securely in place, allowing for required movement, including expansion and contraction.
- F. Install glazing sealants in accordance with manufacturer's instructions without exception, including surface preparations.
- G. Set sill members in bed of sealant. Set other members with internal sealants to provide weather tight construction.
- H. Install flashings, bent metal closures, corners, gutters, and other accessories as required or detailed.
- I. Clean surfaces and install sealant in accordance with sealant manufacturer's instructions and guidelines.

3.03 ADJUSTING AND CLEANING

- A. Adjust hinge set, locksets, and other hardware for proper operation. Lubricate using a suitable lubricant compatible with door and frame coatings.

- B. Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions before owner's acceptance.
- C. Any abraded surface of the finish shall be cleaned and touched up with air dry paint, as approved and furnished by the window manufacture, in a color to match factory applied finish.
- D. Remove from project site, and legally dispose of construction debris associated with this work.
- E. Removable sill and head stop provide for greater serviceability of hardware without the need to remove the other panels.

3.04 HOUSEKEEPING

- A. Manufacturer shall deliver all related operating instructions, maintenance manuals, and warranty registration cards to the general contractor during the completion of the project.
- B. Installer shall protect installed products until completion of the installation from all construction debris and natural elements.
- C. Manufacturer is responsible for all touch-up, repair, or replacement of damaged products during the installation.
- D. Installer shall keep area tidy and safe at all times.
- E. Clean and dress all sealant prior to installation completion.
- F. Clean all glass prior to installation completion.
- G. Installer shall clean the entire enclosure one time at the completion of the installation. Cleaning shall include surface cleaning of aluminum framing and glass and clean up of construction debris. All subsequent cleaning shall be the responsibility of the general contractor.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION