

**SECTION 08 51 10  
ALUMINUM TILT AND TURN WINDOWS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
1. Extruded aluminum tilt and turn windows.
  2. Factory glazing.
  3. Operating hardware.

**1.02 SYSTEM DESCRIPTION**

- A. Design Requirements: Drawings and Specifications establish requirements for aesthetic including dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
- B. Performance Requirements: As specified in PART 2, with the following additional requirements:
- C. Manufacturers "Certificate of Compliance" must be submitted certifying product meets requirements of AAMA/WDMA/CSA 101/I.S.2/A440-08 DAW-AW-PG60. AAMA Certificate of compliance will be required on all windows
- D. Design and size combination window system to withstand both positive and negative loads when tested in accordance with ASTM E 330 using test loads equal to 1.5 times the design test pressure (90 psf.)
- E. Deflection: Not to exceed 1/175 of unsupported spans, when tested in accordance with ASTM E 330 using test loads equal the design pressure (60 psf.), both positive and negative, and must be without permanent deformation of any component, glass breakage or anchorage failure.
- F. Air Infiltration: Limit air infiltration through assembly to 0.5 L/s/m<sup>2</sup> (0.01 cfm/ft<sup>2</sup>) of wall area, measured at a reference differential pressure across assembly of 6.2 psf when measured in accordance with ASTM E 283.
- G. Water Leakage: None, when measured in accordance with ASTM E 547 and ASTM E 331 at a water test pressure of 12 psf.
- H. System Internal Drainage: Drain to the exterior any water entering joints, condensation occurring in glazing channel, or migrating moisture occurring within system.

**1.03 SUBMITTALS**

- A. Administrative Requirements, for submittal procedures. Submit following for review:
1. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
  2. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, anchorage locations, and installation requirements.
    - a. Include full scale, head, jamb, meeting stile, and sill sections.
  3. Color Samples: Submit for approval two samples of frame coating, showing full range of color variations.
  4. Samples: Submit two samples, 12 x 12 inch (300 x 300 mm) in size illustrating typical corner construction, accessories, and finishes.
  5. Submit two samples of operating hardware.
  6. Submit current unexpired copies of AAMA 101.I.S.A-440-08 certified structural test reports.
  7. Submit current unexpired copies of AAMA 1302.5 Forced Entry Testing.
  8. Submit current specifications of technical compliance of factory applied paint finish.

- B. Quality Assurance/Control Submittals: Submit following for Project record. No action will be taken.
1. Test Reports: Manufacturer's published reports and Independent testing agency reports must be AAMA Certified and demonstrate compliance with specified requirements. Include the following:
    - a. Reports of Independent Testing Agency, approved by Owner and Architect, demonstrating compliance of mock-up of proposed units with specified performance requirements. Test reports shall describe window and window systems completely.
    - b. Written test procedure and drawings including details of units and mounting in test chamber.
  2. Manufacturer and Installer Qualifications: Submit lists of projects documenting not less than five years of documented successful experience in fabrication and installation of high rise residential and commercial windows and windows.
    - a. For each project: List building name and address, owners representative, general contractor, architect and appropriate subcontractors with phone numbers and contact personnel.
  3. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

C. Closeout Submittals: Contract Closeout Submittals:

1. Submit warranty. Ensure that forms have been completed in Owner's name and registered with manufacturer. Produce "Original" warranties by manufacturer for ownership to owner.
2. Maintenance Manuals: Produced by manufacturer listing procedures and recommended frequency for inspecting, adjusting and maintaining windows specific to this project. Address all hardware, gaskets, and sealants and describe cleaning procedures for glass and metal surfaces.

#### 1.04 QUALITY ASSURANCE

- A. Comply with requirements of AAMA 101.I.S.A-440-08
1. Maintain one copy of document on site.
- B. Manufacturer and Installer: Company specializing in fabrication of commercial aluminum windows and windows of types required, with not fewer than five years of experience.
1. Check availability of all specified materials upon contract signing, and order promptly so work is not delayed.
  2. Installer Qualifications: All mechanics on this project shall be completely familiar with these contract documents and procedures shown on installation sequence shop drawings before installing units.
- C. Testing Agency Qualifications: Manufacturers testing and or Independent testing agency, acceptable to authorities having jurisdiction, with experience and capability to conduct testing indicated, as documented according to AAMA101.I.S.A-440-08

#### 1.05 PRE-INSTALLATION MEETING

- A. Schedule pre-installation meeting to occur immediately before or after regularly scheduled Progress Meeting.
1. Convene one week before starting work of this section.
  2. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
  3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  4. Review required testing and inspecting procedures.

#### 1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Comply with requirements of AAMA CW-10.
- B. Delivery: Schedule delivery to coincide with glazing schedules so that minimum handling of crates is

required.

1. Deliver products to project site and store in delivered state until openings are ready for window installation. Do not open except as required for inspection for shipping damage.
  2. Inspect frames for damage, including finish damage and fracture of thermal breaks or frame corner seals.
- C. Storage: Store cases according to printed instruction on case, in areas least subject to traffic or falling objects. Provide space around frames and keep storage area clean, dry and well-ventilated to avoid condensation and other moisture-induced damage to frame finish.
- D. Handling: Unpack cases following printed instructions on case. Stack individual upright leaned slightly against upright supports with separators between each.

#### 1.07 WARRANTY

- A. Provide with submittals and Field and File submittals manufacturers warranty for materials and manufactured workmanship for a period of \_\_\_\_ years from substantial completion. Warranty must convey ownership to the project owner.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Series 1900 tilt and turn window as manufactured by Thermal Windows, Inc.
1. Performance Requirements: AAMA/WDMA/CSA 101/I.S.2/A440-0 DAW AW-PG60
  2. Construction: Thermally broken.
  3. Glazing: Double; clear; Low E, Tempered
- B. All aluminum tilt and turn windows must be provided by sole source manufacturer capable of providing the aluminum windows, sliding glass doors, terrace doors, and all components required for complete assembly.
- C. Substitutions
1. Other manufacturers' products that meet or exceed specified design requirements may be considered. The following information must be submitted within ten (10) working days preceding bid date.
    - a) Substitution Request form CSI Form 1.5C
    - b) Test reports specified in 1.02 SYSTEM PERFORMANCE REQUIREMENTS
    - c) Full proposal details and samples specified in 1.03 SUBMITTALS
    - d) Copy of manufacturer's warranty specified in 1.06 WARRANTY
    - e) Other information as requested for evaluation
  2. Substituted products not pre-approved by the Architect via addenda will not be considered.

#### 2.02 COMPONENTS

- A. Frames: Main frame depth shall be no less than 3 ¼" with profile as indicated, thermally broken with interior portion of frame insulated from exterior portion; applied glass stops of snap-on type
1. Attachment Accessories: Aluminum; as detailed and required for attachment to wall structure at head, jamb and sill
- A. Operable Weather-stripping: Santoprene; permanently resilient, profiled to achieve effective weather seal
- B. Fasteners: Stainless steel

- C. Sealant and Backing Materials: As specified in Section 07900

## 2.03 MATERIALS

- A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), 6063 alloy, T5 temper.
- B. Concealed Steel Items: Profiled to suit mullion sections;
- C. Fastener materials: AISI Type 302 machine screws.
  - 1. Fasteners for Structural Angle to Window Sub-frame: Pan Head slotted machine screws.
  - 2. Pneumatic or powder-driven shot-in anchors nail, or screw-type anchors into concrete or masonry not allowed.
- D. Plastic Components: Resist QUV exposure with UV-B 313 bulbs, 4 hour CON at 50° C/4 hour UV at 40°C, in accordance with ASTM G53 for 2000 hours without embrittlement, cracking, or fading, and shall have a verifiable 5 year successful field track record.
  - 1. Recommended for exterior use by plastics manufacturer.
  - 2. Polyurethane for Insul-Bar Thermal Breaks: Obtain from source providing material used successfully in insul-bar thermal breaks for at least five years.
- E. Sealants: Compatible with perimeter joint caulking. Seals with double-faced tape not allowed.
  - 1. Frame Corner Sealant: Compatible with contiguous sealants.

## 2.04 HARDWARE

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Cadmium-plated hardware is not permitted. Do not use aluminum in frictional contact with other metals.
  - 1. Window lock: Multi Point Lever handles with multiple engagement points.
    - a. Standard operation will be; first motion tilt, second motion turn inward.
  - 2. Pulls: Manufacturer's standard type.
  - 3. Provide with aluminum thermally broken sill.

## 2.05 GLASS & GLAZING INSTALLATION

- A. Conform to latest edition of glazing standards of GANA GM - Glass Association of North America Glazing Manual and GANA SM - Glass Association of North America Sealant Manual.
  - 1. Install glass in fixed and operating units in accordance with manufacturer's recommendations.
  - 2. Allow all rubber gaskets to relax and recover several hours prior to installation. All gaskets shall be oversized 1% to 2% in length. Install gaskets at ends and center and then fit in remaining portions. Butt corner joints tightly and seal.
  - 3. Intermediate butt joints in gaskets are not acceptable. Avoid contaminating surfaces to be sealed with any lubricating solutions. Provide 6 to 8 lb/in pressure on gaskets.
  - 4. Do not permit edges of insulated glass to contact any solvents.
  - 5. Do not allow glass to touch framing system; replace chipped or scratched glass.
  - 6. Keep glazing rabbet clean and dry during installation of glass.
  - 7. Place setting blocks at quarter points of sill member without blocking any weep holes.
  - 8. Set glass centered in opening to allow at least 1/8 inch clearance between sides of glass and anti-walk pads, and to provide at least 1/2 inch bite on glass by glazing stops.
- B. Sealed Insulated Glass: Sealed insulated glass in all operable window sashes shall be factory glazed with EPDM gasket at exterior perimeter with extruded aluminum glazing bead and EPDM wedge at interior of glass. The insulated glass units shall be 1" overall thickness and shall be composed with exterior pane (1/8" clear with 2nd surface Low "E" tempered and the interior pane (1/8") clear.
- C. All sealed insulated glass units shall meet the requirements of ASTM E 2190 - 10 specification, Class "A".

Sealed insulated glass units shall be warranted against seal failure for a period of " \_\_\_\_\_ " from date of manufacturing.

## 2.06 FABRICATION

- A. Fabricate components with smallest possible clearances and shim spacing around perimeter of assembly that will enable window and adjacent components installation and dynamic movement of perimeter seal.
  - 1. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
  - 2. Prepare components to receive anchor devices.
  - 3. Arrange fasteners and attachments to ensure concealment from view.
  - 4. Prepare components with internal reinforcement for operating hardware.
  - 5. Provide steel internal reinforcement in mullions as required to meet loading requirements.
- B. Perimeter Seals: Provide outer head and jamb perimeter seals. Provide seals at outer edge of sills.
- C. Double weather-strip operable units.
  - 1. Install weather-stripping continuously around opening and butt together tightly at corners. Discontinuities in backing retainer grooves at intersections shall not exceed 1/8 inch (3 mm).
  - 2. Mechanically secure weather-stripping to prevent slippage when operating sash and to prevent other displacement.
  - 3. Provide single line of weather-stripping along inboard face of operable sash at sill, placed approximately, 1/4 inch (6 mm) below top edge of inboard vertical leg of sill track.
  - 4. Weather-stripping: Replaceable without disassembly of sash or unit frame or removal of unit frame from opening.
- D. Polyamide Thermal Breaks:
  - 1. Design and fabricate sash, frame, and sub-frame with continuous integral thermal barrier, permanently bonded to extrusions.
  - 2. Provide stitched ridged polyamide thermal separators in aluminum extruded main frames.
  - 3. Do not expose polyamide to sunlight in permanent installation.
  - 4. Shield plastic components, such as parting blocks, in unit construction from direct exterior exposure at sills, jambs, and meeting stiles using aluminum covers. Other exterior visible components shall match frame color.
  - 5. Frame Corner Sealant: Compatible with contiguous sealants.
  - 6. Do not drill or punch holes, including weep holes, through thermal break.
- E. Match components to ensure continuity of line.

## 2.07 FINISHES

- A. High Performance Organic Finish: "AAMA 2603" or "AAMA 2604" or "AAMA 2605" or "Class II, AAMA 611" or "Class I, AAMA" or "Electrolytically Deposited - Class I, AAMA 611:" thermally cured powder coating organic paint system; color as selected from manufacturer's (14) standard colors.
- B. Apply 1 coat of bituminous coating or install PVC shim separations to concealed aluminum and steel surfaces in contact with dissimilar materials.

## 2.08 SOURCE QUALITY CONTROL

- A. Fabrication Tolerances:
  - 1. Maximum offset of frame or sash component, including glazing stops, from plane of adjacent section: 1/32 inch (0.8 mm).
  - 2. Maximum metal-to-metal joint separations: 1/32 inch (0.8 mm); positively and continuously seal exterior joints to prevent water penetration into frame.
  - 3. Maximum difference in corner-to-corner diagonal dimension on frames: 1/8 inch (3 mm).

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Existing Conditions: Examine openings for aluminum swing terrace windows to ensure that they are proper size plumb, square and level before installation of frames is started.
  - 1. Verify that adjoining air and vapor seal materials are ready to receive aluminum windows.
- B. Immediately before placing into opening, inspect frames for any damage, including finish damage and fracture of thermal breaks or frame corner seals.

### 3.02 PREPARATION

- A. Clean down of Masonry: Completed prior to installation of window unit assemblies.
- B. Coat aluminum in direct contact with concrete, masonry, steel, or other non-compatible material with bituminous paint, zinc rich primer, or other suitable insulating material.

### 3.03 INSTALLATION

- A. Securely install windows and windows in accordance with AAMA 101, manufacturer's instructions and accepted shop drawings.
  - 1. Shim frames to perimeter opening to accommodate construction tolerances and other irregularities.
  - 2. Install sill shims at three points to support to sill track
  - 3. Align windows plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
  - 4. Maintain relation to established lines and grades indicated on approved shop drawings.
- B. Use anchorage devices to securely fasten unit assemblies to wall construction without distortion or imposed stresses.
  - 1. Use approved means of frame anchorage to allow for thermal expansion and contraction of frames. Fit support angles tightly against sub-frame and sill flashing without gaps and support directly on substrate without shims.
  - 2. Do not penetrate horizontal portion of flashing or active weep areas of unit frame with fasteners. Install frames without use of exterior exposed fasteners.
- C. Provide thermal isolation where components penetrate or disrupt building insulation.
- D. Install perimeter sealant in accordance with requirements specified in Section 07900.
- E. Install perimeter trim and interior closures, where applicable.

### 3.04 FIELD QUALITY CONTROL

- A. Either from a window unit selected from the initial delivery or a mock up unit of each type to be used within the project and conduct a field test in strict compliance with AAMA 502-8 method A and Method B. Each opening will be tested to achieve performance of ASCE 7-05 calculated requirements (PSF) for water resistance, which shall not exceed .667 % of the products capable water based on AAMA 101/I.S. 2. Allowable rates of air leakage for field testing shall be 1.5 times applicable AAMA 101/I.S.2 rate for the Product Type and Performance Class. Example: Performance test at 1.57 PSF allows .30 cfm/ft2, 502B test allows .45 cfm/ft2. Both separate openings to be tested under "Contract" testing by a designated independent testing agency.
  - 1. Schedule installation sufficiently in advance of need to allow adequate time for cure of sealants, testing and reconstruction, if needed, without delaying the project.
- B. Notify Owner and Architect at least one week before testing so that they may be represented during all testing.
- C. Perform tests specified in Field Quality Control Article.

1. If window unit fails test, Contractor shall propose corrections for approval of Owner and Architect.
2. Modify construction and perform additional tests as required to achieve specified minimum acceptable results. If corrections are not adequate, construct new test unit, at written direction of Owner and Architect. Co-ordinate construction of test unit with other involved trades.
3. Approved test units may become part of completed Work if undisturbed at time of Substantial Completion.

#### 3.04 ERECTION TOLERANCES

- A. Comply with following tolerances:
  1. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.
  2. Maximum Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 foot straight edge.

#### 3.05 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth operation and secure weather tight closure.
- B. Cleaning:
  1. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.
  2. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

**END OF SECTION**