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 nor AIA 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 AA™4325 Ultra Thermal Windows
      b. Project-In and Project-Out Windows
      c. 3-1/4" (82.5 mm) frame depth
      d. AW-PG80-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 Manufactures 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: AW-PG80-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: after the AAMA 910 life cycle test, meet AAMA 101 standard of maximum 0.10 cfm/ft^2 when tested per ASTM E 283 at a static air pressure differential of 6.24 psf (300 PA).
   3. Water Penetration: after the AAMA 910 life cycle test, no uncontrolled water leakage when tested per ASTM E 547 and ASTM E 331 at a static air pressure differential of 15 psf (720 PA).
   4. Uniform Deflection: no more than L/175 when tested per ASTM E 330 at a static air pressure differential of 80 psf (3840 PA).
   5. Uniform Structural: window to be operable, and maximum .2% permanent deformation per member when tested per ASTM E 330 at a static air pressure differential of 120 psf (5748 PA).

6. Component Testing: Window components shall be tested in accordance with procedures described in ANSI AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).

7. Thermal Transmittance Test (U-Factor): When tested to AAMA specification 1503, AAMA 507 or NFRC 100 the thermal transmittance (U-Factor) shall not be more than:

EDITOR NOTE: SELECT FROM BELOW.

   a. 1" insulating glass:
      i. U-Factor not more than .44 BTU/hr/sf/°F per AAMA 1503 with exterior 3/16" soft coat low E glass, argon gas, and interior 3/16" clear glass.
      or
      ii. U-Factor not more than ____ BTU/hr/sf/°F per AAMA 507 or NFRC100 when using project specified glass.

   b. 1-3/4" triple insulating glass:
      i. U-Factor not more than .27 BTU/hr/sf/°F per AAMA 1503 with exterior 3/16" soft coat low E glass, thermo-plastic butyl spacer, argon gas, center 3/16" soft coat low E glass, thermo-plastic butyl spacer, argon gas, and interior 3/16" clear glass.
      or
      ii. U-Factor not more than ____ BTU/hr/sf/°F per AAMA 507 or NFRC100 when using project specified glass.

8. Condensation Resistance Test (CRF): When tested in accordance with AAMA 1503, the condensation resistance factor (CRF) shall not be less than:

EDITOR NOTE: SELECT FROM BELOW.

   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:
      (CRF_f) frame not less than 70.
      (CRF_g) glass not less than 66.

   b. 1-3/4" triple insulating glass made with exterior 3/16" soft coat low E glass, thermo-plastic butyl spacer, argon gas, center 3/16" soft coat low E glass, thermo-plastic butyl spacer, argon gas, and interior 3/16" clear glass:
      (CRF_f) frame not less than 76.
      (CRF_g) glass not less than 79.

9. Condensation Resistance (I): When tested to CSA A-440, the condensation index shall not be less than:

EDITOR NOTE: SELECT FROM BELOW.

   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:
      Temperature Index (I_f) frame not less than 63.
      Temperature Index (I_g) glass not less than 67.

   b. 1-3/4" triple insulating glass made with exterior 3/16" soft coat low E glass, thermo-plastic butyl spacer, argon gas, center 3/16" soft coat low E glass, thermo-plastic butyl spacer, argon gas, and interior 3/16" clear glass:
      Temperature Index (I_f) frame not less than 68.
      Temperature Index (I_g) glass not less than 79.

10. Windborne-Debris-Impact Resistance Performance: Shall be tested in accordance with ASTM E1886, information in ASTM E1996, and TAS 201/203.
    a. Large-Missile Impact: For aluminum-framed systems located within 30 feet (9.1 m) of grade (Project-Out only).
    b. Small-Missile Impact: For aluminum-framed systems located above 30 feet (9.1 m) of grade (Project-Out only).

11. Blast Mitigation Performance: Shall be tested or proven through analysis to meet ASTM F1642, GSA-TS01, and UFC 04-010.01 performance criteria.

    To meet UFC 04-010.01, B-3.1 Standard 10 for Windows and Skylights, the following options are available:
    a. Section B-3.1.1 Dynamic analysis
    b. Section B-3.1.2 Testing
    c. Section B-3.1.3 ASTM F2248 Design Approach

12. Forced Entry Resistance: All windows shall conform to ASTM F588, Grade 10.

13. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating 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: 33 (STC) and 26 (OITC).
    b. 1-3/4" triple insulating glass made with exterior 3/16" soft coat low E glass, thermo-plastic butyl spacer, argon gas, center 3/16" soft coat low E glass, thermo-plastic butyl spacer, argon gas, and interior 3/16" clear glass: 32 (STC) and 25 (OITC).

14. Thermal Barrier Tests: Testing shall be in general accordance with AAMA 505 Dry Shrinkage and Composite Thermal Cycling test procedure, AAMA TIR-A8, Structural Performance of Composite Thermal Barrier systems.

1.5 Submittals

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.

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.

B. Windows: warrant for two years against defects in material or workmanship under normal use.

C. Insulating glass units: warrant seal for five years **Contact Kawneer for other time frames** against visual obstruction from film formation or moisture collection between internal glass surfaces, excluding that caused by glass breakage or abuse.

D. Paint finish: PPG…

Enter the following for an AAMA 2605 70% fluoropolymer paint finish

1. Permafluor™ organic finish conforming to AAMA 2605: warrant for ten years against chipping, peeling, cracking, chalking, or fading.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Basis-of-Design Product:
1. Kawneer Series AA™4325 Ultra Thermal Windows - Project-In and Project-Out Windows
2. 3-1/4" (82.5 mm) frame depth
3. AW-PG80-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.

B. Thermal Barrier: Structural thermal break made with glass-reinforced nylon strips, (closed cell PVC foam strips) installed by the window manufacturer in the frame and vent members.

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

D. 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.

E. 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.

F. 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. Series AA™4325 Ultra Thermal Windows - Project-In and Project-Out.

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.

C. Glazing: Exterior extruded silicone gasket with 2-part structural silicone; 1" (25.4) insulating glass or 1-3/4" (44.5) triple insulating glass; Interior aluminum glazing bead; open cell foam encased in black thermoplastic elastomeric (TPE) gasket; glass description in paragraph 2.4; glazed by the window manufacturer.

D. Insulating Glass Units
   1. Materials
      a. Spacer: extruded thermoplastic butyl with integrated desiccant.
      b. Spacer color: black.
      c. Secondary seal: silicone.
      d. Air space fill: plain air [argon].
   2. Performance
      a. Dual-seal durability: conformance to ASTM E 2190; visible, permanent IGCC certification label.
      b. Other: **Enter U value, etc., information as required**
   3. Exterior glass lite
      a. Thickness: 1/8" [3/16"] [1/4"].
      b. Tint: clear [bronze] [gray].
      c. Type: annealed [tempered] [laminated *Enter interlayer and lite descriptions*].
      d. Coating: **consult your Kawneer representative**
   4. Center glass lite
      a. Thickness: 1/8" [3/16"] [1/4"]
      b. Tint: clear [pattern #62 obscure]
      c. Type: annealed [tempered] [laminated *Enter interlayer and lite descriptions*].
      d. Coating: **consult your Kawneer representative**
   5. Interior glass lite
      a. Thickness: 1/8" [3/16"] [1/4"].
      b. Tint: clear [pattern #62 obscure].

c. Type: annealed [tempered] [laminated *Enter interlayer and lite descriptions*].
6. Coating: **consult your Kawneer representative**

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. Projected Window Typical Hardware:

EDITOR NOTE: SELECT FROM BELOW.

C. Typical Hardware:
1. Locking
   a. Cast White Bronze Cam Locks (Standard)
   b. Single Handle Multi-Point Locks
   c. Access Control Locks
2. Hinging
   a. 4-Bar Hinges (Standard)
   b. Limit Stop
   c. Butt Hinges
   d. Friction Adjusters
3. Other
   a. Roto Operator
   b. Pole Ring
   c. Pole

2.6 Accessories

A. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, non-migrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

B. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

C. Sealants and joint fillers for joints at perimeter of window system as specified in Division 7 Section "Joint Sealants".

D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

EDITOR NOTE: BETWEEN THE GLASS MUNTIN FINISHES SHALL MATCH THE WINDOW UNLESS SPECIFIED OTHERWISE.

E. Muntins:
1. Material: extruded aluminum or roll-formed aluminum; with exposed surfaces finished to match window exterior and interior colors; concealed fasteners; designed for unrestricted expansion and contraction.
2. Design: muntin bar cross-section profile and material chosen from manufacturer's standards.
3. Patterns: grid patterns to be designated by architect.
4. Locations:
   a. Exterior and Interior.
   b. Internal: (Encapsulated between the two glass lites in the insulating glass unit to protect them from damage and dirt buildup).

F. Glazing: Factory glazing as required and specified in Division 8 Section "Glazing".

G. Accessories
1. Material: extruded aluminum; nominal .062" (1.57 mm) wall; with exposed surfaces finished to match window color and finish performance; concealed fasteners; required weatherseals; designed for unrestricted expansion and contraction.
2. Exterior: (wrap around panning;) (preset panning;) (two-piece mullion cover;) (two-piece head and jamb receptor with thermal break;) (subsill with thermal break and end dams sealed by the window manufacturer;) (sill cover;) (slip-on expanders).
3. Interior: (two-piece snap trim;) (stool cover).
4. Mullions: with thermal break; (integral: mounted between frame members;) (stack;) (offset stack;) (three-piece).

H. Insect Screens: full; field-mounted on interior with steel spring clips; handle-access *Enter wicket color choice: white, bronze, or black* wickets; 3/4" x 1-1/8" x .050" extruded tubular aluminum frame with finish to match window in color and performance; corners mitered, gusset reinforced, and crimped; 18 x 16 dark fiberglass [aluminum] mesh; PVC spline.

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. Frame and Vent: All members double tubular; corners mitered, double gusset reinforced, factory-sealed with sealant conforming to AAMA 800, and crimped.

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. Structural thermal break made with glass-reinforced nylon strips, (closed cell PVC foam strips) installed by the window manufacturer in the frame and vent members.

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. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).

I. 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 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating (Color _____).
2. Kawneer Permanodic™ AA-M10C21A41 / AA-M45C22A41, 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 Permadize™ (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 (76.2 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 Field Quality Control

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
   1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
   1. Testing Methodology: Testing Standard shall be per AAMA 502 including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 for Water Penetration Test.
      a. Air Infiltration Test: Conduct test in accordance with ASTM E 783 at a minimum uniform static test pressure of 1.57 psf (75 Pa) for CW or 6.24 psf (300 Pa) for AW. The maximum allowable rates of air leakage for field testing shall not exceed 1.5 times the project specifications.
      b. Water Infiltration Test: Water penetration resistance tests shall be conducted in accordance with ASTM E 1105 at a static test pressure equal to 2/3 the specified water test pressure.
   2. Testing Extent: Architect shall select window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
   3. Test Reports: Shall be prepared according to AAMA 502.

3.4 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.

END OF SECTION 085113