

SECTION 085113 ALUMINUM WINDOWS

This suggested guide specification has been developed using the current edition of the Construction Specifications Institute (CSI) "Manual of Practice," including the recommendations for the CSI 3 Part Section Format and the CSI Page Format. Additionally, the development concept and organizational arrangement of the American Institute of Architects (AIA) MASTERSPEC Program has been recognized in the preparation of this guide specification. Neither CSI, AIA, USGBC nor ILFI endorse specific manufacturers and products. The preparation of the guide specification assumes the use of standard contract documents and forms, including the "Conditions of the Contract," published by the AIA.

PART 1 - GENERAL

1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 Summary

- A. Section includes Kawneer Architectural Aluminum Windows including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of window units.
 - 1. Types of aluminum windows include:
 - a. Kawneer Series 526 Thermal Windows
 - b. Project-In or Project-Out Window
 - c. 2-1/4" (57.2 mm) frame depth
 - d. Project-In: CW-PG70-AP
 - e. Project-Out: CW-PG45-AP

EDITOR NOTE: BELOW RELATED SECTIONS ARE SPECIFIED ELSEWHERE HOWEVER KAWNEER RECOMMENDS SINGLE SOURCE RESPONSIBILITY FOR ALL OF THESE SECTIONS AS INDICATED IN PART 1.6 QUALITY ASSURANCE.

B. Related Sections:

- 1. 072700 "Air Barriers"
- 2. 079200 "Joint Sealants"
- 3. 083213 "Sliding Aluminum-Framed Glass Doors"
- 4. 084113 "Aluminum-Framed Entrances and Storefronts"
- 5. 084313 "Aluminum-Framed Storefronts"
- 6. 084329 "Sliding Storefronts"
- 7. 084413 "Glazed Aluminum Curtain Walls"
- 8. 084433 "Sloped Glazing Assemblies"
- 9. 086300 "Metal-Framed Skylights"

1.3 Definitions

- A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.4 Performance Requirements

- A. General Performance: Aluminum-framed window system shall withstand the effects of the following performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Window Performance Requirements:
 - 1. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).
 - a. Performance Class and Grade: Project-In: CW-PG70-AP.
 - b. Performance Class and Grade: Project-Out: CW-PG45-AP.

EDITOR NOTE: AIR AND WATER PERFORMANCE RESULTS ARE BASED UPON ASTM AND AAMA STANDARDS FOR WINDOW SYSTEMS. CONSULT YOUR LOCAL KAWNEER REPRESENTATIVE CONCERNING SPECIFIC PROJECT PERFORMANCE REQUIREMENTS.

EDITOR NOTE: PROVIDE WIND LOAD DESIGN PRESSURES IN PSF AND INCLUDE APPLICABLE BUILDING CODE AND YEAR EDITION.

- 2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283 at a minimum window size of 48" x 32" (1219.2 x 812.8 mm). The air infiltration rate shall not exceed 0.10 cfm/ft² at a static air pressure differential of 6.2 psf (300 Pa).
- 3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 547 and ASTM E 331 at a minimum window size of 32" x 60" (1219.2 x 812.8 mm). There shall be no leakage as defined in the test method at a static air pressure differential of 12.11 psf (580 Pa).

4. Uniform Load Deflection:
 - a. Project-In: A minimum static air pressure difference of 70 psf (3352 Pa) shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member.
 - b. Project-Out: A minimum static air pressure difference of 45 psf (2155 Pa) shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member.
 5. Uniform Load Structural:
 - a. Project-In: A minimum static air pressure difference of 105 psf (5027 Pa) shall be applied in the positive and negative direction in accordance with ASTM E330. The unit shall be evaluated after each load.
 - b. Project-Out: A minimum static air pressure difference of 67.5 psf (3232 Pa) shall be applied in the positive and negative direction in accordance with ASTM E330. The unit shall be evaluated after each load.
 6. Component Testing: Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440.
 7. Energy Efficiency:
 - a. Thermal transmittance simulation results using NFRC 100 or AAMA 507 are based upon argon-filled 1" (25.4 mm) or 1-3/4" (44.4 mm) clear low-emissivity coated glass with warm edge spacer.
 - 1) Project-In: U-Factor not more than .42 BTU/hr/sf/°F or ____ BTU/hr/sf/°F per AAMA 507 or NFRC100 when using project specified glass.
 - 2) Project-Out: U-Factor not more than .45 BTU/hr/sf/°F or ____ BTU/hr/sf/°F per AAMA 507 or NFRC100 when using project specified glass.
 - b. Condensation Resistance Test (CRF): When tested in accordance with AAMA 1503, the condensation resistance factor (CRF) shall not be less than:
 - 1) Project-In: (CRF_f) not less than 58 with clear glass.
Project-In: (CRF_g) not less than 68 with clear glass.
 - 2) Project-Out: (CRF_f) frame not less than 58 with clear glass.
Project-Out: (CRF_g) glass not less than 61 with clear glass.
 8. Condensation Index (I): When tested to CSA A-440.2, the condensation index shall not be less than:
 - a. 1" insulating glass made with exterior 3/16" soft coat low E glass, therm-oplastic butyl spacer, argon gas, and interior 3/16" clear glass:
Project-In: Temperature Index (I_f) frame not less than 47.
Project-In: Temperature Index (I_g) glass not less than 66.
 - b. 1" insulating glass made with exterior 3/16" soft coat low E glass, therm-oplastic butyl spacer, argon gas, and interior 3/16" clear glass:
Project-Out: Temperature Index (I_f) frame not less than 53.
Project-Out: Temperature Index (I_g) glass not less than 57.
 9. Operating window air tightness shall meet the A3 rating (less than 0.10 cfm/ft (0.55 (m³/h)/m) at 1.57 psf (75 Pa)) when tested in accordance with CAN/CSA-A440 Windows.
 10. Operating window water tightness shall meet the B5 rating (no water leakage at 10.4 psf (500 Pa)) when tested in accordance with CAN/CSA-A440 Windows.
 11. Wind load resistance for operating windows shall meet the C5 rating when tested with configurations in accordance with CAN/CSA-A440 Windows.
 12. Operating windows shall meet performance criteria for ease of operation, sash strength and stiffness in accordance with CAN/CSA-A440 Windows.
 13. The thermal transmittance (U-Factor) of the window when tested in accordance with CAN/CSA A440.2 shall be:

Project-In	U = 0.43 BTU/hr · ft ² · F (2.4 W/m ² · °C)
Project-Out	U = 0.42 BTU/hr · ft ² · F (2.4 W/m ² · °C)

(Note to Specifier: Thermal performance depends on glass specified. Above tests were performed using 25mm double glazed insulated glass unit with 0.10 low emissivity coating on surface 3, argon gas filled interspace and a thermally broken aluminum glazing spacer.)
Test size 4 ft x 6 ft (1219 mm x 1829 mm).
 14. The condensation index of the frame when tested in accordance with CAN/CSA-A440 Windows shall be:

Project-In	I _f = 55
Project-Out	I _f = 60
 15. Forced Entry Resistance: All windows shall conform to ASTM F588, Grade 10.
 16. Thermal Barrier Test: Thermal break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- C. Environmental Product Declarations (EPD): Shall have a Type III Product-Specific EPD created from a Product Category Rule.

1.5 Submittals

EDITOR NOTE: ADD RECYCLED CONTENT SECTION IF REQUIRED TO MEET PROJECT REQUIREMENTS AND/OR GREEN BUILDING CERTIFICATIONS SUCH AS LEED, LIVING BUILDING CHALLENGE (LBC), ETC. ARE REQUIRED.

*** IF RECYCLED CONTENT REQUIREMENTS ARE NOT SPECIFIED - PRIME (ZERO RECYCLED CONTENT) ALUMINUM COULD BE SUPPLIED.**

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.
 - 1. Recycled Content:
 - a. Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific information that will be provided after product shipment.
 - b. Once product has shipped, provide project specific recycled content information, including:
 - 1) Indicate recycled content; indicate percentage of pre- and post-consumer recycled content per unit of product.
 - 2) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 - 3) Indicate location recovery of recycled content.
 - 4) Indicate location of manufacturing facility.
 - 2. Environmental Product Declaration (EPD):
 - a. Include a Type III Product-Specific EPD created from a Product Category Rule.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances and installation details.
- C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.
- D. Samples for Verification: For aluminum windows and components required.
- E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.

1.6 Quality Assurance

- A. Installer Qualifications: An installer which has had successful experiences with installation of the same or similar units required for this project and other projects of similar size and scope.
- B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
- C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup for type(s) of window(s) indicated, in location(s) shown on Drawings.
- F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 Project Conditions

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 Warranty

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
 - 1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

Laws and building and safety codes governing the design and use of Kawneer products, such as glazed entrance, window, and curtain wall products, vary widely. Kawneer does not control the selection of product configurations, operating hardware, or glazing materials, and assumes no responsibility therefor.

Kawneer reserves the right to change configuration without prior notice when deemed necessary for product improvement.
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PART 2 - PRODUCTS**2.1 Manufacturers**

- A. Basis-of-Design Product:
1. Kawneer Company Inc.
 2. Series 526 Thermal Windows - Project-In or Project-Out
 3. 2-1/4" (57.2 mm) frame depth
 4. Project-In: CW-PG70-AP
 5. Project-Out: CW-PG45-AP

EDITOR NOTE: PROVIDE INFORMATION BELOW INDICATING APPROVED ALTERNATIVES TO THE BASIS-OF-DESIGN PRODUCT.

- B. Subject to compliance with requirements, provide a comparable product by the following:
1. Manufacturer: (_____)
 2. Series: (_____)
 3. Profile dimension: (_____)
 4. Performance Grade: (_____)
- C. Substitutions: Refer to Substitutions Section for procedures and submission requirements.
1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
 2. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid window installation and construction delays.
 3. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
 4. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for window system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum windows for a period of not less than ten (10) years. (Company Name)
 5. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
 6. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.
- D. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 Materials

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and sash members.

EDITOR NOTE: ADD RECYCLED CONTENT SECTION IF REQUIRED TO MEET PROJECT REQUIREMENTS AND/OR GREEN BUILDING CERTIFICATIONS SUCH AS LEED, LIVING BUILDING CHALLENGE (LBC), ETC. ARE REQUIRED.

*** IF RECYCLED CONTENT REQUIREMENTS ARE NOT SPECIFIED - PRIME (ZERO RECYCLED CONTENT) ALUMINUM COULD BE SUPPLIED.**

1. Recycled Content: Shall have a minimum of 50% mixed pre- and post-consumer recycled content.
 - a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
 - b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 - c. Indicate location recovery of recycled content.
 - d. Indicate location of manufacturing facility.
- B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.3 Window System

- A. 526 Thermal Windows

EDITOR NOTE: IF RAIN SCREEN WINDOW IS REQUIRED, ADD THE FOLLOWING:

- B. All glazing pockets shall be vented, pressure equalized and drained to the exterior.
- C. Elastomeric air seal gasket shall be installed around the full perimeter of glass and sealed at corners with silicone sealant. Air seal gasket must provide adhesion with silicone sealant.

2.4 Glazing

- A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.
- B. Glazing System: Glazing method shall be a wet/dry type in accordance with manufacturer's standards. Exterior glazing shall be silicone back bedding sealant. Interior glazing shall be snap-in type glazing beads with an interior gasket in accordance with AAMA 702 or ASTM C864.

2.5 Hardware

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash weight and dimensions.
- B. Project-In Window: Provide the following operating hardware:
 - 1. 4-Bar Hinges
 - 2. Cast White Bronze Cam Locks (Standard)
 - 3. Weep Covers

EDITOR NOTE: INCLUDE OPTIONAL HARDWARE BASED ON PROJECT REQUIREMENTS.

- 4. Access Control Locks
- 5. Pole Ring
- 6. Rainscreen Sash

- C. Project-Out Window: Provide the following operating hardware:
 - 1. 4-Bar Hinges
 - 2. Cast White Bronze Cam Locks (Standard)
 - 3. Weep Covers

EDITOR NOTE: INCLUDE OPTIONAL HARDWARE BASED ON PROJECT REQUIREMENTS.

- 4. Access Control Locks
- 5. Pivot Shoe Operator
- 6. Loose Rivet 4-Bar Hinges
- 7. Hook Lock Handle
- 8. Rainscreen Sash

2.6 Accessories

- A. Insect Screens: Insect screen frames shall be extruded aluminum finished to match window frame and rigidly joined at the corners. Screen shall be 18 x 16 glassfiber mesh. Splines shall be extruded elastomer removable to permit re-screening.

2.7 Fabrication

- A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fit joints; make joints flush, hairline and weatherproof.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- B. Window framing shall be designed for screw spline corner construction. Operating sash extrusions shall be tubular with mitered, clip, adhesive, stake joint construction. All framing joints shall be sealed to provide neat weathertight connections.
- C. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- D. Fabricate aluminum windows that are re-glazable without dismantling sash or framing.
- E. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact. Thermal barriers shall be designed in accordance with AAMA TIR A8.
 - 1. Frame thermal barrier shall be Kawneer IsoPort® with a minimum of ¼" (6mm) separation consisting of a one piece polyamide strip installed continuously and mechanically bonded to the aluminum.
- F. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.
- G. Sub frames: Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093-inch (2.4-mm) thick extruded aluminum. Miter or cope corners, and join with concealed mechanical joint fasteners. Finish to match window units. Provide sub frames capable of withstanding design loads of window units.

- H. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match frame.

2.8 Aluminum Finishes

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

EDITOR NOTE: CHOOSE THE APPROPRIATE FINISH BELOW BASED ON PROJECT REQUIREMENTS.

- B. Factory Finishing:
1. Kawneer Permanodic® AA-M10C21A44, AAMA 611, Architectural Class I Color Anodic Coating (Color _____).
 2. Kawneer Permanodic® AA-M10C21A41, AAMA 611, Architectural Class I Clear Anodic Coating (Color #14 Clear) (Optional).
 3. Kawneer Permanodic® AA-M10C21A31, AAMA 611, Architectural Class II Clear Anodic Coating (Color #17 Clear) (Standard).
 4. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating (Color _____).
 5. Kawneer Permادize® (50% PVDF), AAMA 2604, Fluoropolymer Coating (Color _____).
 6. Kawneer Permacoat™ AAMA 2604, Powder Coating (Color _____).
 7. Other: Manufacturer _____ Type _____ Color _____.

PART 3 - EXECUTION

3.1 Examination

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.
1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
 3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
 4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Installation

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Install aluminum framed window system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- D. Install aluminum framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.
- E. Separate aluminum from dissimilar materials to prevent corrosion or electrolytic action at points of contact.

3.3 Adjusting, Cleaning, And Protection

- A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.
- B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

DISCLAIMER STATEMENT

This guide specification is intended to be used by a qualified construction specifier. The guide specification is not intended to be verbatim as a project specification without appropriate modifications for the specific use intended. The guide specification must be used and coordinated with the procedures of each design firm, and the particular requirements of a specific construction project.

END OF SECTION 085113

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