Historic Preservation Services
Community Development & Neighborhood Services
281 North College Avenue
P.O. Box 580
Fort Collins, CO 80522.0580

970.224.6078
preservation@fcgov.com
fcgov.com/historicpreservation

CERTIFICATE OF APPROPRIATENESS
ISSUED: April 10, 2024
EXPIRATION: April 10, 2025

City of Fort Collins
c/o Sean Rogers, Hillside Construction
216 Hemlock St. Ste B.
Fort Collins, CO 80524

Dear Property Owner:

This letter provides you with confirmation that the proposed changes to your designated Fort Collins landmark property, the Fort Collins Power Plant at 430-454 N. College Ave., have been approved by the City's Historic Preservation Division because the proposed work meets the criteria and standards in Chapter 14, Article IV of the Fort Collins Municipal Code.

1) Replacement of 2 fixed windows with awning windows on the non-historic portion of the building, with no structural changes, to match the finishes of other awning windows on the elevation

Notice of the approved application will be provided to building and zoning staff to facilitate the processing of any permits that are needed for the work.

Please note that all ensuing work must conform to the approved plans. Any non-conforming alterations are subject to stop-work orders, denial of Certificate of Occupancy, and restoration requirements and penalties.

If the approved work is not completed prior to the expiration date noted above, you may apply for an extension by contacting staff at least 30 days prior to expiration. Extensions may be granted for up to 12 additional months, based on a satisfactory staff review of the extension request.

Property owners can appeal staff design review decisions by filing a written notice of appeal to the Director of Community Development & Neighborhood Services within fourteen (14) days of this decision. If you have any questions regarding this approval, or if I may be of any assistance, please do not hesitate to contact me. I can be reached at yjones@fcgov.com or at 970-224-6045.

Sincerely,

Yani Jones
Historic Preservation Planner

Applicable Code Standard	Summary of Code Requirement and Analysis (Rehabilitation)	Standard Met (Y/N)
SOI #1	*A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships;* **This project will not alter the existing use of this historic building by the Energy Institute, and so this Standard is met.**	**Y**
SOI #2	*The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.* **The only exterior material that will need to be removed for this project is on the non-historic addition, and the replaced windows will match the rest of the awning windows on the elevation, ensuring continued compatibility of the addition's design with the overall historic character of the building.**	**Y**
SOI #3	*Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.* **This project does not alter the historic portion of this building, and so a false sense of historical development is avoided.**	**Y**
SOI #4	*Changes to a property that have acquired historic significance in their own right will be retained and preserved.* **The area of the building in the project area was constructed in 2013 and has not acquired historic significance in its own right.**	**N/A**
SOI #5	*Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.* **This project does not impact any historic materials.**	**Y**
SOI #6	*Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.*	**N/A**
SOI #7	*Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.*	**N/A**

SOI #8	*Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.*	**N/A**
SOI #9	*New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.* **This window replacement project will take two small, fixed windows, the lower portion of two window units, and replace them with awning windows. There are many other window units on this south elevation of the non-historic addition that also contain lower awning windows. Because the window type and finishing shall match these other existing window units, and because the design is already compatible with the historic portion of the building, this Standard is considered met.**	**Y**
SOI #10	*New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.* **These windows could be converted back into fixed windows without having any effect on the historic building.**	**Y**

BUILDING PERMIT APPLICATION: Fenestration (exterior doors & windows)

Check all the apply: **All information on the application must be filled out (as applicable).**

Residential ☐ Commercial ☑

Single family detached ☐ Duplex/Two-Family ☐ Single Family Attached (Townhome) ☐ Multi-Family (Apartment/Condo) ☐

Garage ☐ Bank ☐ Bar ☐ Church ☐ Hotel/Motel ☐ Medical Office ☐ Retail ☐ Other ☐: _____

JOB SITE ADDRESS: 430 North College Avenue **UNIT#:** _____

PROPERTY OWNER INFO: (All owner information is required – NOT optional)

Last Name Colorado State University Research Foundation First Name _____ Middle _____

Street Address 2537 Research Blvd, Ste 200 City Fort Collins State CO Zip 80526

Phone # 970-491-2933 Email bo.brown@colostate.edu

CONTRACTOR INFO:

Company Name Hillside Construction Inc.

License Holder Name Sean Rogers LIC # B-423 CERT # 2771-B

CONSTRUCTON INFO:

1. Like for like fenestration replacements (non-structural):

	Quantity replaced	Is the fenestration operable? **(commercial and more than 3 story multi-family only)**	U- factor	SHGC factor	Is % glazing transparency the same **(commercial only)** Ground floor = 60% glazing (transparency) Upper floors = 40% glazing (transparency)
Windows	2	Changing two small areas from fixed to awning	0.185	0.194	Match Existing
Doors	N/A	N/A	N/A	N/A	N/A
Skylight	N/A	N/A	N/A	N/A	N/A

*For code requirements see **window guide** and **codes**

2. Structural Fenestration: New or enlarged openings, new or enlarged basement egress windows (including lowering sill heights in a foundation wall)

Changing two small windows at the South Elevation from fixed glass to inserts for Awning Windows

Attached is picture of elevation showing changes.

VALUE OF CONSTRUCTION (*materials and labor*): $ 2,155.00

JOBSITE SUPERVISOR CONTACT INFO: Name Sean Rogers Phone 970-568-2772

SUBCONTRACTOR INFO:

Electrical N/A Mechanical N/A Plumbing N/A

Structural Framing (wood only) N/A

Applicant: I hereby acknowledge that I have read this application and state that the above information is correct and agree to comply with all requirements contained herein and City of Fort Collins ordinances and state laws regulating building construction.

Applicant Signature _____ Type or Print Name Sean Rogers

Phone # 970-568-2772 Email srogers@hillsideconst.com

THIS APPLICATION EXPIRES 180 DAYS FROM APPLICATION DATE

City of Fort Collins

Planning, Development & Transportation
281 N. College Ave
Fort Collins, CO 80524
Phone 970-416-2740 Fax 224-6134

BUILDING OWNER AUTHORIZATION TO OBTAIN A COMMERCIAL BUILDING PERMIT

I, (Print) Colorado State University Research Foundation as owner of record (property address) 430 North College Avenue Addition known as (name of business) Powerhouse Engery Campus hereby authorize the work listed below to be done on said property. I understand that such work will **only be performed contractors licensed by the City of Fort Collins.**

☐ I am giving permission for **interior work only.** The scope of the work shall be limited to: _____

_____

☐ I am giving permission for **exterior work only.** The scope of the work shall be limited to: Modify two small fixed windows on south elevation to awning windows.

☐ I am giving permission for **interior and exterior work.** The scope of the work shall limited to : _____

_____

M.S. Bo Brown
Digitally signed by M.S. 'Bo' Brown
Reason: Approved
Date: 2024.04.05 09:38:46-06'00'

(Property owner signature)

CSURF
(Property owner name; please print)

The foregoing affidavit was acknowledged before me on the 5th day of April, 2024 (month, year) by M.S. Bo Brown for the purpose therein set forth.

Witness my hand and official seal.

RACHELLE CARPINE
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20214027149
MY COMMISSION EXPIRES JULY 07, 2025

My Commission expires: July 07, 2025

Notary Public

Permit # _____
Office use only

430 North College Avenue
Two Window Change Out to Awning Window
Date: April 2, 2024

Switching to lower panes of glass that are fixed, to awning windoes to match on each side.

SMR 4-2-2024

Existing Awning Window

Change Fixed Window to Awning Window

Change Fixed Window to Awning Window

Existing Awning Window

MANKO WINDOW SYSTEMS INC.

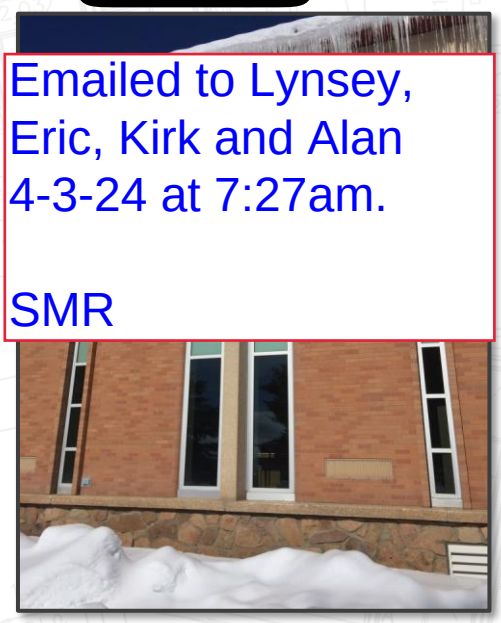
www.mankowindows.com

* This submittal contains a broad range of information and not all information pertain to this project

2727i

Fixed ▪ Casement ▪ Project In/Out ▪ GO

Manko's 2727i series was specifically designed to provide an efficient, economical window to an industry seeking thermally enhanced products. The 2727i is a member of a family of projected windows utilizing the same exterior die profile with interchangeable thermal struts depths and interior dies to create six different frame depths. Specifically, the 2727i uses a 24mm polyamide crimped in place structural thermal barrier to create a 2 3/4" overall window with a 2 3/4" vent. This specific strut provides superior frame performance and can be used in conjunction with dual or triple pane insulated glass. Main frame construction is mortise and tenon joinery with dual integral screw races. Operable sash uses mechanically joined, angle reinforced, mitered corner construction. The 2727i is tested to AAMA Architectural Class (AW) specifications, and carries NFRC 100, 200, 400, and 500 certifications.



Emailed to Lynsey, Eric, Kirk and Alan 4-3-24 at 7:27am.

SMR

Features:

- ⇒ 2 3/4" overall frame depth, 2 3/4" vent depth
- ⇒ 1/4" to 2" glazing options
- ⇒ Preglazed at factory for added quality control
- ⇒ Exterior grids available (beveled, cove, OG)
- ⇒ Interior surface applied & between glass muntins available
- ⇒ Hermetically sealed, hinged sash, and take-out sash blinds available
- ⇒ Panning systems & interior snap trims available
- ⇒ Receptor systems available w/optional starter sill
- ⇒ Custom profiles & configurations available
- ⇒ Full range of anodized & painted finishes, including dual finish capability

AAMA Structural Performance

Type	AAMA Performance Rating	Air Infiltration @ 6.24 psf	Water	Design Pressure	Structural Overload Pressure
Fixed	AW-PG100-F	≤ .1 cfm/ft²	12.0 psf	100 psf	150 psf
Projected	AW-PG80-AP	≤ .1 cfm/ft²	12.0 psf	80 psf	120 psf
Casement	AW-PG80-AP	≤ .1 cfm/ft²	12.0 psf	80 psf	120 psf

NFRC Thermal Performance

COG U-Value	U-Value (NFRC 100)		
	Fixed	Projected	Casement
0.38	0.43	0.50	0.50
0.35	0.40	0.49	0.48
0.32	0.38	0.47	0.46
0.29	0.35	0.45	0.45
0.26	0.33	0.43	0.43
0.23	0.30	0.41	0.41
0.20	0.28	0.40	0.39

All values shown are calculated with Manko standard TriSeal insulated units. Verify performance numbers with test reports for specific glass make-ups as these are estimates.

Sizing Capabilities (Frame Size)

Type	Width		Height		Max FT²
	Min	Max	Min	Max	
Fixed	12"	100"	12"	100"	≤ 36
Projected w/ cam handle	15"	60"	15"	41"	≤ 16
Projected w/ cam handle & jamb locks	15"	60"	15"	60"	≤ 20
Projected w/ rotary handle & jamb locks	22"	60"	16"	60"	≤ 20
Casement w/ single cam handle	16"	36"	16"	41"	≤ 10
Casement w/ dual cam handle	16"	36"	16"	60"	≤ 15
Casement w/ rotary operator & lift lock	18"	36"	18"	60"	≤ 12

Glazing Infill Options

Glazing	1/4"	1/2"	7/8"	1"	1 1/4"	1 1/2"	2"
Infill	O	O	O	S	O*	O	O
Hinged/Take-Out Sash	S		S				
Grid Option	O			S		0	

*Hermetically sealed blinds are available, but will limit glass options and between glass muntins

Hardware Options

Type	4 Bar Hinge w/Friction Shoe	Butt Hinges	Auxiliary Friction Device	Limit Device	Single Arm Roto Operator	Dual Arm Roto Operator	Cam Handle	Pole Ring Cam Handle	Access Control Custodial Lock	Lift Lock
Projected	S		O	O		*O	*S	O	O	*O
Casement	O	S	O	O	S		O			S

S = Standard Hardware O = Optional Hardware

*Lift locks are standard with roto operators, and whenever vents exceed 42" tall when using cam handles

~~2727i-GO~~ Optional Grids

2727i Series
2-3/4” Architectural
Fixed, Projected &
Casement Window

MANKO WINDOW SYSTEMS, INC.
800 HAYES DRIVE
MANHATTAN, KANSAS 66502
PHONE: (800) 642-1488 (785) 776-9643
FAX: (800) 576-2656 (785) 776-9644

MANKO WINDOW SYSTEMS, INC.
11000 EAST 51ST AVE. SUITE B
DENVER, COLORADO 80239
PHONE: (888) 642-1488 (303) 375-0642
FAX: (888) 576-2656 (303) 375-0669

MANKO WINDOW SYSTEMS, INC.
3001 MCKINLEY AVE.
DES MOINES, IA 50321
PHONE: (888) 642-1488 (515) 288-7427
FAX: (888) 576-2656 (515) 288-6968

GUIDE SPECIFICATIONS - SECTION 08520
ALUMINUM WINDOWS
Manko Window Systems Inc. 2727i Series
(Fixed, Projected and Casement)

SECTION 08520 ALUMINUM WINDOWS (Fixed, Projected and Casement)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. All exterior windows furnished and installed as shown on drawings, specified in this section and designated in AAMA 101/I.S.2.
2. All labor, materials, tools, equipment and services needed to furnish and install Architectural Performance Class windows.
3. Components furnished with installed windows.
4. Installation accessories furnished and installed.
5. Single Source Requirement
    a. All products listed in Section 08400; 08500; 08800; and 08900 shall be by the same manufacturer.

1.02 SYSTEM PERFORMANCE REQUIREMENTS

A. Design Wind Loads
1. The design wind pressure for the project will be: (Specify)
    a. ___ psf positive and negative; ___ psf negative at corner zones
    b. Per wind pressure diagram
    c. Per local building codes
2. All structural components, including meeting rails, mullions and anchors shall be designed accordingly, complying with deflection and stress requirements of Paragraph 1.02 B.

[Determination of design load(s) is the sole responsibility of the building's Engineer of Record, considering code interpretation issues and/or prescriptive requirements not included in contract documents. Manko Window Systems, Inc. strongly recommends that design loads (in psf or Pa) specific to all relevant areas of the building be provided by the specifier.]

B. Air, Water and Structural Performance Requirements
1. When tested in accordance with cited test procedures, windows shall meet or exceed the following performance criteria, as well as those indicated in AAMA 101/I.S.2 for Architectural (AW) Performance Class windows, Performance Grade 80 (AW80) unless otherwise noted herein.
2. Air Test Performance Requirements
    a. Air infiltration maximum 0.1 cfm per square foot at 6.24 psf pressure differential when tested in accordance with ASTM E283.
3. Water Test Performance Requirements
    a. No uncontrolled water leakage at 12.00 psf static pressure differential, with water application rate of 5 gallons/hr/sq ft when tested in accordance with ASTM E331.
4. Structural Test Performance Requirements
    a. Uniform Load Deflection Test
        i. No deflection of any unsupported span L of test unit (framing rails, muntins, mullions, etc.) in excess of L/175 at both a positive and negative load of 80 psf (design test pressure) when tested in accordance with ASTM E330.
        ii. Structural reinforcing that is not standard on units being furnished is not allowed.
    b. Uniform Load Structural Test
        i. Unit to be tested at 1.5 x design test pressure (120 psf), both positive and negative, acting normal to plane of wall in accordance with ASTM E330.
        ii. No glass breakage; permanent damage to fasteners, hardware parts, or anchors; damage to make windows inoperable; or permanent deformation of any main frame or ventilator member in excess of 0.2% of its clear span.

C. Life Cycle Testing:
1. When tested in accordance with AAMA 910-93, there is to be no damage to fasteners, hardware parts, support arms, activating mechanisms or any other damage that would cause the window to be inoperable at the conclusion of testing. Air infiltration and water resistance tests shall meet the primary performance requirements specified.

D. Thermal Transmittance (U-Value):
1. The NFRC certified whole window U-Value based on NFRC 100 test sizes and calculated by using Windows 5.2 and Therm 5.2 software (or newer version), shall not exceed 0.44 BTU/hr/sf/degF for projected vents, 0.44 BTU/hr/sf/degF for casements, and 0.33 BTU/hr/sf/degF for fixed windows. All values submitted for comparison

shall be calculated using manufacturers standard two pane insulated glass unit with center of glass U-value of .25 BTU/hr/sf/degF. Values calculated with triple pane units, removeable sash, oversized test samples, units with suspended films, nonstandard spacers, or nonstandard frame construction, shall not be allowed.

E. Condensation Resistance (CR)
   1. calculated by using Windows 5.2 and Therm 5.2 software (or newer version), shall not be less than 49 for projected vents, 49 for casements, and 53 for fixed windows. All values submitted for comparison shall be calculated using manufacturers standard two pane insulated glass unit with center of glass U-value of .25 BTU/hr/sf/degF and standard spacer and gas fill. Values calculated with triple pane units, removeable sash, oversized test samples, units with suspended films, nonstandard spacers, or nonstandard frame construction shall, not be allowed.

[DISCLAIMER: Condensation on interior surfaces of installed windows is affected by many variables, including component thermal performance, thermal mass of surrounding materials, interior trim coverage and air flow conditions, weather, and mechanical system design. Since many of these variables are outside of Manko Window Systems, Inc., we can make no representations or warranties against the formation of condensation, except on pre-defined configurations under controlled and steady-state laboratory conditions, as specified above.]

1.03 SUBMITTALS

A. General Requirements
   1. Provide all submittals in a timely manner to meet the required construction completion schedule.

B. Shop Drawings
   1. Shop drawings must be prepared wholly by the window manufacturer, or a qualified engineering services firm under the direction of the manufacturer. Shop drawings for pre-engineered configurations may be prepared by installers authorized per 1.04 QUALITY ASSURANCE.
   2. Provide design details along with bid proposals to define system aesthetic and functional characteristics.
   3. Provide three photocopied sets of shop drawings, including half size details of all necessary conditions.

C. Samples
   1. Components: Submit samples of anchors, fasteners, hardware, assembled corner sections and other materials and components as requested by Architect.
   2. Finish: Submit color samples for Architect's approval as requested.

D. Test Reports and Calculations
   1. Submit certified independent laboratory test reports verifying compliance with all test requirements of 1.02 SYSTEM PERFORMANCE REQUIREMENTS as requested by Architect.

1.04 QUALITY ASSURANCE

A. Qualifications
   1. Upon request, the window manufacturer will provide written confirmation that the installer is authorized to install window products to be used on this project.

1.05 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading
   1. Materials will be packed, loaded, shipped, unloaded, stored and protected in accordance with AAMA CW-10.

1.06 WARRANTY

A. Aluminum Window Warranty
   1. Products: Submit a written warranty, executed by the window manufacturer, for a period of 2 years (10 years for insulated glass seal failure) from the date of manufacture, against defective materials or workmanship, including substantial non-compliance with applicable specification requirements and industry standards, which results in premature failure of the windows, finish, factory-glazed glass, or parts, outside of normal wear.
      a. In the event that windows or components are found defective, manufacturer will repair or provide replacements without charge at manufacturer's option.
      b. Warranty for all components must be direct from the manufacturer (non-pass through) and non-prorated for the entire term. Warranty must be assignable to the non-residential owner, and transferable to subsequent owners through its length.
   2. Installation: Submit a written warranty, executed by the window installer, for a period of 2 years from the date of substantial completion, against defective materials or workmanship, including substantial non-compliance with applicable specification requirements, which result in premature failure.
      a. In the event that installation of windows or components is found to be defective, installer will repair or provide replacements without charge at the installer's option.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer
   1. Drawings and specifications are based on:
      a. Manko Window Systems, Inc. 2727i Series Fixed, Flush Project In/Out Vent and/or Casement Windows.
         i. Base bid will be Manko Window Systems, Inc.

B. Substitutions
   1. Other manufacturers' products that meet or exceed specified design requirements may be considered. Submit the following information with request for substitutions at least ten (10) working days prior to bid date.
      a. Test reports specified in 1.02 SYSTEM PERFORMANCE REQUIREMENTS
      b. Full proposal details and samples specified in 1.03 SUBMITTALS
      c. Copy of manufacturer's warranty specified in 1.06 WARRANTY
      d. Other information as requested for evaluation
   2. Substitute products not pre-approved by the Architect via addenda will not be considered.

2.02 MATERIALS

A. Aluminum Members
1. Extruded aluminum prime billet 6063-T5 or 6063-T6 alloy for primary components; 6063-T5, 6063-T6, or 6061-T6 for structural components; all meeting the requirements of ASTM B221.
   2. Aluminum sheet alloy 5005 H 32 (for anodic finish), meeting the requirements of ASTM B209 or alloy 3003 H 14 (for painted or unfinished sheet).

2.03 MANUFACTURED UNITS

A. Materials
   1. Principal window frame members will be a minimum 0.094" in thickness at all structural areas, hardware mounting webs, and section flanges.
   2. Extruded or formed trim components will be a minimum 0.062" in thickness.

B. Fabrication
   1. Frame depth 2 3/4" minimum.
   2. Sash depth 2 3/4" minimum.
   3. Sash ventilator sections must be tubular.

2.04 COMPONENTS

A. All steel components including attachment fasteners to be 300 series stainless steel except as noted.

B. Extruded aluminum components 6063-T5 or 6063-T6.

C. Locking handles, cases and strikes to be die cast or stainless steel.

D. Thermoplastic or thermo-set plastic caps, housings and other components to be injection-molded nylon, extruded PVC, or other suitable compound.

E. Hardware: (select from options 1, 2, 3, 4, 5, 6, or 7 per operational requirements)
   1. Project-Out Vent
      a. Hinges are to be two stainless steel concealed four-bar adjustable friction hinges per vent meeting AAMA 904.1.
      b. Locks are to be standard die cast white bronze cam locks and strikes OR a dual arm roto operator with lift lock. Provide two locks for ventilators over 40". (Specify one of the following for cam locks)
         i. Standard project-out cam handle lock
         ii. Removable project-out cam handle lock
         iii. Pole operated project-out cam lock
      c. Optional -- Limited opening device/friction adjuster to limit initial sash operation to 6". Operation past this point to be by use of a tool or removable key.
   2. Project-In Vent
      a. Hinges are to be two stainless steel concealed four-bar adjustable friction hinges per vent meeting AAMA 904.1.
      b. Locks are to be standard die cast white bronze cam locks and stainless steel keepers. Provide two locks for ventilators over 40". (Specify one of the following)
         i. Standard project-in cam handle lock
         ii. Removable project-in cam handle lock
         iii. Pole operated project-in cam lock
         iv. Custodial lock
      c. Optional -- Limited opening device/friction adjuster to limit initial sash operation to 6". Operation past this point to be by use of a tool or removable key.
   3. Out-Swing Casement Vent with Butt Hinges

a. Hinges are to be two five-knuckle aluminum nylon-bushed hinges with coated stainless steel pins. Provide three hinges on units over 4'" high. Finish of aluminum housing shall match window finish.
b. Locks are to be a single arm roto operator with lift lock OR standard die cast white bronze cam locks and strikes. Provide two-point locking for ventilators over 40". (Specify one of the following cam locks)
    i. Standard project-out cam handle lock
    ii. Removable project-out cam handle lock
c. Optional -- Limited opening device/friction adjuster to limit initial sash operation to 6". Operation past this point to be by use of a tool or removable key.

4. Out-Swing Casement Vent with Four-Bar Hinges
    a. Hinges are to be two stainless steel concealed four-bar adjustable friction hinges per vent meeting AAMA 904.1.
    b. Locks are to be standard die cast white bronze cam locks and strikes. Provide two-point locking for ventilators over 40". (Specify one of the following for cam locks)
        i. Standard project-out cam handle lock
        ii. Removable project-out cam handle lock
    c. Optional -- Limited opening device/friction adjuster to limit initial sash operation to 6". Operation past this point to be by use of a tool or removable key.
5. In-Swing Casement Vent with Butt Hinges
    a. Hinges are to be two five-knuckle aluminum nylon-bushed hinges with coated stainless steel pins. Provide three hinges on units over 4'" high. Finish of aluminum housing shall match window finish.
    b. Locks are to be standard die cast white bronze cam locks and stainless steel keepers. Provide two-point locking for ventilators over 40". (Specify one of the following for cam locks)
        i. Standard project-in cam handle lock
        ii. Removable project-in cam handle lock
        iii. Custodial lock
    c. Limited opening device/friction adjuster to limit initial sash operation to 6". Operation past this point to be by use of a tool or removable key.
6. In-Swing Casement Vent with Four-Bar Hinges
    a. Hinges are to be two stainless steel concealed four-bar adjustable friction hinges per vent meeting AAMA 904.1.
    b. Locks are to be standard die cast white bronze cam locks and stainless steel keepers. Provide two-point locking for ventilators over 40". (Specify one of the following cam locks)
        i. Standard project-in cam handle lock
        ii. Removable project-in cam handle lock
        iii. Custodial lock
    c. Optional -- Limited opening device/friction adjuster to limit initial sash operation to 6". Operation past this point to be by use of a tool or removable key.
7. Fixed -- No Hardware Required

F. Sealants
1. All sealants shall comply with applicable provisions of AAMA 800 and/or Federal Specifications FS-TT-001 and 002 Series.
2. Frame joinery sealants shall be suitable for application specified and as tested and approved by window manufacturer.

G. Glass
1. Provide in accordance with Section 08800. Compliance with stated U-Value shall require Cardinal 366 LoE glass or equivalent, EdgeTech "TriSeal Superspacer", and argon gas filled. (Specify Section 08800 accordingly)
2. Sealed insulated glass shall meet ASTM E 2190.

H. Glazing
1. Provide in general accordance with Section 08800.
2. Glazing method shall be in general accordance with the FGMA Glazing Manual for specified glass type, or as approved by the glass fabricator.

I. Glazing Materials
1. Setting Blocks/Edge Blocking: Provide in sizes and locations recommended by FGMA Glazing Manual.
2. Back-bedding tapes, expanded cellular glazing tapes, toe beads, heel beads and cap beads shall meet the requirements of applicable specifications cited in AAMA 800.
3. Glazing gaskets shall be non-shrinking, weather-resistant, and compatible with all materials in contact.
4. Structural silicone sealant where used shall meet the requirements of ASTM C 1184.
5. Spacer tape in continuous contact with structural silicone shall be tested for compatibility and approved by the sealant manufacturer for the intended application. Gaskets in continuous contact with structural silicone shall be extruded silicone or compatible material.

J. Steel Components
1. Provide steel reinforcements as necessary to meet the system performance requirements of 1.02.
2. Concealed steel anchors and reinforcing shall be factory painted after fabrication with rust-inhibitive primer complying with Federal Specification TT-P-645.

K. Thermal Break Construction:
   1. Structural Thermal Barrier
      a. Structural thermal barriers shall consist of polymide nylon 6.6 struts reinforced with glass fibers oriented in all three (3) axis.
         i. Frame and sash members must include a thermal break applied in the manufacturer's facility, using a low conductance consisting of twin polymide struts not less than 24mm in length.

L. Weather Stripping:
   1. Dual durometer PVC, neoprene, EPDM or other suitable material as tested and approved by the window manufacturer.
   2. Bulb type at exterior vent members.
   3. Securely stake and join at corners. Provide drainage to exterior as necessary.
   4. Weather-stripping shall provide an effective pressure-equalization seal at the interior face of the sash ventilator.

M. Muntins: (Optional)
   1. Provide muntin grids as shown on architectural drawings.
   2. Finish to match window frames.

N. Panning: (Optional)
   1. Provide extruded aluminum panning to receive replacement windows as shown on architectural drawings.
   2. Finish to match window frames.

O. Receptors/Sill Starter: (Optional)
   1. Provide extruded aluminum receptors to receive windows, as shown on architectural drawings.
   2. Finish to match window frames.

P. Insect Screens: (Optional)
   1. Tubular extruded aluminum frames shall meet the requirements of ANSI/SMA 1004. Finish to match window frames.
   2. Aluminum cloth shall comply with GSA-FS-RR-W-365 and USDC-CS-138 with 18 X 16 mesh. Cloth color shall be (Select one) charcoal grey or brite aluminum.

Q. Access Panels: (Optional - Hinged or lift out)
   1. Miter all corners and mechanically stake over a solid aluminum corner block, leaving hairline joinery, then sealed weather tight.
   2. Access panel joinery shall not be exposed to the exterior.
   3. Access panels (when hinged) will be side-hinged and in-swing type.
   4. Hinged access panels will be hinged on the interior left jamb with the lock located on interior right jamb.
   5. Two locks will be provided at the interior right jamb of hinged access panels that exceed 40" in height.

R. Integral Venetian Blinds: (Optional)
   1. 5/8" wide aluminum slat blinds. Blind color shall be _____ (Select from manufacturer standard).
   2. Blind to be integrally mounted between the dual glazing.
   3. Tilt-control knob will be located on the interior face of access panel at the bottom of the right jamb. Raise and lower pull cords will be located between glass for access only when access panel is opened.
   4. Tilt-control knob will incorporate a "slip clutch" feature.

2.05 FABRICATION

A. General:
   1. Finish, fabricate and shop assemble frame and sash members into complete windows under the responsibility of one manufacturer.
   2. No bolts, screws or fastenings to bridge thermal barrier or impair independent frame movement.
   3. Fabricate to allow for thermal movement of materials when subjected to a temperature differential from -30 degrees F to +180 degrees F.

B. Frames:
   1. Cope and mechanically fasten each corner, or miter all corners and mechanically stake over a solid extruded aluminum corner key leaving only hairline joinery, then seal weather tight.

C. Main Sash Ventilator
   1. Miter all corners and mechanically stake over a solid extruded aluminum corner key, leaving only hairline joinery, then seal weather tight.

D. Glass Drainage: (field glazed units only)
   1. Provision shall be made to insure that water will not accumulate and remain in contact with the perimeter area of sealed insulated glass.

2.06 FINISHES

A. Finish of Aluminum Components

1. Finish of all exposed areas of aluminum windows and components shall be done in accordance with the appropriate AAMA Voluntary Guide Specification shown (select from below).

Designation	Description	Standard	Color
AAM12C21A31	Clear - Class II	AAMA 611	Clear
AAM12C21A41	Clear - Class I	AAMA 611	Clear
AAM12C21A44	Electrolytically Deposited – Class I	AAMA 611	Champagne, Light Bronze, Medium Bronze, Dark Bronze, Black
AAM12C1RX	Organic Paint	AAMA 2603	As selected by Architect from manufacturer's standard colors - Suitable for INTERIOR Finishes
AAM12C1RX	Organic Paint	AAMA 2605	As selected by Architect from manufacturer's standard colors - suitable for INTERIOR or EXTERIOR finishes

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions

1. Verify that building substrates permit installation of windows according to the manufacturer's instructions, approved shop drawings, calculations and contract documents.
2. Do not install windows until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Erection of Aluminum Windows

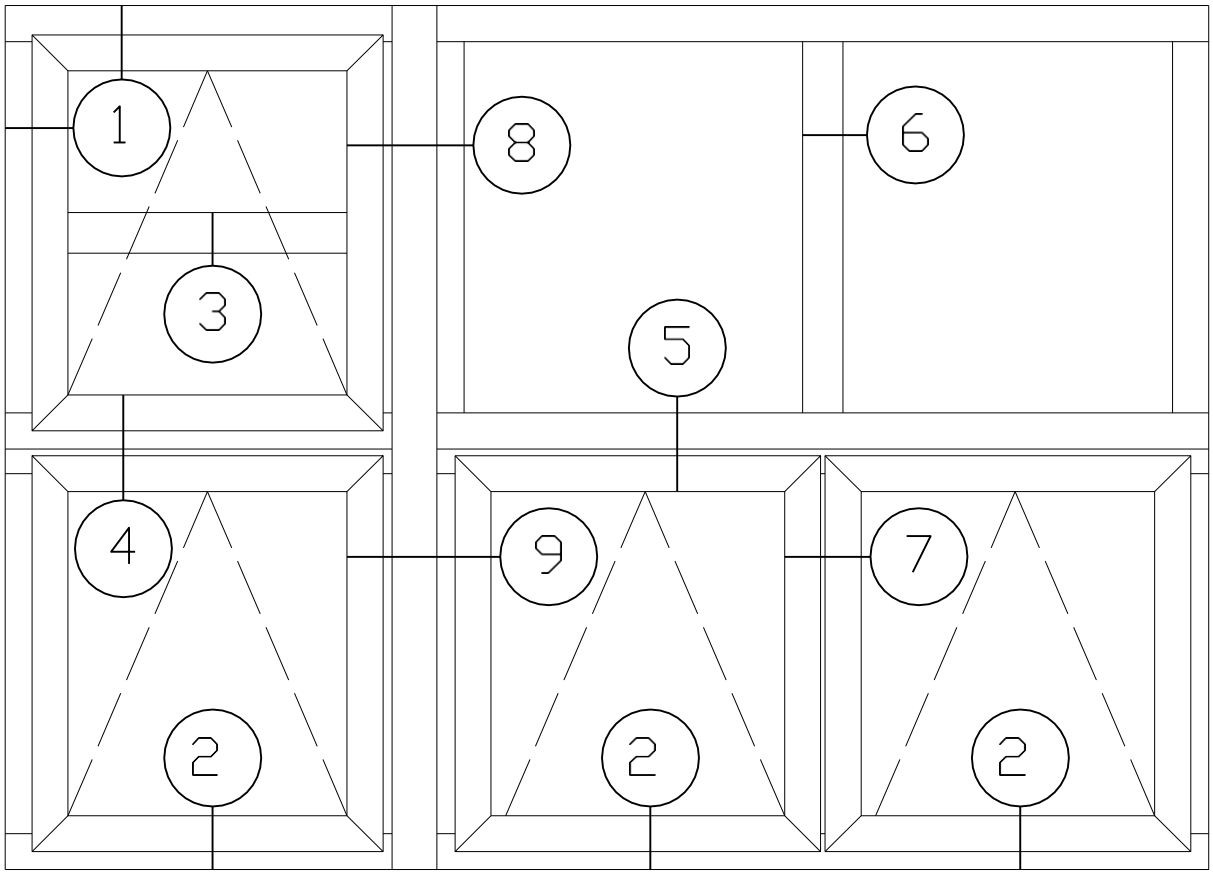
1. Install windows with skilled tradesman in exact accordance with approved shop drawings, installation instructions, specifications, and AAMA 101/I.S.2.
2. Windows must be installed **plumb, square and level** for proper weathering and operation. Jambs must not be "sprung", bowed or warped during installation.
3. Aluminum that is not organically coated shall be insulated from direct contact with steel, masonry, concrete or other dissimilar metals by bituminous paint, zinc chromate primer, nonconductive shims or other suitable insulating material.

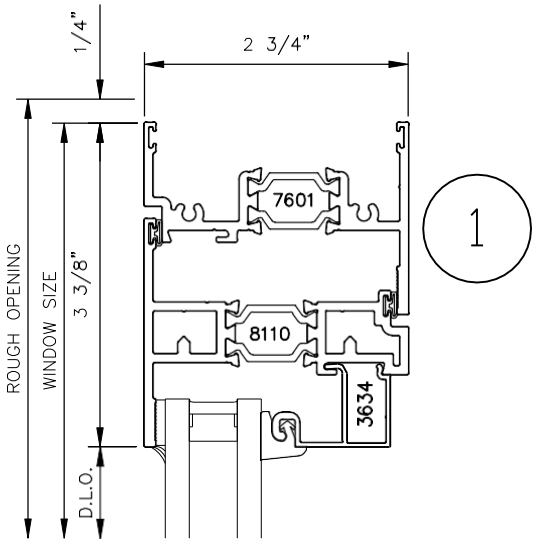
[DISCLAIMER: Manko Window Systems, Inc. takes no responsibility for product selection or application, including, but not limited to, compliance with building codes, safety codes, laws, merchantability or fitness for a particular purpose, and further disclaims all liability for the use, in whole or in part, of these guide specifications in preparation of project specifications and/or other documents. Guide specifications are subject to change at any time, without notice, and at Manko Window Systems, Inc. sole discretion.]

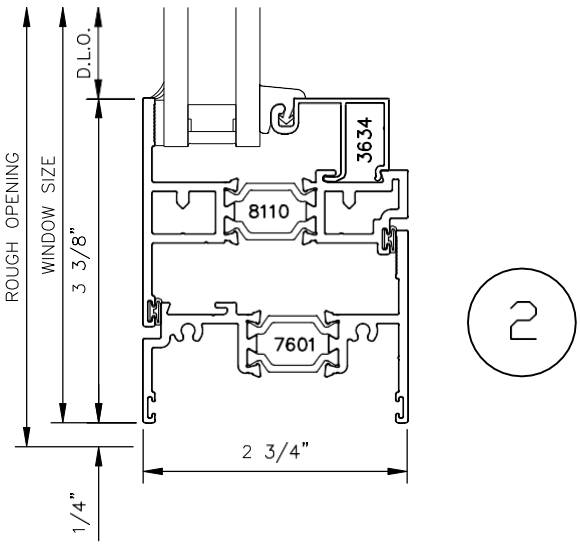
MANKO

2727i SERIES WINDOWS

STANDARD PROJECT OUT CONFIGURATIONS



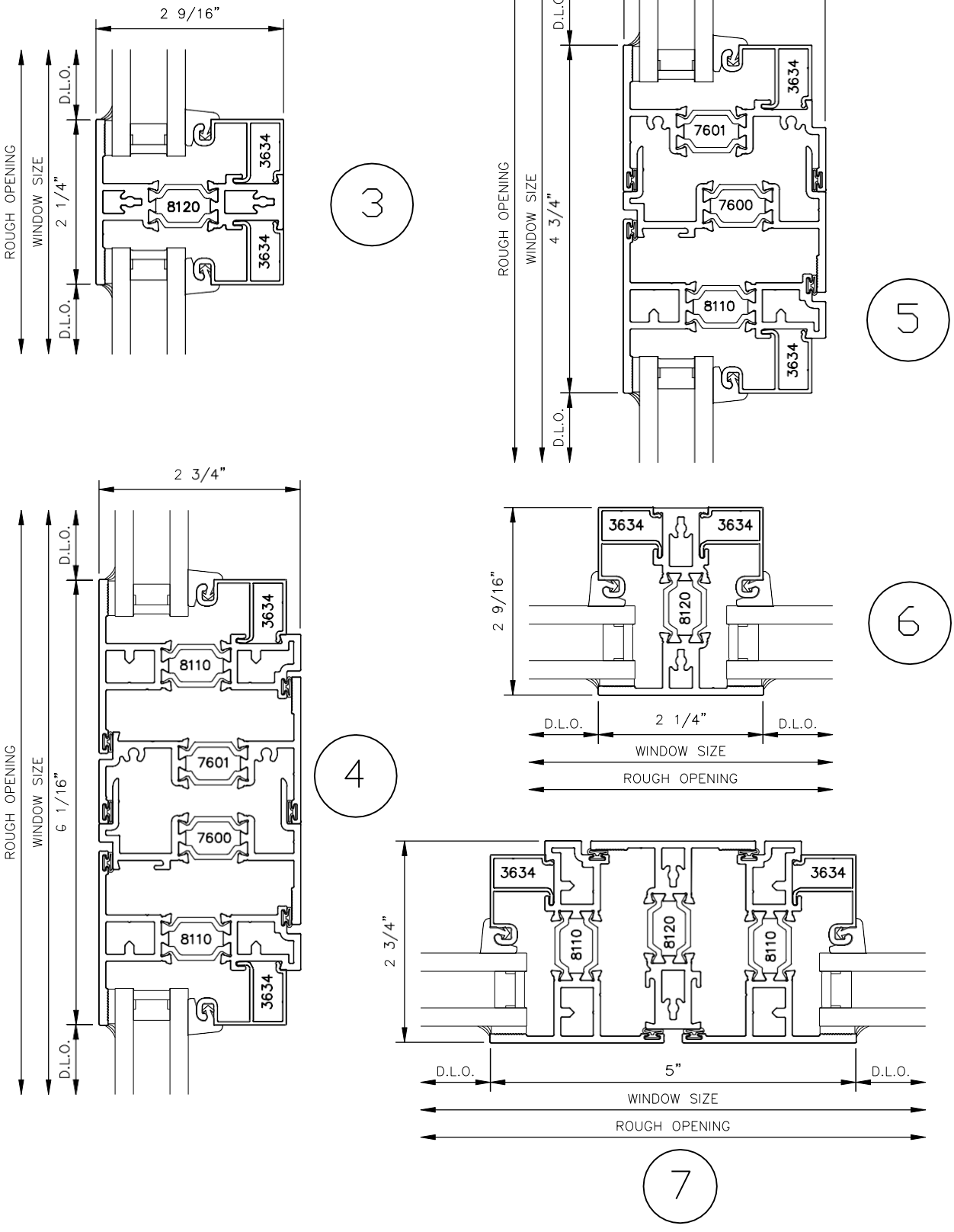




MANKO

2727i SERIES WINDOWS

STANDARD PROJECT OUT CONFIGURATIONS



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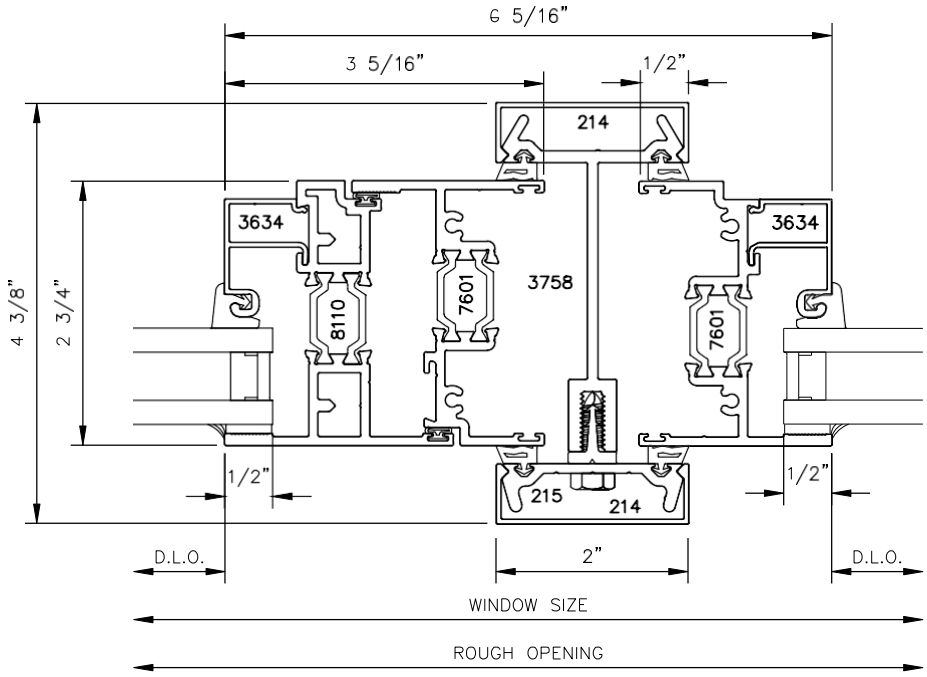
2727i SERIES WINDOWS

STANDARD PROJECT OUT CONFIGURATIONS



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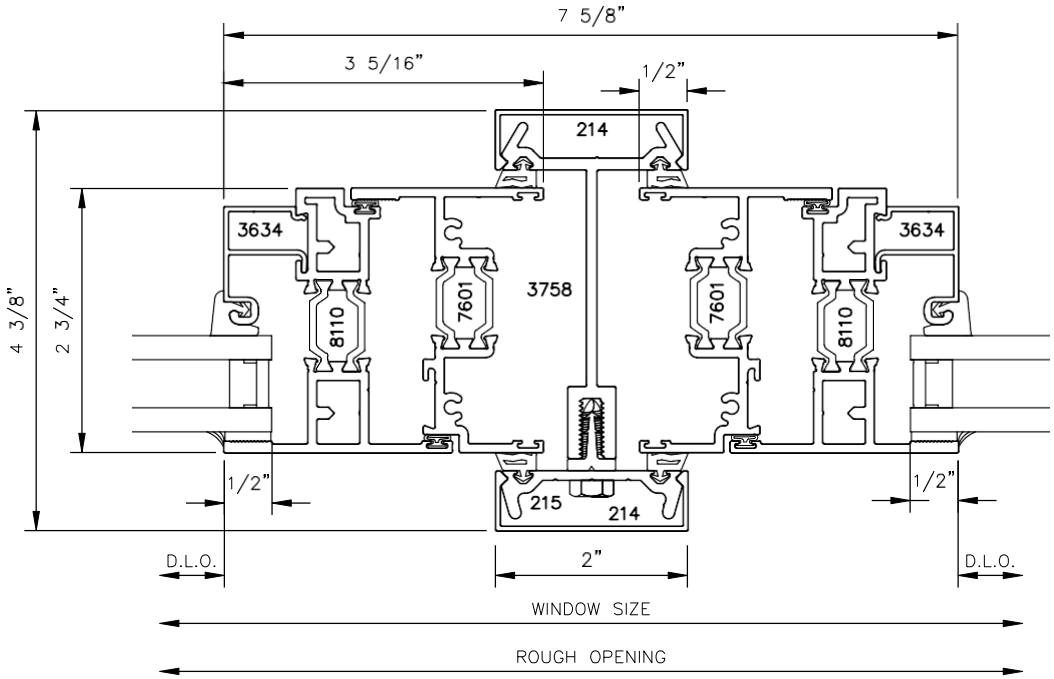

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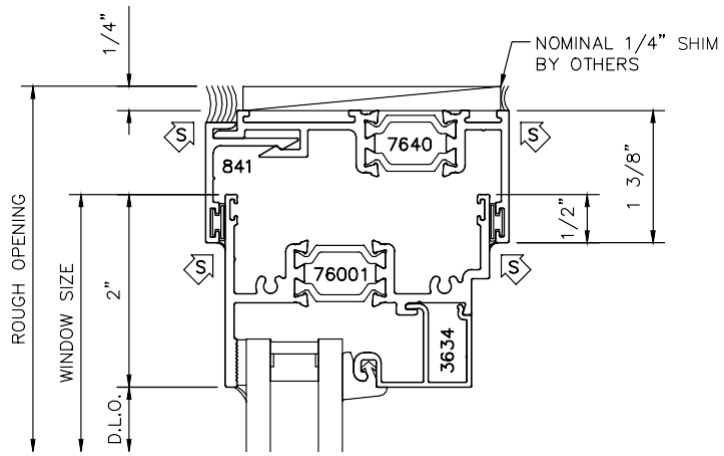
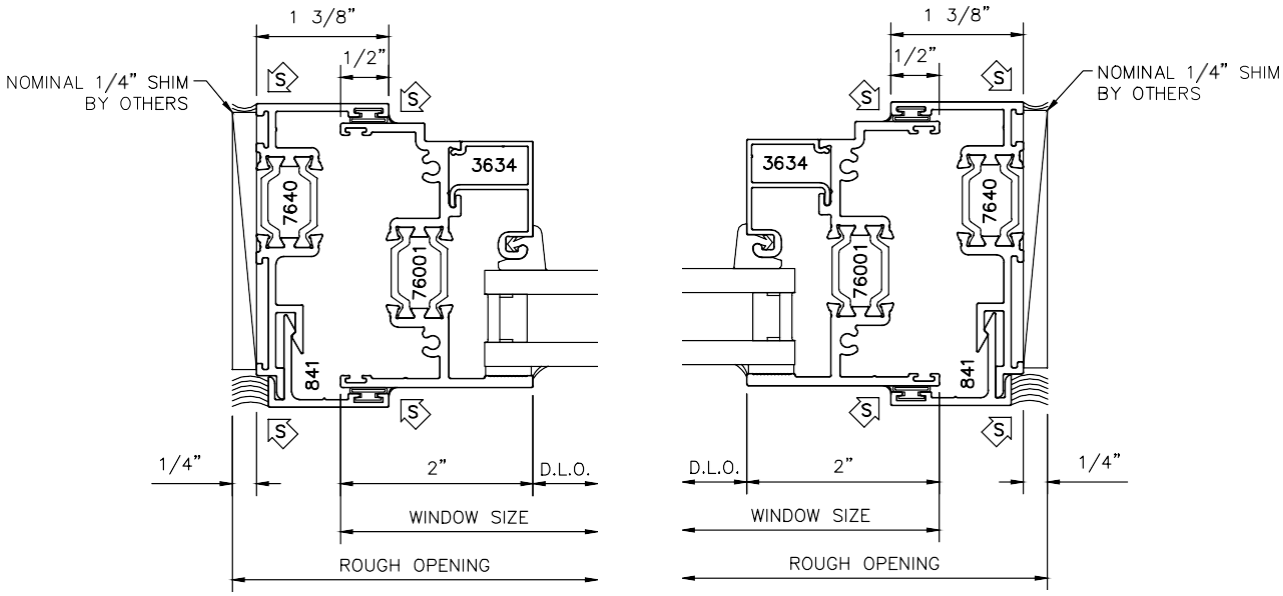
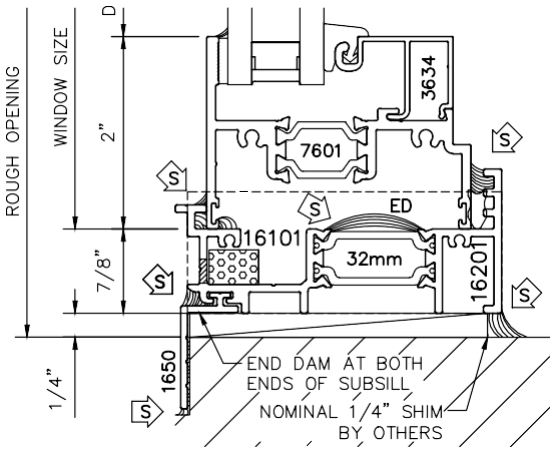
MANKO

2727i SERIES WINDOWS
RECEPTORS







Element Materials Technology
3922 Delaware Ave
Des Moines, Iowa
50313 USA

P 515-266-5101
F 515-262-1910

element.com

Summary of Test Results

Product Manufacturer:	Manko Window Systems, Inc
Product Type:	Awning
Product Series/Model:	2727i- Awning 60x36
Primary Product Designator:	
AAMA/WDMA/CSA 101/I.S.2/A440-08	**Class AW-PG80- Size tested 1524x914mm (60x36 in)- AP**
Test Completion Date:	11/1/16
Operating Force :	9.5 lbf
Air Infiltration:	<.01 cfm/ft^2
Water Resistance Test Pressure:	580 Pa (12.12 psf)
Uniform Load Deflection Test Pressure:	± 3840 Pa (80.26 psf)
Uniform Load Structural Test Pressure:	± 5760 Pa (120.38 psf)
Forced Entry Resistance:	Grade 40

Reference must be made to Report No.ESP024202P.4 dated 11/1/16 for complete test specimen description and detailed test results.

EAR-CONTROLLED DATA

LABORATORY TESTING OF A 2727i AWNING 60x36

MANUFACTURED BY
MANKO WINDOW SYSTEMS

MANUFACTURED BY
MANKO WINDOW SYSTEMS
Attn: Kevin Dix
800 Hayes Drive
Manhattan KS. 66502

Test Date:	11/01/16
Record Retention End Date:	11/01/20

Prepared By:

Richard B. Luna
Project Managers
Product Testing Department
Telephone: (515) 309-4228

Reviewed By:

Brian Escherich
Operations Manager, Des Moines
Telephone: (515) 309-4220

The test results contained in this report pertain only to the specimens tested and not necessarily to all similar products.

EAR-CONTROLLED DATA

INTRODUCTION:

This report presents the results of laboratory testing conducted on a 2727i Awning window manufactured by Manko Window Systems, Manhattan KS.. This work was requested and authorized by Kevin Dix of Manko Window Systems, with testing conducted on November 1st – November 3rd, 2016 at Manko Window Systems, Manhattan KS. The purpose of the testing was to determine the performance of the windows for air infiltration, water resistance, structural integrity and life cycling..

TEST RESULTS SUMMARY:

The window described herein meets or exceeds the following specifications:

AAMA/WDMA/CSA 101/I.S.2/A440-08	**Class AW-PG80- Size tested 1524x914mm (60x36 in)- AP**

SAMPLE DESCRIPTION:

Unit Size:	1524mm (60”) wide x 914mm (36.00”) high
Unit Area:	1.40m^2 (15.00 ft^2)
Sash Size:	1473mm (58.00”) wide x 864mm (34.00”) high
Crack Length:	4.67m (15.33 ft)
Finish:	Anodized Aluminum

Glazing: Exterior Silicone cap bead and ½” x 1/8” foam tape with interior removeable glazing bead and dry glazed gasket. 1” OA unit with two lites of ¼” annealed glass and a ½” Quanex Triseal Airspacer.

Frame Construction: Screw Spline with Mortise and Tenon.

Sash Construction: Crimped and Dual Corner Staked

Screen Construction: N/A

Reinforcement: None

Weatherstrip Description: Bulb rubber gaskets around the perimeter of the sash on both the inboard and out board sash legs seals the sash to the frame.

Hardware Description: Std Dual cam locks and auxillary jamb locks

Weeps: Two weeps at the sill member located approximately 6” in from each sash jamp.

Joint Sealant Application: AcryIR seam sealer at all joints

Installation: The window was installed into a nominal (2” x 10”) SPF test buck. Wood Stops were installed around full Perimeter inside and out using 1 ½” drywall screws 2” from the corner and 16” O.C.

EAR-CONTROLLED DATA

TEST RESULTS:

	ACTUAL		REQUIREMENTS	
Operating Force (NAFS/11: 9.3.1)				
Open (Initiate)	42 N	9.5 lbs	----	Report Only
Open (Maintain)	25 N	5.6 lbs	135 N	30.35 lbs
Close (Initiate)	40 N	9 lbs	----	Report Only
Close (Maintain)	17 N	3.8 lbs	135 N	30.35 lbs
Air Infiltration (ASTM E 283)				
Chamber Pressure, Pa (psf)	+300 (+6.24)		+300 (+6.24)	
L/s/m^2 (cfm/ft^2)	0.01 (<.01)		0.5 (.10) maximum	

(The tested specimen meets or exceeds the performance levels specified in 101/I.S.2/A440-08 for air infiltration.)

	ACTUAL	REQUIREMENTS
Cyclic Water Penetration (ASTM E 547**)**		
Chamber Pressure, Pa (psf)	+580 (12.11)	+580 (12.11)
Duration, minutes	5	5
Cycles	4	4
Water Penetration	Pass	No water shall flow over interior face.
Static Water Penetration (ASTM E 331)		
Chamber Pressure, Pa (psf)	+580 (12.11)	+580 (12.11)
Duration, minutes	15	15
Cycles	1	1
Water Penetration	Pass	No water shall flow over interior face.
Sash/Vent Cycling (AAMA 910-10)		
2000 Cycles (First Half)	Pass	No Damage
Locking Hardware Cycling (AAMA 910-10)		
2000 Cycles (First Half)	Pass	No Damage
Misuse Testing (AAMA 910-10**)**		
Ventilator Torsion Test @ 330 N (75 lbf)	Pass	No Damage
Vent Lateral Racking Test @ 330 N (75 lbf)	Pass	No Damage
Sash/Vent Cycling (AAMA 910-10)		
2000 Cycles (Second Half)	Pass	No Damage
Locking Hardware Cycling (AAMA 910-10**)**		
2000 Cycles (Second Half)	Pass	No Damage
Air Infiltration (ASTM E 283)		
Chamber Pressure, Pa (psf)	+300 (+6.24)	+300 (+6.24)
L/s/m^2 (cfm/ft^2)	0.05 (.01)	0.5 (.10) maximum

(The tested specimen meets or exceeds the performance levels specified in 101/I.S.2/A440-08 for air infiltration.)

EAR-CONTROLLED DATA

TEST RESULTS (CON'T):

	ACTUAL	REQUIREMENTS
Cyclic Water Penetration (ASTM E 547)		
Chamber Pressure, Pa (psf)	+720 (15.04)	+580 (12.11)
Duration, minutes	5	5
Cycles	4	4
Water Penetration	Pass	No water shall flow over interior face.
Static Water Penetration (ASTM E 331)		
Chamber Pressure, Pa (psf)	+580 (12.11)	+580 (12.11)
Duration, minutes	15	15
Cycles	1	1
Water Penetration	Pass	No water shall flow over interior face.
Uniform Load Deflection (ASTM E 330)		
Chamber Pressure, Pa (psf)	+3840 (+80)	+3840 (+80)
Duration, sec.	10.00	10.00
Unsupported Span, mm (in.)	1346 (53)	----
Deflection, mm (in.)	0.48 (.019)	<L/175= 4.03 (.159) max
Chamber Pressure, Pa (psf)	-3840 (+80)	-3840 (+80)
Duration, sec.	10.00	10.00
Deflection, mm (in.)	0.22 (.009)	<L/175= 4.06 (.160) max
Air Infiltration (ASTM E 283)		
Chamber Pressure, Pa (psf)	+300 (+6.24)	+300 (+6.24)
$L/s/m^2$ (cfm/ft^2)	0.03 (<.01)	0.5 (.10) maximum

(*The tested specimen meets or exceeds the performance levels specified in 101/I.S.2/A440-11 for air infiltration.)*

Cyclic Water Penetration (ASTM E 547)		
Chamber Pressure, Pa (psf)	+580 (12.11)	+580 (12.11)
Duration, minutes	5	5
Cycles	4	4
Water Penetration	Pass	No water shall flow over interior face.
Static Water Penetration (ASTM E 331)		
Chamber Pressure, Pa (psf)	+580 (12.11)	+580 (12.11)
Duration, minutes	15	15
Cycles	1	1
Water Penetration	Pass	No water shall flow over interior face.
Uniform Load Structural (ASTM E 330)		
Chamber Pressure, Pa (psf)	+5760 (+120.38)	+5760 (+120.38)
Duration, sec.	10.00	10.00
+Permanent Set, mm (in.)	0.17 (.007)	<0.2%L = 2.69 (.106) max
Chamber Pressure, Pa (psf)	-5760 (+120.38)	-5760 (+120.38)
Duration, sec.	10.00	10.00
- Permanent Set, mm (in.)	0.09 (.004)	<0.2%L = 2.69 (.106) max

EAR-CONTROLLED DATA

TEST RESULTS (CON'T):

	ACTUAL	REQUIREMENTS
Forced Entry Test Grade 40 (ASTM F 588)		
Type B	No Entry	No Entry
Sash/Leaf Torsion Test (NAFS/11: 7.3.4.2)		
Concentrated Load, N (lbs.)	70 (15.74)	70 (15.74)
Duration, sec.	10.00	10.00
Deflection, mm (in.)	2.36 (0.093)	<43.69 (1.72)
Sash/Leaf Concentrated Load Test (NAFS/11: 9.3.6.4.3)		
Perpendicular Concentrated Load, N (lbs.)	135 (30.35)	135 (30.35)
Duration, sec.	60.00	60.00
Deflection, mm (in.)	0.51 (0.020)	<1.50 (0.06)

TEST PROCEDURE:

The tests were conducted in accordance with ASTM and AAMA/WDMA/CSA101/I.S.2/A440-11 test procedures and the results were compared to the performance requirements.

REMARKS:

Detailed assembly drawings showing wall thickness of all members, corner construction and hardware application are on file and have been compared to the sample submitted. A test sample will be retained at the test laboratory.

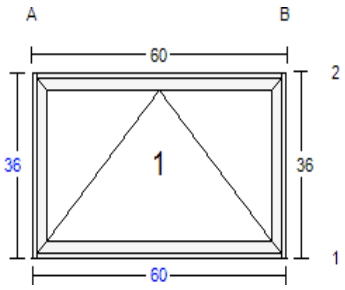
The above results were secured by using the designated test methods and indicate compliance with the performance requirements of the referenced specifications, except if noted above. This report does not constitute certification of this product which may only be granted by a Validator.

The detailed drawings and representative samples of the tested window will be held in the laboratory for a period of four (4) years.

8/25/2016

Elevation Detail

Manufacturer : Manko Window Systems, Inc.
Job Name : test
Job ID : 61405
Elevation Name : A1
Qty : 1
Series : 2727i AW80
Finish : Anodized
Color : Clear Cl 1
Stack : Vertical
Dimension Ref. : Frame Size
Elevation Width : 60"
Elevation Height : 36"



* Extrusions *

Category		Part Code - Color	Qty	Length	Fabrication	Location
Window 1	60" X 36"					
HSTOP	Glass Stop	MWK3634 - Clear Cl 1	2	54 3/4"	||	A 1
VSTOP	Glass Stop	MWK3634 - Clear Cl 1	2	29 1/4"	||	A 1
HEAD	2 3/4" Perimeter	MWK7601 - Clear Cl 1	1	58 1/4"	**	A 2
SILL	2 3/4" Perimeter	MWK7601 - Clear Cl 1	1	58 1/4"	**	A 1
JAMB	2 3/4" Perimeter	MWK7601 - Clear Cl 1	1	36"	OO	A 1
JAMB	2 3/4" Perimeter	MWK7601 - Clear Cl 1	1	36"	OO	B 1
VHEAD	PO Vent	MWK8110 - Clear Cl 1	1	58"	/\	A 1
VSILL	PO Vent	MWK8110 - Clear Cl 1	1	58"	/\	A 1
VJAMB	PO Vent	MWK8110 - Clear Cl 1	2	34"	/\	A 1

* Sundries *

Category	Part Code	Description	Total Length
GASKET	CP389	Bulb Rubber	30' 8"
GASKET	R100	R100 Glazing Gasket	14'
GASKET	SM390	1/8" X 1/2" Glazing Tape / Heal Bead	14'
SCREWS	FRS-5	#8 X 1 PPH SMS TYPE A Z	8
STBL	SB-1	3/8 X 1 1/4 X 2 Setting Block	8

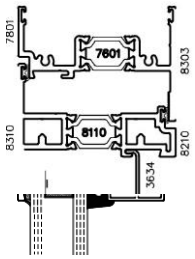
* Glass *

Description	Lite	Qty	Width	Height
Glazing ID : 1	A 1	1	54 1/4"	30 1/4"

1" Insulated Glass (A/A)
1/4" Clear (AN)
1/2" Tri-Seal Black Air Spacer
1/4" Clear (AN)
DSE + PIB Sealant

1

HEAD
2727i PO SERIES WINDOW



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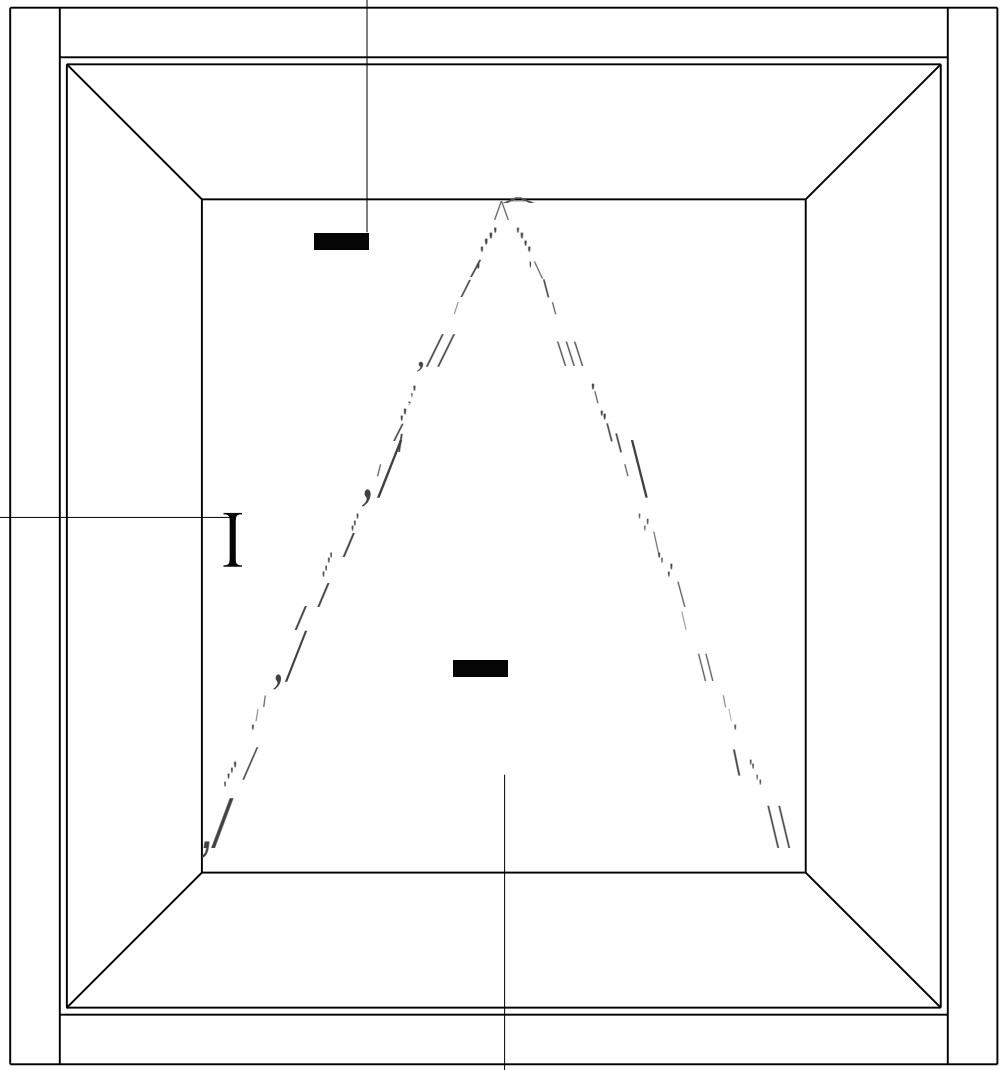
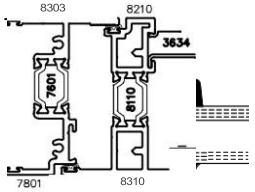
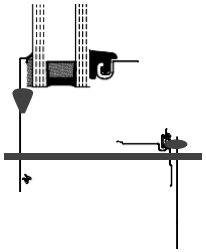




4B
2727i PO SERIES WINDOW

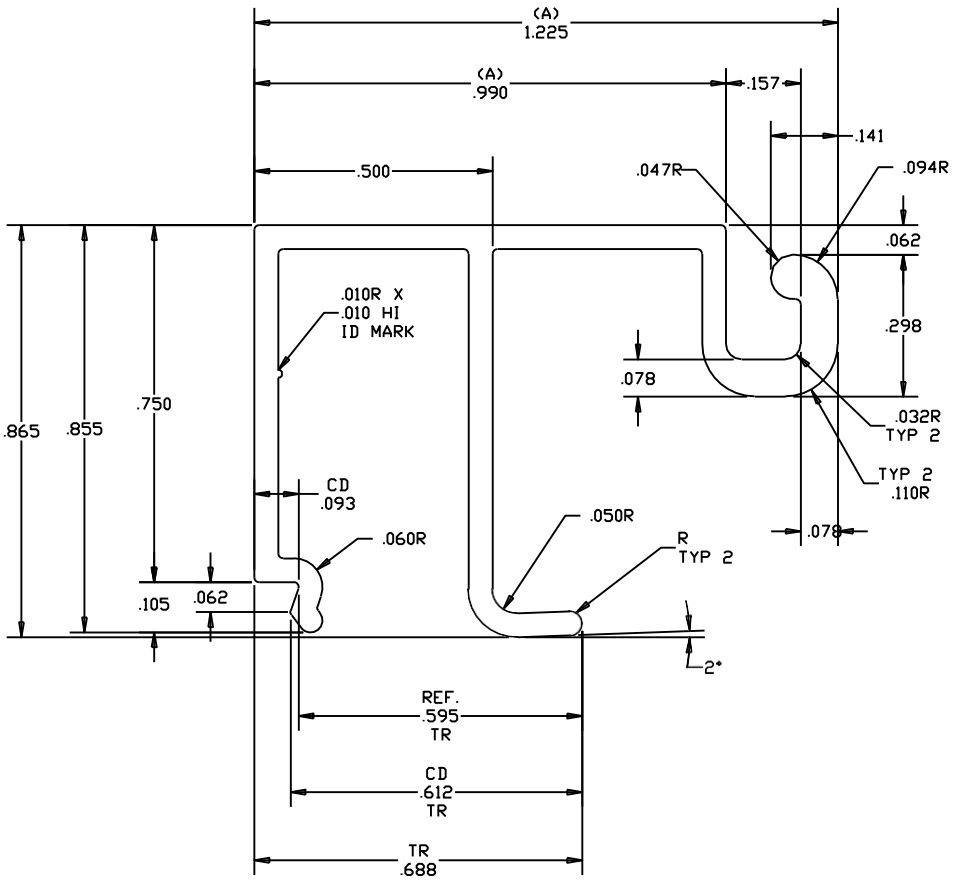


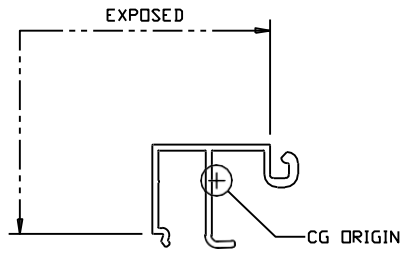
SILL
2727i PO SERIES WINDOW

2

ELEMENT PROJECT # ESP024202P.4 2727i Awning
Reviewed by: Brian Escherich

Standard Aluminum Association tolerances apply unless otherwise noted.			DIE NUMBER	REV
CUST PART #:	TITLE BLOCK: REV A	EUC	MWK-3634	A
CUST PART NAME: GLASS STOP	DIM AND TOL BLOCK REMOVED	103		
PROPOSAL: REL. DATE 03-15-05 TMB	ALLOY 6063-T6		FINISH PAINT, ANOD.	





ACTUAL SIZE

WARRANTY:
Bonnell warrants that the product(s) supplied by Bonnell shall be free from defects in workmanship and material and shall conform to all descriptions and specifications, as agreed between Bonnell and Purchaser. BONNELL DISCLAIMS ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WHETHER CREATED BY CONTRACT, BY STATUTE OR OTHERWISE BY OPERATION OF LAW, INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
PURCHASER'S DESIGNS, PLANS, DRAWINGS, SPECIFICATIONS AND REQUIREMENTS:
For any product that is not included in Bonnell's standard product line offered for sale generally in the usual course of Bonnell's business, it is agreed that Purchaser has engaged Bonnell to manufacture such product to Purchaser's specifications and requirements. Bonnell shall not be responsible for the adequacy of prints, drawings, specifications and requirements respecting such product or for the adequacy of the design represented thereby. Bonnell also shall not be responsible for the adequacy of the materials incorporated in such product or for testing or otherwise determining the sufficiency and applicability of the design. Bonnell shall not be responsible for determining or assuring that such product or the use or application of such product conforms with applicable federal, state or local laws, rules or regulations. Bonnell's only warranty with respect to such products shall be as set forth above: All Designs, plans, prints, or drawings of whatever kind prepared by Bonnell with respect to such products are and shall remain the sole property of Bonnell.

REV	DESCRIPTION OF REVISION	DATE	BY
A	1.225 WAS 1.125, .990 WAS.890	01-29-07	TMB

6WDQGDUG 1RPLQDO :DOO 7KLFNQHVV 7ROHUDQFH &KDUW "

for Circumscribing Circle Sizes Less than 10 inches					
Up thru 0.124	.006	0.250 - 0.499	.008	0.750 - 0.999	.010
0.125 - 0.249	.007	0.500 - 0.749	.009	follows 10% .010 min .060 max	

Structural values estimated for reference only.

Ix:	.0050	x 10^6 mm^4	.012 in^4	Iy:	.0133	x 10^6 mm^4	.032 in^4
Sx:	.350	x 10^3 mm^3	.021 in^3	Sy:	.770	x 10^3 mm^3	.047 in^3
CGx:	14.27 mm		.562 in	CGy:	17.30 mm		.681 in

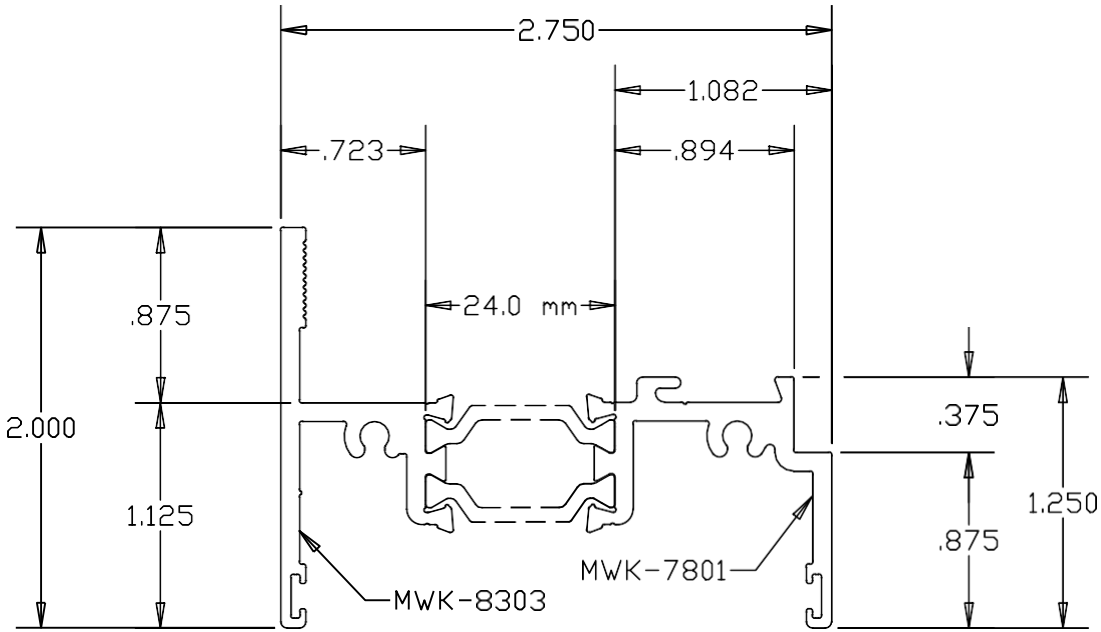
MWK-3634

15108
MANKO WINDOW SYSTEMS, INC.
800 HAYES DRIVE
P.O. BOX 1403
MANHATTAN KS 66502

BONNELL ALUMINUM

UNSPECIFIED WALLS:	1.27 mm	MASS:	.343 kg/m		.230 lb/ft
	.050 in	EST PER:	182.42 mm		7.182 in
UNSPECIFIED RADII:	.41R mm	OUT PER:	mm		in
	.016R in	EXP PER:	mm		in
DATE:	2/15/05	BUFF PER:	mm		in
DRAWN:	TMB	BUFF TURNS:		CLASS:	Solid
SCALE:	4-1	FACTOR:	532 metric		31 imperial
THM BAR:	NO	C.C.D.:	35.16 mm		1.384 in
P&D CODE:	NO	P&D AREA:	mm^2		in^2

6WDQGDUG IRPLQDO :DOO 7KLFNQHVV 7ROHUDQFH &KDUW "						ELEMENT PROJECT # ESP024202P.4 2727i Awning			DIE NUMBER	REV
for Circumscribing Circle Sizes Less than 10 inches						CUST PART #: Reviewed by: Brian Escherich			MWK-7601	
Up thru 0.124	.006	0.250 - 0.499	.008	0.750 - 0.999	.010	CUST PART NAME:				
0.125 - 0.249	.007	0.500 - 0.749	.009	hollows 10% .010 min .060 max		PROPOSAL:		ALLOY	FINISH	



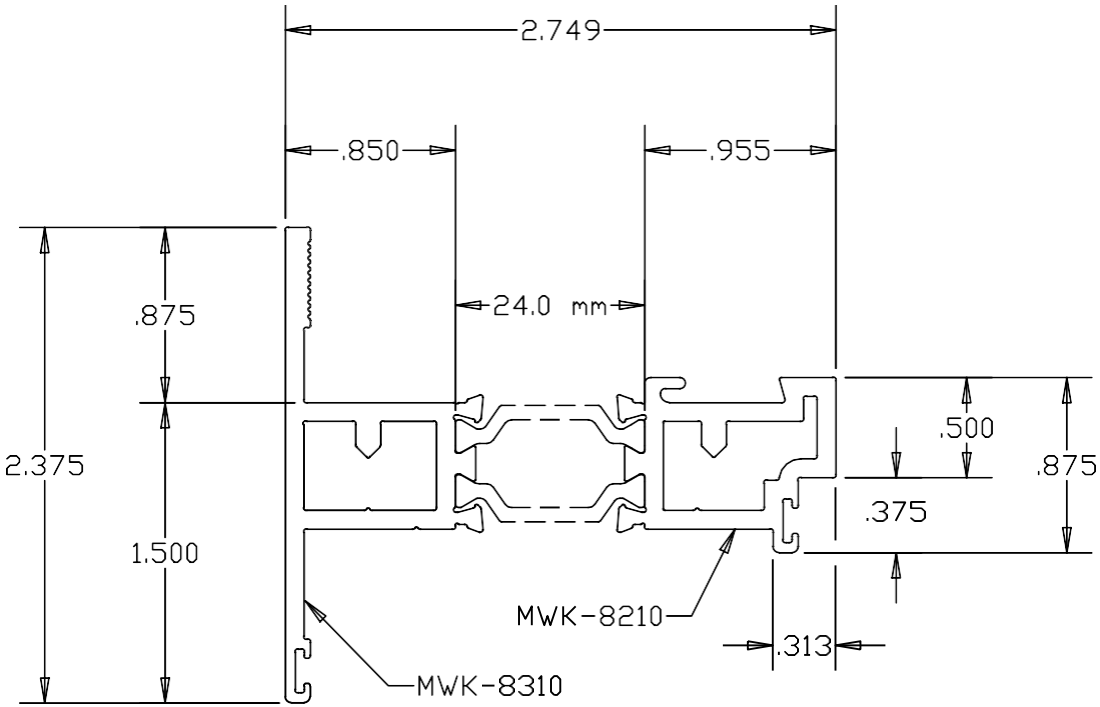
APPLICATION:
ASSEMBLY OF MWK-8303 AND MWK-7801 TO FORM MWK-7601

MWK-7601

MANKO
WINDOW SYSTEMS, INC.
800 HAYES DRIVE, MANHATTAN, KS 66502
PHONE (785) 776-9643 (800) 642-1488
FAX (785) 776-9644

UNSPECIFIED WALLS:	mm / in	MASS:	kg/m		lb/ft
		EST PER:	mm		in
UNSPECIFIED RADII:	mm / in	OUT PER:	mm		in
		EXP PER:	mm		in
DATE:	11/12/13	BUFF PER:	mm		in
DRAWN:	JP	BUFF TURNS:	CLASS:		
SCALE:		FACTOR:	metric		imperial
THM BAR:		C.C.D.:	mm		in
P&D CODE:		P&D AREA:	mm^2		in^2

6WDQGDUG IRPLQDO :DOO 7KLFNQHVV 7ROHUDQFH &KDUW "						ELEMENT PROJECT # ESP024202P.4 2727i Awning			DIE NUMBER	REV
for Circumscribing Circle Sizes Less than 10 inches						CUST PART #: Reviewed by: Brian Escherich			MWK-8110	
Up thru 0.124	.006	0.250 - 0.499	.008	0.750 - 0.999	.010	CUST PART NAME:				
0.125 - 0.249	.007	0.500 - 0.749	.009	hollows 10% .010 min .060 max		PROPOSAL:		ALLOY	FINISH	



APPLICATION:
ASSEMBLY OF MWK-8310 AND MWK-8210 TO FORM MWK-8110

MWK-8110

MANKO
WINDOW SYSTEMS, INC.
800 HAYES DRIVE, MANHATTAN, KS 66502
PHONE (785) 776-9643 (800) 642-1488
FAX (785) 776-9644

UNSPECIFIED WALLS:	mm		MASS:	kg/m	lb/ft
	in		EST PER:	mm	in
UNSPECIFIED RADII:	mm		OUT PER:	mm	in
	in		EXP PER:	mm	in
DATE:	11/12/13		BUFF PER:	mm	in
DRAWN:	JP		BUFF TURNS:	CLASS:	
SCALE:			FACTOR:	metric	imperial
THM BAR:			C.C.D.:	mm	in
P&D CODE:			P&D AREA:	mm^2	in^2

KEYSTONE CERTIFICATIONS, INC.
564 OLD YORK ROAD, SUITE 5
ETTERS, PA 17319 / PHONE 717-932-8500

Notice of Product Certification Authorization

National Fenestration Rating Council

Issued To:

Manufacturer: Manko Window Systems
Address: 800 Hayes Drive
Manhattan KS 66502
Man'f Code MWS
Cert Date: 5/4/2012

Certification Number
8385
Product Line Number
MWS - K - 028
Revision Date
12/19/2016

The Following NFRC Product Line Has Been Authorized For Certification:

Model / Series: 2727i Project Out Awning
Operator Type: PRAW
Frame Type: AT
Sash Type: AT
Exp. Date: 10/7/2021

Ratings Authorized For Certification:

Rating	Property	Authorized
NFRC 100	U-factor	☑
NFRC 200	Solar Heat Gain Coefficient	☐
NFRC 200	Visible Light	☑
NFRC 400	Air Leakage	
NFRC 500	Condensation Resistance	

Fenestration products are not NFRC Certified unless manufactured and labeled in accordance with the current version of NFRC-700, Product Certification Program requirements.

This is a cover sheet for an NFRC Certification Authorization Report (CAR)

the corresponding CAR may be downloaded for printing at www.nfrc.org.

The Manufacturer is authorized to label the options listed in the corresponding CAR

Please notify Keystone of any errors or omissions within 10 days of receipt.

Due diligence was used in authorizing these products for certification. By accepting this report the licensee agrees to hold harmless and indemnify Keystone Certifications, Inc. from all claims or liabilities which may arise based on this certification authorization. Certification authorization is based on NFRC program requirements and simulation and test reports from accredited laboratories.

New Project 151

Glazing Type in project out window

Make-up Name	Glass 1 & Coating	Glass 2 & Coating	Visible Light			Solar Energy			Thermal Properties		Embodied CO_2
			Transmittance	Reflectance		Transmittance	Reflectance	Solar Heat Gain Coefficient (SHGC)	U-Value		[eq. kg/m²] A1-A3
			Visible (τ_V %)	ρ_V % out	ρ_V % in	Solar (τ_e %)	ρ_e % out		Winter Night (Btu/hr·ft²·F)	Summer Day (Btu/hr·ft²·F)	
TRIPLE PANE SNX62/27	Guardian Clear Glass (North America)	SunGuard® SNX 62/27 (North America) on Guardian Clear Glass (North America)	43	14	12	14	43	0.29	0.185	0.194	53.12

Calculation Standard: NFRC 2010

TRIPLE PANE SNX62/27

Outdoors

GLASS 1	Guardian Clear Glass (North America) Thickness = 1/4" (6mm)	#1 ----- #2 -----
GAP 1	100% Air, 3/8" (9.5mm)	
GLASS 2	Guardian Clear Glass (North America) Thickness = 1/4" (6mm)	#3 SunGuard® SNX 62/27 (North America) #4 -----
GAP 2	100% Air, 3/8" (9.5mm)	
GLASS 3	Guardian Clear Glass (North America) Thickness = 1/4" (6mm)	#5 SunGuard® SNX 62/27 (North America) #6 -----

Total Unit (Nominal) = 1 1/2 in Slope = 90° Window Height = 1 meter

Estimated Nominal Glazing Weight: 8.62 lb/ft²

Indoors

Important Notes

Calculations and terms in this report are based on NFRC 2010. The performance values shown above represent nominal values for the center of glass with no spacer system or framing.

Embodied CO2 [eq. kg/m2] A1-A3 is estimated based on material Embodied Carbon Factor (ECF), derived from Guardian Glass Regional third-party independently verified and published / current Environmental Product Declarations (EPDs) which are produced to EN 15804 and are compliant with the requirements of ISO 14044, the International Life Cycle Assessment (LCA) standard, and ISO 14025 and ISO 21930, the international standards covering EPD for construction products. The A1–A3 ECF is an estimate of the embodied carbon due to production of that material. The resulting material value should then be multiplied by the square area of glazing to provide an estimate of embodied carbon of the material at the project scale. Embodied CO2 estimates provided by Guardian represent only values associated with the glass components manufactured by Guardian. The estimated values do not represent in any way a plant-specific and/or product specific guarantee.

Laminated products:
The Performance Calculator allows the user to model a wide variety of laminated glass makeups using different float glass substrates, coatings and interlayer material, including those makeups where the coating faces the interlayer. It is the user's

responsibility to assess whether the laminated glass makeup meets relevant regional standards and complies with applicable laminated glass safety regulations.

In addition, when the laminated glass makeup includes a coating facing the interlayer material, there may be a loss of thermal insulation performance and a color change compared to non-embedded coated class.

Non-specular products (translucent or diffuse):
The performance measurement for non-specular (translucent or diffuse) materials such as translucent interlayers or acid etched glass surface, or surface with ceramic frit is limited by the current experimental technologies. Since measurements capture physically only a part of the resulting radiation, calculated performance results provided herein and based on such measurements are not compliant with any standard (including EN 410) and may only be used as a general reference. Actual values may vary significantly based upon exact fabrication process, as well as type, thickness and color of used non-specular material.

Please note that the Thermal Stress Guideline is only a general guide to the thermal safety of a glazing, and it is not a replacement for detailed thermal stress analysis.

Explanation of Terms

Visible Light Transmittance (Tv, %) is the percentage of incident light in the wavelength range of 380 nm to 780 nm that is transmitted by the glass.

Ultraviolet (UV) Transmittance (Tuv, %) is the percentage of the incident solar radiation transmitted by the glazing in the 300 nm to 380 nm range.

Solar Energy Direct Transmittance (Te, %) is the percentage of incident solar energy in the wavelength range of 300 nm to 2500 nm that is directly transmitted by the glass.

Visible Light Reflectance Outdoors/Indoor (Rv out/in, %) is the percentage of incident visible light directly reflected by the glass.

Solar Direct Reflectance Outdoors/Indoors (Re out/in, %) is the percentage of incident solar energy directly reflected by the glass.

Solar Energy Absorptance (Ae, %) is the percentage of the sun's energy that is absorbed by glass.

U-Value is the glazing parameter that characterizes the heat transfer through the central part of the glazing, i.e. without edge effects, and expresses the steady-state density of heat transfer rate per temperature difference between the environmental temperatures on each side. US Standard units are Btu/hr·ft²·F and SI / Metric units are W/m2 K.

Relative Heat Gain (RHG) is the total net heat gain to the indoors due to both the air-to-air thermal conductance and the solar heat gain. US Standard units are Btu/hr.ft² and SI / Metric units are W/m².

Shading Coefficient (sc) is Solar Factor divided by 0.87. It is a measure of the solar heat gain referenced to 3 mm clear glass which has the designated value of 1.00.

Solar Heat Gain Coefficient (SHGC) is the sum of the solar direct transmittance and the secondary heat transfer factor of the glazing towards the inside, the latter resulting from heat transfer by convection and longwave IR-radiation of that part of the incident solar radiation which has been absorbed by the glazing.

Light-to-Solar Gain (LSG) is the ratio of visible light gain to solar gain. LSG = (Visible Transmittance) / (SHGC)

Color Rendering Index in transmission, D65 (R_a) is the change in color of an object as a result of the light being transmitted by the glass.

Weighted Sound Reduction Index (Rw) is a single-number quantity which characterizes the airborne sound insulation of a material or building element over a range of frequencies.

Sound Transmission Class (STC) is a single-number quantity which characterizes the airborne sound insulation of a material or building element over a range of frequencies.

Disclaimer

This performance analysis is provided for the limited purpose of assisting the user in evaluating the performance of the glass products identified on this report.

Spectral data for products manufactured by Guardian reflect nominal values derived from typical production samples or CE Initial Type Testing and subject to variations due to manufacturing and calculation tolerances. Spectral data for products not manufactured by Guardian were derived from the LBNL International Glazing Database and have not been independently verified by Guardian. Guardian recommends a full-size mock-up be approved.

The values provided herein are generated according to established engineering practices and applicable calculation standards. Many factors may affect glazing characteristics, including glass size, building orientation, shading, wind speed, type of installation, production process and others. The applicability and results of the analysis are directly related to user inputs and any changes in actual conditions can have a significant effect on the results. It is the responsibility of the users of the analysis to ensure that the intended application is appropriate and complies with all relevant laws, regulations, standards, codes of practices, processing guidelines and other requirements. Guardian makes no guarantee that any glazing modeled herein is available from Guardian or any other manufacturer. The user has the responsibility to check with the manufacturer regarding availability of any glass type or make-up.

While Guardian has made a good faith effort to verify the reliability of the tools used for this analysis, they may contain unknown programming errors that could result in inaccurate results. The user assumes all risk relating to the results provided and is solely responsible for selection of appropriate products for user's application. Guardian makes no express or implied warranty of any kind with respect to the tools used by Guardian and this analysis. There are no warranties of merchantability, non-infringement or fitness for a particular purpose with respect to the tools used by Guardian and this analysis and no warranty shall be implied by operation of law or otherwise. The only warranties applicable to Guardian products are those separately provided in writing for each product. In no event shall Guardian be liable for direct, indirect, special, consequential or incidental damages of any kind relating to or resulting from use of Guardian tools and analyses.

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Program Version: 4.1.0.9850
Database Version: 20240326