

SECTION 08 51 13**ALUMINUM WINDOWS****PART 1 GENERAL**

1.01 SUMMARY

- A. Section includes furnishing and installing an aluminum-framed, dual-action, tilt-turn casement window/door system that includes:
1. Aluminum frame and sash
 2. Tilt-turn hardware
 3. Handles
 4. Weatherstripping
 5. Glass and glazing
 6. Insect screens, fixed
 7. Accessories as required for a complete working installation.
- B. Related Documents and Sections: Contractor to examine Contract Documents for requirements that directly affect or are affected by Work of this Section. A list of those Documents and Sections include, but is not limited to, the following:
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 General Requirements, Specification Sections, apply to this Section.
 2. Section 06 10 00, Rough Carpentry: Wood framing R.O. and blocking.
 3. Section 07 27 00, Air Barriers: Building wrap
 4. Section 07 62 00, Sheet Metal Flashing and Trim: Flashing and other sheet metal work.
 5. Section 07 90 00, Joint Protection
 6. Section 08 43 29, Sliding Glass Storefronts: NanaWall LS160
 7. Section 08 43 29, Sliding Glass Storefront: NanaWall HSW60, sliding aluminum-framed glass door and panel system.
 8. Section 08 43 33, Folding Glass Storefront: NanaWall SL60, sliding-folding aluminum-framed glass door and wall system.
 9. Section 09 22 16, Non-Structural Metal Framing: Metal framing R.O. and reinforcement.
 10. Section 10 22 43, Sliding Glass Partitions: NanaWall LS160

1.02 REFERENCES

- A. Reference Standards in accordance with Division 01 and current editions from the following:
1. AAMA. American Architectural Manufacturers Association; www.aamanet.org
 - a. AAMA 503, Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
 - b. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum
 - c. AAMA 2604, Voluntary Specifications, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
 - d. AAMA/WDMA/CSA 101/I.S.2/A440, NAFS, North American Fenestration Standard - Specification for Windows, Doors and Skylights
 2. ANSI. American National Standards Institute; www.ansi.org
 - a. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used In Buildings

3. ASTM. ASTM International; www.astm.org
 - a. ASTM C1036, Standard Specification for Flat Glass
 - b. ASTM C1048, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
 - c. ASTM E283, Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - d. ASTM E330, Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - e. ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 - f. ASTM E413, Classification for Rating Sound Insulation
 - g. ASTM E547, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
 - h. ASTM E1332, Standard Classification for Rating Outdoor-Indoor Sound Attenuation
 - i. ASTM F588, Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies
4. CPSC. Consumer Product Safety Commission; www.cpsc.gov
 - a. CPSC 16CFR-1201, Safety Standard for Architectural Glazing Materials
5. CSA Group (Canadian Standards Association); www.csagroup.org/global/en/home
 - a. CSA A440S1 - The Canadian supplement to North American (NAFS) standards
6. DIN. "Deutsches Institut für Normung" (German institute for standardization); www.en-standard.eu/din-standards | EN Standards - Construction Materials and Building (European Standards); www.en-standard.eu/din-standards
 - a. DIN EN 1627, Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Requirements and classification
 - b. DIN EN 1630, Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance to manual burglary attempts
7. Energy Star, U.S. Environmental Protection Agency (EPA) Program; www.energystar.gov

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate Aluminum Tilt Turn Window system and framing R.O.
- B. Preinstallation Meetings: See Section 01 30 00.

1.04 SUBMITTALS

- A. For Contractor submittal procedures see Section 01 30 00.
- B. Product Data: Submit manufacturer's printed product literature for each product to be incorporated into the Work. Show performance test results and details of construction relative to materials, dimensions of individual components, profiles and colors.
- C. Shop Drawings: Indicate Aluminum Tilt Turn Window system component sizes, dimensions and framing R.O., configuration, direction of swing, typical head jamb, side jambs and sill details, type of glazing material, handle height and field measurements.
- D. Manufacturers' Instructions: Submit manufacturer's installation instructions.
- E. Operation and Maintenance Data: Submit Owner's Manual from manufacturer. Identify with project name, location and completion date, and type and size of unit installed.

NOTE: Delete the following Article if LEED is not applicable; edit to meet project LEED requirements.

- F. Sustainable Design Submittals (USGBC [LEED®](https://www.usgbc.org/)): Refer to Section 01 81 15, LEED Design Requirements.

1. **LEED 2009** (v3) Credits. Complete online LEED forms and submit other required materials as follows:
 - a. Energy and Atmosphere (EA) Credits:
 - 1). EA Credit 1 (EA1): Optimize Energy Performance: System
 - b. Materials and Resources (MR) Credits:
 - 1). MR Credit 1.1 (MRc1.1): Building Reuse - Maintain Existing Exterior Walls, Floors and Roof
 - 2). MR Credit 1.2 (MRc1.2): Building Reuse - Maintain Existing Interior Nonstructural Elements
 - 3). MR Credit 2 (MRc2): Construction Waste Management

NOTE: MR Credit 3 below can apply to reusing salvaged Folding Glass Storefront.

- 4). MR Credit 3: Materials Reuse - 5% (MRc3.1) or 10% (MRc3.2)
- c. Indoor Environmental Quality (EQ) Credits:
 - 1). IEQ Credit 2 (IEQc2): Increased Ventilation - Case 2 - Naturally Ventilated Spaces
 - 2). IEQ Credit 8.1 (IEQc8.1): Daylight & Views - Daylight 75% of Spaces
 - 3). IEQ Credit 8.2 (IEQc8.2): Daylight & Views - Views for 90% of Spaces
 - 4). IEQ Credit 9 (LEED for Schools - IEQc9): Enhanced Acoustical Performance
2. **LEED v4 for Building Design and Construction (BD&C)** Credits. Complete online LEED forms and submit other required materials as follows:
 - a. Energy and Atmosphere (EA) Credits:
 - 1). EA Credit 2 (EA2): Optimize Energy Performance
 - b. Materials and Resources (MR) Credits:

NOTE: MR Credit 1 below can apply to reusing salvaged Folding Glass Storefront.

- 1). MR Credit 1 (MRc1): Building Life-Cycle Impact Reduction; Option 3 - Building and Material Reuse
 - c. Indoor Environmental Quality (EQ) Credits:
 - 1). EQ Credit 7 (EQc7): Daylight
 - 2). EQ Credit 8 (EQc8): Quality Views
 - 3). EQ Credit 9 (EQc9): Acoustic Performance
- G. LEED Closeout Documentation:

NOTE: Edit below to meet project LEED requirements.

1. **LEED 2009** (v3). Submit completed LEED™ submittal Worksheet Templates for the following credits:
 - a. EA1, MRc1.1, MRc1.2, MRc2, MRc3, IEQc2, IEQc8.1, IEQc8.2, IEQc9
2. **LEED v4 (BD&C)**. Submit information and documentation to complete LEED™ Worksheet Templates for the following credits:
 - a. EA2, MRc1, EQc7, EQc8, EQc9

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer capable of providing complete, precision built, engineered, pre-fitted units with a minimum twenty-five (25) years' experience in the sale of window and door systems in the North American market.
 1. Manufacturer to have ISO 9001: 2008 quality management system registration.
 2. Manufacturer to have ISO 14001: 2005 environmental management system registration.

- B. Installer Qualifications: Installer experienced in the installation of manufacturer's products or other similar products. Installer to provide reference list of at least three (3) projects of similar scale and complexity successfully completed in the last three (3) years.
 - 1. Installer to be trained and certified by manufacturer.
- C. Single Source Responsibility: Furnish Aluminum Tilt Turn Window system materials from one manufacturer for entire Project.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's instructions and recommendations, Section 01 60 00 requirements, and as follows:
 - 1. Deliver materials to job site in sealed, unopened cartons or crates.
 - a. Upon receipt, inspect the shipment to ensure it is complete, in good condition and meets project requirements.
 - 2. Store material under cover in a clean and dry location, protecting units against weather and defacement or damage from construction activities, especially to the edges of panels.

1.07 FIELD CONDITIONS

- A. Field Measurements: Contractor to field verify dimensions of rough openings (R.O.) Mark field measurements on shop drawing submittal.
- B. Do not use forced heat to dry out building.

1.08 WARRANTY

- A. Manufacturer Warranty: Provide Aluminum Tilt Turn Window system manufacturer's standard limited warranty as per manufacturer's published warranty document in force at time of purchase, subject to change, against defects in materials and workmanship.
 - 1. Warranty Period beginning with the earliest of 120 days from Date of Delivery or Date of Substantial Completion:
 - a. Rollers and Glass Seal Failure: Ten (10) years
 - b. All Other Components Except Screens: Ten (10) years
 - 1). Exception: Five (5) years if NOT installed by manufacturer's certified trained installer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Product by Manufacturer: **NanaWall SL68** by **NANA WALL SYSTEMS, INC.** (www.nanawall.com)

NANA WALL SYSTEMS, INC.

100 Meadow Creek Drive, Corte Madera, CA 94925

Toll Free (800) 873-5673

Telephone: (415) 383-3148

Fax: (415) 383-0312

Email: info@nanawall.com

- 1. Substitution Procedures: See Section 01 20 00; Submit completed and signed:
 - a. Document 00 43 25, Substitution Request Form (During Procurement), or
 - b. Document 00 63 25, Substitution Request Form (During Construction)

2.02 PERFORMANCE / DESIGN CRITERIA

NOTE: Air infiltration and water penetration testing results are only applicable if the unit matches the tested panel and unit size, direction of opening and type of sill.

Structural load testing results are only applicable for the test unit size and type of locking and rods.

Comparative analysis charts published by manufacturer shows which panel sizes, if any, meets the structural loading design pressures specifically required for the project. Check for limitations on the use of these charts in the jurisdiction of the project.

Forced entry testing results are only applicable for the test unit type of locking.

Check for requirements in the jurisdiction of the project.

See manufacturer's latest published data regarding performance.

It is expected that the installed system's performance would be not more than 2/3rds of the following certified laboratory test data in accordance with AAMA 503.

A. Performance Criteria (Lab Tested):

1. Folding Glass Window Unit Ratings (AAMA/WDMA/CSA 101/I.S.2/A440):
 - a. AAMA DAW-C90; DA-C100
2. Air Infiltration (ASTM E283):
 - a. 0.04 cfm/ft² (0.20 L/s/m²) at a static air pressure difference of 1.57 psf (75 Pa)
 - b. 0.11 cfm/ft² (0.56 L/s/m²) at 6.24 psf (300 Pa)
3. Water Penetration (ASTM E547 and ASTM E331):
 - a. No uncontrolled water leakage at a static test pressure of 13.5 psf (645 Pa)
4. Structural Load Deflection (ASTM E330):
 - a. Design Pressure - Positive: 100 psf (4800 Pa)
 - b. Design Pressure - Negative: 110 psf (5270 Pa)
5. Forced Entry (ASTM F588): Meets requirements

NOTE: Retain Burglary Resistance subparagraph below when desired; this additional security option is available for an upcharge.

6. Unit Burglary Resistance: EN 1627-30, Class RC2/ RC2N (Resistance Class 2) certified
7. EPA Energy Star: Meets requirements

NOTE: **Energy Star** values for DOORS with > 50% glass can be achieved through the use of specific glass units meeting the following requirements:

Northern & North-Central Region:	≤ 0.30 U-factor	0.40 SHGC
South-Central & Southern Region:	≤ 0.30 U-factor	0.25 SHGC

Energy Star values for WINDOWS can be achieved through the use of specific glass units meeting the following requirements (U-factor in accordance with NFRC 100 and SHGC in accordance with NFRC 200):

Northern Region (as of 1/1/2016):	≤ 0.27 U-factor	Any SHGC
Northern Region*:	≤ 0.28 U-factor	≥ 0.32 SHGC
Northern Region*:	≤ 0.29 U-factor	≥ 0.37 SHGC
Northern Region*:	≤ 0.30 U-factor	≥ 0.42 SHGC
North-Central Region:	≤ 0.30 U-factor	0.40 SHGC
South-Central Region:	≤ 0.30 U-factor	0.25 SHGC
Southern Region:	≤ 0.40 U-factor	0.25 SHGC

* For Windows with NFRC certified U-factor and SHGC ratings that meet or exceed the listed equivalent energy performance criteria as of 1/1/2016.

Energy Star Air Leakage Rating Requirements (ASTM E283 in accordance with NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440-11):

Window, Sliding Door, or Skylight: $\leq 0.3 \text{ cfm/ft}^2$ (1.54 L/s/m²)

Swinging Door: $\leq 0.5 \text{ cfm/ft}^2$ (2.56 L/s/m²)

B. LEED Characteristics:

1. **LEED 2009** (v3)

- a. EAc1: *NanaWall* systems using low U-Value designed double or triple IGU and thermally broken frames can provide significant energy performance.
- b. MRc1.1: *NanaWall* exterior window systems, not demolished in a renovation project, are reused in the same location.
- c. MRc1.2: *NanaWall* interior window systems, not demolished in a renovation project, are reused in the same location.
- d. MRc2: *NanaWall* cardboard shipping crates are made of 60% recycled material and are 100% recyclable.
- e. MRc3: *NanaWall's* components easily disassemble and reassemble to "Use as salvaged... or reused materials."
- f. IEQc2: *NanaWall* systems provide natural ventilation in the open position, assisting in the 90% required natural ventilation of occupied spaces of ASHRAE 62.1.
- g. EQc8.1: *NanaWall* window assembly borrowed light brings daylight deeper into the floor plate.
- h. EQc8.2: *NanaWall* window assemblies provide direct outdoor lines of sight.
- i. IEQc9: (LEED for Schools) For gasketed *NanaWall* window assemblies with glass units STC testing of up to 45 dB.

2. **LEED v4 for Building Design and Construction (BD&C)**

- a. EAc2: *NanaWall* systems using low U-Value designed double or triple IGU and thermally broken frames can provide significant energy performance.
- b. EQc7: *NanaWall* window assembly borrowed light brings daylight deeper into the floor plate.
- c. EQc8: *NanaWall* window assemblies provide direct outdoor lines of sight.
- d. EQc9: *NanaWall* window assemblies can contribute with system acoustic ratings of up to a 45 dB reduction.

C. Design Criteria:

1. Sizes and Configurations: As indicated by the drawings for dimensions, swing and number of single tilt turns, double sash tilt turns and double tilt turns with mullion. On double sash tilt turn, looking from inside, tilt turn panel is on the [**left**] [**right**].
2. Unit Operation: Inswing
3. Window Configuration: [**Single**] [**Paired**]

2.03 MATERIALS

- A. Aluminum Tilt Turn Window Description: Extruded aluminum framed tilt-turn windows, tilt-turn doors and tilt-only hopper windows that accept single or insulated double glazed units with dimensions as shown on Drawings.

1. Max. Window H x W: As indicated.

NOTE: Maximum **tilt-turn** panel size using a net glass thickness of 5/16 inch (8 mm) is 8'-2" (2.5 m) high and 4'-3" (1.3 m) wide, but not more than 24 sq. ft. (2.3 m²).
Maximum **fixed** panel size using a net glass thickness of 5/16 inch (8 mm) is 9'-2" (2.8 m) high and 6'-6" (2.0 m) wide, but not more than 24 sq. ft. (2.3 m²).

2. Frame: Extruded aluminum
 - a. Rail Depth: 2-5/16 inch (59 mm)
 - b. Rail Width (Tilt-Turn): 4-3/4 inch (120 mm)
 - c. Rail Width (Fixed): 2-13/16 inch (72 mm)
3. Sash:
 - a. Single lite.

NOTE: Single lite above is standard; other options below may require an upcharge.

- b. [**Horizontal mullion(s) at specified height(s) from the bottom of the panel.**]
 - c. [**Simulated divided lites in pattern as indicated on Drawings.**]
4. Aluminum Extrusion: AlMgSi0.5 alloy, 6063-T5 (F-22 - European standard)
 - a. Thickness: 0.078 inch (2.0 mm) nominal
 - b. Thermally broken with polyamide plastic reinforced with glass fibers and additional insulating foam.
5. Aluminum Finish:

NOTE: Select finish type below, edit to requirements and delete items not used.

- a. Anodized (AAMA 611):
 - 1). [**Clear**]
 - 2). [**Dark Bronze**]
 - b. Powder Coat (AAMA 2604):
 - 1). Color as chosen from manufacturer's powder coating finish chart from
 - a). [**manufacturer's standard selection of 50 colors - matte.**]
 - b). [**manufacturer's full RAL selection.**]
 - i. [**High Gloss**]
 - ii. [**Matte**]
 - c). [**wood grain.**]
 - d). [**custom finish.**]
- B. Glass and Glazing:
1. Safety Glazing: In compliance with ANSI Z97.1 and CPSC 16CFR 1201.

NOTE: For window units requiring acoustic performance keep the following paragraph. Edit to suit project conditions.

- a. Glass Acoustical Performance (ASTM E413 and ASTM E1332): STC

NOTE: Acoustical ratings listed below are for the **glass only** and not the full panel system but will most likely be within 2 dB of the glass STC rating when the frame is added.

- 1). [**32; 15/16 inch (24 mm) double IGU, air filled, tempered glass**]
- 2). [**39; 15/16 inch (24 mm) double IGU, air filled, laminated and tempered glass**]
- 3). [**41-43; 15/16 inch (24 mm) double IGU, air filled, double-laminated glass**]
- 4). [**40-46; 1-1/2 inch (38 mm) triple IGU, air filled, laminated and tempered glass**]
2. Manufacturer's [**tempered**] [**and**] [**laminated**] glass lites in [**double**] [**triple**] insulated glazing units, dry glazed with glass stops on the inside.

NOTE: Select and edit glass type(s) to meet building code, wind-load design, acoustic, bullet resistant and/or security, and other project requirements with other glass available from manufacturer.

Anti-fall glazing available where required.

IGU glazing is capable of meeting 2010 Energy Star requirements of a U-factor \leq 0.32 and SHGC \leq 0.30 for all climate zones.

Custom layouts with horizontal mullions, simulated divided lites, inserts, and high bottom rails are possible.

Contact NanaWall for availability of other commercial glass types.

- a. Insulated Glass Unit (IGU) Lites:
 - 1). [**Double IGU:** **15/16 inch (24 mm) thick.**]
 - 2). [**Triple IGU:** **1-1/2 inch (38 mm) thick.**]
- b. IGU Fill: < insert IGU fill >
 - 1). [**Low-E**]
 - 2). [**Argon filled**]
 - 3). [**Air filled**]
 - 4). [**Krypton filled**]
- c. Glass Lite Type: < insert glass type >
 - 1). Standard

NOTE: Items below are options and may require an upcharge.

- 2). [**Low iron**]
 - 3). [**Solar bronze**]
 - 4). [**Solar gray**]
 - 5). [**Ornilux bird safe**]
 - d. Glass Spacers: Manufacturer's standard [**gray**] [**dark bronze**] finish; [**without**] [**with**] capillary tubes.
- C. Tilt Turn Hardware:
1. Manufacturer's standard cam type multipoint locking mechanism.
 - a. Concealed multipoint locking mechanism operated by a single locking handle.
 2. Manufacturer's standard hinges, pins, strikes, and limit stays.
 3. Lever Handle - Finish:
 - a. Brushed satin stainless steel

NOTE: Finish above is standard; other option below may require an upcharge.

- a. [**Titanium black stainless steel**]
 4. Handle Height: 41-3/8 inch (105 cm) centered from bottom of panel or as otherwise indicated.
- D. Weatherstripping: Manufacturer's standard double layer EPDM.
- E. Fasteners: Stainless steel screws for connecting frame components.

2.04 FABRICATION

- A. Extruded aluminum frame and panel profiles, corner connectors and hinges, tilt-turn hardware and handles, glass and glazing and weather stripping components needed to construct a Dual Action Tilt Turn window.
1. Each unit factory pre-assembled and shipped with all components and installation instructions.
 2. Exposed work to be carefully matched to produce continuity of line and design with all joints.
 3. No raw edges visible at joints.

2.05 ACCESSORIES

- A. Fixed insect screening.
- B. Provide sidelights and transoms, as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examination and Acceptance of Conditions per Section 01 70 00 and as follows:
 - 1. Carefully examine rough openings with Installer present, for compliance with requirements affecting Work performance.
 - a. Verify that field measurements, substrates, tolerances, levelness, plumbness, cleanliness and other conditions are as required by the manufacturer, and ready to receive Work.
 - b. Verify the structural integrity of the header for deflection with live and dead loads limited to the lesser of L/720 of the span or 1/4 inch (6 mm). Provide structural support for lateral loads, and both wind load and eccentric load when the panels are stacked open.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install Aluminum Tilt Turn Window system in accordance with the Drawings, approved submittals, manufacturers' recommendations and installation instructions, and as follows:
 - 1. Properly flash, waterproof and seal around opening perimeter.
 - 2. Securely attach anchorage devices to rigidly fit frame in place, level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work
 - 3. When lower track is designed to drain, provide connections to allow for drainage.
 - 4. Install sash, handles, screens and other accessories in accordance with manufacturer's recommendations and instructions.

3.03 FIELD QUALITY CONTROL

- A. Field Tests and Inspections per Section 01 40 00 of the following:
 - 1. Verify the Aluminum Tilt Turn Window system operates and functions properly. Adjust hardware for proper operation.
- B. Non-Conforming Work: Repair or replace non-conforming work as directed by the Architect; see General and Supplementary Conditions, and Division 01, General Requirements.

3.04 CLEANING AND PROTECTION

- A. Keep units closed and protect Aluminum Tilt Turn Window installation against damage from construction activities.
- B. Remove protective coatings and use manufacturer recommended methods to clean exposed surfaces.

END OF SECTION

DISCLAIMER:

Nana Wall Systems, Inc. takes no responsibility for product selection or application, including, but not limited to, compliance with building codes, safety codes, laws, or fitness for a particular purpose. This guide specification is not intended to be verbatim as a project specification without appropriate modifications for the specific use intended and the particular requirements of a specific construction project.

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