

# ARCHITECTURAL SPECIFICATIONS

Section 08520  
2004 Master Format 08 51 13

## DeVAC Series 400 Single Frame Aluminum Windows

### PART 1 GENERAL

#### 1.00 SCOPE

- A. This is a high performance aluminum window Specification. The Specification provides the Bidders with rigid standards for product materials, workmanship and performance that must be complied with in every respect.
- B. It is the intent of this Specification to provide the Owner with proper product materials, workmanship, design, application performance, installation and warranty coverage. The Specification describes specific test requirements, system performance, quality assurance tests, and product material requirements required to meet the Owner's desired quality level.

#### 1.01 WORK INCLUDED

- A. Furnish and install single frame aluminum windows, complete with hardware, and related components as shown in drawings and specified in this Section.
- B. All windows are to be DeVAC Series 400 as manufactured by Mon-Ray, Inc. Other manufacturers requesting approval to bid their product will be viewed as alternate bids and must submit a request for approval 10 days prior to bid for consideration.
- C. Windows to be fixed, removable panel, double hung, horizontal sliding, awning or hopper windows. Refer to drawing for window type.
- D. Related Sections
  - 07900 - Joint Sealers
  - 08800 - Glazing

#### 1.02 REFERENCES

- A. AAMA/NWWDA 101/I.S.2-97 "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Sliding Glass Doors"
- B. ASTM E 283 "Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors"
- C. ASTM E 330 "Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference"
- D. ASTM E 331 "Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Air Pressure Difference"
- E. AAMA 502 "Voluntary Specification for Field Testing of Windows and Sliding Glass Doors"
- F. ASTM E 90 "Laboratory Measurement of Airborne Sound Transmission of Building Partitions"
- G. ASTM E 413 "Determination of Sound Transmission Class (STC)"

#### 1.03 SYSTEM PERFORMANCE

- A. Performance Requirements: Windows will conform to AAMA/NWWDA 101/I.S.2-97 Sections 2.2.9 Fixed, 2.2.3 Vertical Sliding Windows 2.2.2 Horizontal Sliding windows, 2.2.4 Awning/Hopper windows and meet the optional designations F-C60, HS-C60, H-C60, and AP-C60 when tested in accordance with AAMA/NWWDA 101/I.S.2-97, Section 4, "Optional Performance Grades" for higher than minimum performance class. Each Bidder will submit test reports from Independent Testing Laboratories for each model being bid. Operating force and air leakage tests may be performed before water resistance testing. Unless a specific size dimension is noted in this specification, all window units tested by an independent laboratory shall have an overall frame size dimension not less than the following: **Revised 5/12/07**

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|---------------------------------------|--|
| 1. Fixed and removable panel windows: | 5'0" (1.525 m) wide by 5'0" (1.525 m) high                 |
| 2. Horizontal sliding windows:        | 5'11" (1.80 m) wide by 4'11" (1.50 m) high                 |
| 3. Vertical sliding windows:          | 4'6" (1.37 m) wide by 7'6" (2.29 m) high                   |
| 4. Awning and Hopper windows          | 4'0" (1.21 m) wide by 1'4" (.406 m) and 2'5" (.737 m) high |

- B. Air Leakage Test: The window shall be subjected to an air leakage test in accordance with ASTM-E 283. Window units tested by an Independent Laboratory shall be glazed with 1/8" (3.18 mm) clear annealed glass. Air leakage shall meet the following performance requirements.
1. Air leakage for fixed shall not exceed 0.06 CFM (.028 l/s) per square foot at both a positive (infiltration) and negative (exfiltration) static pressure of 6.24 PSF (298.6 Pa) at 50 mph wind (80.46 kmph).
  2. With sash in the closed and locked position, air leakage in removable panel, horizontal, vertical sliding, awning and hopper windows shall not exceed 0.15 CFM (.07 l/s) per lineal foot of sash crack at both positive and negative static pressure of 1.56 PSF (74.6 Pa) at 25 mph wind (40.23 kmph) or 0.35 CFM (.165 l/s) per lineal foot of sash crack at a positive (infiltration) static pressure of 6.24 PSF ( 298.6 Pa) at 50 mph wind (80.46 kmph). Windows with less than 18' (5.49 m) of sash crack shall not exceed 2.7 CFM (1.27 l/s) at 25 Mph (40.23 kmph). or 6.3 CFM (2.96 l/s) at 50 mph (80.46 kmph). total leakage.
- C. Water Resistance Test: The window shall be subjected to a water resistance test in accordance with ASTM E 331. When a positive static pressure of 8.0 PSF (382.8 Pa) at 56 mph wind (90.12 kmph) has been stabilized, 5 gallons (18.92 l) of water per hour per square foot of window area shall be applied to the exterior face of the window for a continuous period of 15 minutes. No water shall pass the interior face of the window frame. Windows tested by an independent laboratory shall be glazed with 1/8" (3.18 mm) clear annealed glass.
- D. Uniform Structural Load Test: With the sash in the closed and locked position, the window shall be tested in accordance with ASTM E 330. Optional Class 60 for commercial windows. A minimum exterior positive and negative load of 90 PSF (4306.5 Pa) at 187 mph wind (300.9 kmph) shall be applied to fixed, removable sash, horizontal and vertical sliding windows. Each load shall be maintained for a period of 10 seconds. At the conclusion of these tests, there shall be no glass breakage, damage to fasteners, hardware or any other damage causing the window to be inoperable. There shall be no permanent deformation on any frame or sash member in excess of 0.5% of its span. Windows made to the AAMA/NWDA laboratory test size for commercial grade windows requirements shall have the both sash glazed with 3/16" (4.8 mm) clear annealed glass for horizontal and vertical operating window and 1/4" (6.36 mm) glass for fixed, removable panel, awning and hopper windows for this test.
- E. Operating Force Test: Operating sash once started in motion, will not require more than 20 LBS (9.08 kg) operating force for a horizontal sliding window and 35 LBS (15.89 kg) operating force for a vertical sliding window, to keep the sash in motion in either direction.
- F. Forced Entry Test: Windows shall pass a forced entry resistance of Grade 10
- G. Deglazing Test: Operating sash will have no disengagement of the sash stiles and rails from the glass, when tested in accordance with ASTM E 987-88, when a load of 70 LBS (31.78 kg) is applied to the stiles of the horizontal sliding window and rails of the removable panel and vertical sliding windows and a load of 50 LBS (22.7 kg) is applied to the rails of the horizontal sliding window and stiles of the removable panel and vertical sliding windows.
- H. Sound Transmission Test: When tested in accordance with ASTM E 90 "Laboratory Measurement of Airborne Sound Transmission of Building Partitions", fixed, removable panel and operating windows measuring at least six square feet in overall frame size shall have a STC Rating not less than \_\_.STC for DeVAC 400 series. Product performance ranges from STC 28-32 depending on product glazing and other optional features. Refer to acoustic matrix and product details for more information.
- I. Aluminum Anodic Finish and Hardness Test: Prior to approval, the successful Bidder shall submit a 12 inch (30.5 cm) long piece of anodically finished exterior window frame sill section. The Owner reserves the right to test this samples for coating thickness, coating weight, stain resistance and hardness. The performance will meet these minimums:

*	ASTM E 244 (Anodized Coating thickness)	.7 mills Architectural Class 1 .4 mills Architectural Class 2
*	ASTM B 137 (Anodic Coating Density)	38 g/in <sup>3</sup>

*	ASTM B 680 (Anodic Seal Integrity)	No observable stain
*	Rockwell Tester (Hardness)	Gauge reading of at least 12 on Webster dial gauge

#### 1.04 SUBMITTALS

- A. Shop Drawings: Submit drawings under provisions of Section 01300. Include dimensions, relationships to construction of adjacent work, air and vapor barrier seal to adjacent construction, component anchorage, type of caulking, window locations, installation methods and installation materials. Dimensions of all windows and components will be the responsibility of the successful Bidder.
- B. Samples: Submit appropriate color Samples for Architects review and approval.
- Color: One (1) 12 inch (30.5 cm) extrusion labeled with the specified finish.  
Glass: One (1) 12 inch (30.5 cm) square sample properly labeled for each glass type indicated.
- C. Test Reports: Submit Independent Laboratory Test Reports verifying windows meet the specified requirements for air leakage, water resistance, uniform structural load, operating force, deglazing, thermal performance, condensation resistance factor, and sound transmission.
- D. Certificates: Furnish an affidavit in triplicate from the Window Manufacturer, certifying that materials used on this Project conform to these Specifications and are identical in all appropriate respects to windows identified in the Independent Laboratory Test Reports.

#### 1.05 QUALITY ASSURANCE

- A. Qualifications: Fabrication shall be by a Window Manufacturer who can furnish evidence to the Owner that it is, and has been for not less than five (5) consecutive years, regularly engaged in the manufacturing of aluminum window units similar in design and performance to those specified for this Project.
- B. Pre-award Installation:
1. Provide a complete installation of one (1) window as specified and selected by the Owner. Window mock-up to be completed within seven (7) days of the bid opening date. This window and installation shall be for the review of the product and installation. The Owner at his discretion may have the window tested by an Independent Test laboratory to verify compliance of the product with these Specifications. The cost for pre-award testing, by the Independent Laboratory shall be paid by Owner. Any deficiencies discovered on the window by the testing and the Bidder at no cost to the Owner will correct deficiencies in any similar models used in the project.
- C. Post Installation Field Testing:
1. The Owner will randomly select \_\_\_ windows after installation for field-testing.
  2. Window field-testing will be in accordance with AAMA 502-90 using Test Method B. After installation and before final payment, up to two percent (2%), but not less than two (2) window units may be randomly selected by the Owner and subjected to an air leakage and water resistance tests. Air leakage and water resistance test results shall meet the specified requirements. If any randomly tested window fails, the Successful Bidder shall make necessary corrections until satisfactory results are achieved and make corrections to all other window units installed as part of this Project.
  3. All costs associated with the Post Installation Field Testing and required repairs or replacements shall be borne by the Successful Bidder. These tests may be performed by either the Window Manufacturer's technical service personnel using accurately calibrated and approved air leakage testing equipment, or by an approved Independent Test Laboratory. All tests shall be conducted in the presence of the Owner, or the Owner's Representative.

**D. Reference List:**

1. The Bidder shall furnish with its bid a Reference List from the Window Manufacturer containing not less than ten (10) completed projects with window units of similar to the window units specified for this Project. At least five (5) of the referenced projects shall be at least three (3) years old. As part of the bid evaluation to determine life cycle cost and best value for the Owner, consideration will be given as to age, longevity, performance and extended product life of these installations. The Reference List shall include the name, address and phone number of the project, and the date the project was completed.
2. Also requested, is a list of five (5) projects, where the work consists of refurbishing similar aged models of those being bid.
3. If an installation sub-contractor is used, the subcontractor must furnish a list of at least five (5) projects similar in scope to this project with the base bid.
4. The Owner or Owners Representative has the right to deem the bidder as “non-responsible” or “non-qualified”, based upon inspection of any projects performed by the bidder as a contractor, sub-contractor or manufacturer, if the products or workmanship is determined to be unacceptable by the Owner or Owners Representative.

**1.06 WARRANTY**

- A. **Product Warranty:** The successful Bidder shall furnish a positively written, non-prorated and fully transferable warranty from the Window Manufacturer against defects in materials and workmanship of the window units, under normal use, for a period of ten (10) years from the date of acceptance of the installed window units by the Owner. The warranty shall state that the Window Manufacturer shall provide all materials required to repair or replace defective materials or workmanship. The warranty shall further state that parts used to manufacture the window units, or suitable replacements, shall be available throughout the warranty period.
- B. **Installation Warranty:** The Successful Bidder shall furnish a written warranty against defects in the installation workmanship and materials for a period of three (3) years from the date of acceptance by the Owner. Installation warranty work will be performed at no cost to the Owner.

**PART 2 PRODUCTS****2.01 ACCEPTABLE MANUFACTURERS**

- A. **Mon-Ray, Inc. (Manufacturer of DeVAC 400 Series Windows)**  
801 Boone Ave North  
Minneapolis, MN 55427-4432  
Phone: (800) 544-3646 Fax: (763) 546-8977 Website: [www.monray.com](http://www.monray.com)
- B. **Alternates:** Under provisions of Section 01030.

**2.02 MATERIALS**

- A. **Aluminum:** All aluminum sections shall be accurately extruded aluminum prime alloy 6063-T6. The minimum nominal wall thickness of all frame and sash members shall not be less than 0.062” (1.57 mm).
- B. **Glazing:** Standard glazing for fixed, removable panel and operating window sash shall be 1/8” (3.18 mm) clear annealed glass. Safety glazing shall be used as required by code and correctly labeled on glass. For fixed and awning windows the glass shall be set into the sash with glazing tape and glass stops. For hopper, horizontal and vertical sliders the glass shall be set into the sash stiles and rails with a wrap-around; flexible black vinyl glazing channel and all glazing channel voids at corners shall be internally sealed. All glass shall be factory washed.

- C. Weather-strip: All weather-strip shall be silicone treated; UV stabilized polypropylene pile with an integral polypropylene fin running through the center. Weather-stripping shall be bonded to a non-shrinking backing, which shall slide into extruded ports in the aluminum frame and sash. All weather-strip shall be staked in place.
- D. Screens: Awning and hopper windows can have a screens on the opposite side to their operation. All horizontal and vertical sliding windows shall have a half screen mounted in the outer sash track of the frame. The screen shall be pre-bowed, extruded 6063-T6 aluminum with a nominal wall thickness of .062 (1.57 mm). The screen cloth shall be fiberglass 18 x 14 mesh with charcoal color and secured into screen frame with a black vinyl spline. NOTE: Fiberglass 18 x 16 mesh shall not be acceptable.

### 2.03 WINDOW TYPE AND OPERATION

- A. Type: All windows shall be fixed panel, removable panel, horizontal sliding, vertical sliding, hopper or awning aluminum windows with a frame depth of 1 7/8" (4.76 cm) All removable and operating glass sash and screen inserts shall be easily removable to the interior for cleaning.
- B. Operation: Operating sash and frame surfaces to be completely separated from metal-to-metal contact. All horizontal sliding sashes shall operate smoothly and within specified operating force on durable nylon blocks securely concealed in the bottom sash rails, which glide on raised sash tracks of sill frame. All vertical-sliding sashes shall operate on spring loaded nylon cushion blocks, incorporating a stainless steel, nylon tipped pin-lock. The pin-locks shall engage automatically into predetermined ventilating positions processed into each of the side jamb frames. All hopper (in-swing sash) and awning (project-out ) shall operate on 4-bar stainless steel hinges, with integral friction adjustment.

### 2.04 HARDWARE

- A. All assembly and installation fasteners and screws incorporated in the window units, exterior panning and interior trim sash be non-magnetic, stainless steel. All hardware parts shall be of aluminum, stainless steel, nylon, or other non-corrosive materials compatible with aluminum. NOTE: Wrought metal or plastic parts will not be acceptable.
- B. Meeting rail locks shall be constructed of extruded 6063-T6 aluminum with a permanent black anodized finish. The lock shall be spring-loaded to provide automatic locking in the closed position.
- C. All removable panel and vertical sliding sash shall remove using spring-loaded nylon cushion blocks, incorporating a stainless steel pin-lock assembly. The pin-lock assemblies in vertical sliding sash shall automatically engage in predetermined ventilation holes processed into the frame.
- D. All horizontal sliding windows will be fitted with a sash retainer at the meeting rail to prevent the sash or screen from being removed or pushed to the exterior beyond the plane of the window. An optional "Anti-Tip" device is available to assure smooth operation of tall and narrow horizontal sliding sash.
- E. All hopper and awning windows will be locked and closed by a die cast, brushed copper-nickel plated handle mounted onto the window frame. This handle engages a matching strike, mounted on the sash rail, to provide a positive closing force to compress the weather strip. One handle assembly will be provided for frames sizes up to 36" wide. Two handle assemblies will be provided on frames over 36". Window hinging will be accomplished by using two 4-bar stainless steal hinges, mounted into the window jambs, with non-magnetic, stainless steel fasteners
- F. All operating sash exceeding 20 LBS (9.1 kg) in weight in vertical sliding (double-hung) windows will be equipped with overhead mounted block-and-tackle, spring-loaded balances. Non-operating, removable upper sash exceeding 20 LBS (9.1 kg) in weight in vertical sliding windows shall be blocked in the closed position by removable sash block installed into the sash track.
- G. Optional sash restrictors are available to restrict sash operation to any desired opening size. Sash restrictors keep operating sash in horizontal sliding and vertical sliding windows from being fully opened from either the interior or exterior.

2.05 FABRICATION

A. Frame and Sash Construction:

1. Frame: All frame members to be extruded 6063-T6 aluminum. Frame corners to be butt type, with permanent cross-linked polyethylene gasket corners, secured with #8 x 5/8" (15.8 mm) non-magnetic stainless steel screws into integral screw ports. All sill members to be tubular construction with a positive five-degree uninterrupted continuous slope to the exterior for drainage. The sill shall be fastened to the jambs with four (4) # 8 x 5/8" (15.8 mm) non-magnetic stainless steel screws. The head shall be fastened to the jambs with two (2) # 8 x 5/8" (15.8 mm) non-magnetic stainless steel screws. Sills to have a 3/4" (19.05 mm) monorail" leg for the sash to ride upon, with a minimum of 3/8" (9.5 mm) sash clearance from the sill base. All sash to frame perimeter will be double weather-stripped. All weather-stripping shall be installed in extruded ports and staked in place to prevent movement.
2. Sash: All sash members shall be extruded 6063-T6 aluminum. All meeting rail and jamb stile members shall be tubular aluminum extrusions. Full length extruded pull or lift rails shall be a minimum 3/16" (4.8 mm) thick and protruding 3/4" (19.05 mm) from the face of the extrusion. Sash corners to be butt-type, joined in a weather tight manner using four (4) #6 x 1 1/4" (31.75 mm) leader type non-magnetic stainless steel screws into integral screw ports. Corner joints to be factory processed with a sealant hole at each corner that allow filling of the corners with sealant to create a watertight seal. All meeting rails shall interlock and be double weather-stripped. Glazing shall be held in place by a wrap-around virgin vinyl glazing installed in one continuous piece with the splice at the top of the glass. Replacement of the glass must be accomplished in a timely manner and reassembly must be capable of re-use of the original vinyl glazing with the restoration to the original weather tight seal.

- B. Weep System: The sill weep system shall be designed and constructed to prevent the infiltration of air, dirt and insects from the outside to the interior, and provide ample opening relative to the window size, to prevent the accumulation of water and not rely on sponge blocks. The sill frame shall have four (2) 2" x 1/4" (50.8 mm x 6.3 mm) weep slots with two (2) 5" (12.7 cm) weep flaps to cover the slots. Weep flaps shall be of extruded aluminum matching the window finish of the frame and be attached into a recessed integral extruded ports allowing for free flap movement. Weep flaps shall be counter-balanced and gravity operated, opening to exhaust water and closing to help prevent air-leakage and infiltration of insects.

2.06 FINISHES

A. Anodic (Anodized Finish)

1. Finish all areas of aluminum windows and components with electrologically deposited color in accordance with the following Aluminum Association Designation:

<u>*AA Designations</u>	<u>Architectural Class</u>	<u>Description</u>	<u>AAMA Guide Specification</u>
AA-M10-C22-A31/41	II/I	Clear Anodized	AAMA 607.1-77
AA-M10-C22-A34/44	III/I	Color Anodized	AAMA 608.1-77

2. AA Designation and color to be \_\_\_\_\_ \*

Available standard colors are 204 R1 or 215 R1 Clear, Champagne, Gold, Light Bronze, Medium Bronze, Dark Bronze, Deep Bronze and Black. Other custom anodized colors available upon request.

B. Organic (Painted Finish)

1. Finish all exposed areas of aluminum windows and components with a factory applied spray coating in accordance with Aluminum Association Designation:

<u>*Description</u>	<u>AA Designation</u>	<u>AAMA Guide Specification</u>
Siliconized polyester baked enamel	AA-M12-C41-RX1	AAMA 603.8-92
Kynar based 70% resin	AA-M12-C41-RX1	AAMA 605.2-92

2. AA Designation and Color to \_\_\_\_\_ \*

Both paint types are available in a wide range of colors. Color samples available upon request.

**2.07 ACCESSORIES**

- A. Exterior panning: All existing exterior wood framing around the window openings as shown in the Project drawings shall be covered with 6063-T6 extruded panning. Panning shall interlock into integral ports around the entire perimeter of the exterior window frame and be backed-sealed to the frame prior to installation in the opening. The panning corners shall be butt-joined, secured with stainless steel screws into integral screw ports. Adjacent corner flanges of the panning shall have stainless steel alignment clips and be back-sealed.  
NOTE: Exposed screw heads or rivets shall not be acceptable.
- B. Interior Trim: All interior trim shall be 6063-T6 extruded aluminum with a minimum nominal wall thickness of .050". Interior trim shall be installed around the interior perimeter of the window opening as shown in the Project drawings with hidden mounting clips and fasteners. NOTE: Exposed screw heads or rivets shall not be acceptable.
- C. Mullions and Transoms: Where two or more frames are joined together, horizontally or vertically, the mullion or transom connector shall continuously interlock onto the inner and outer edges of the adjacent window frames and incorporate a port for weather-sealing at the exterior. Exposed screw heads or rivets on either the interior or the exterior exposed surfaces of mullions or transoms shall not be acceptable. The mullions and transoms shall be capable of withstanding the project design wind load (positive and negative) on the total area without deflecting more than 1/175<sup>th</sup> of the span.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Bidders are expected to visit the job-site and make a complete survey of the Project prior to bid. All window openings will be measured by the Bidder for proper sizing of the new windows. Failure to do so will not relieve the Successful Bidder from the need to furnish any and all materials, which may be required, in accordance with the Specifications, without any additional cost to the Owner.
- B. Inspect openings before installation to assure surfaces are clean and dry. Verify that rough opening and masonry openings are correct and the sill plate is level.

**3.02 PREPARATION**

- A. Remove new window units from crating and packaging material. Verify that all parts and accessories are included. All window units and accessories shall be securely stored, upright and protected from the weather.
- B. Remove old windows and accessories from the window opening. Scrape and remove existing sealant from the opening, which will interfere with the installation of new windows.
- C. Install only preservative treated lumber, as required, for all liners and blocking. All liners, sub-framing or new framing shall be the full length of the head, jambs and sill. The shimming surfaces will be of adequate depth to shim the entire depth of the new window frame.

**3.03 INSTALLATION**

- A. Windows shall be installed in strict accordance with the Manufacturer's instructions and Shop Drawings.
- B. Plumb and align window faces in a single plane for each wall plane. Erect windows and accessories square and true, using shims and anchors to maintain a permanent position.
- C. Anchors should be not less than #10 non-magnetic, stainless steel screws. The length of the installation screws shall allow a minimum of one (1) inch (2.54 cm) to penetrate through any liners or blocking into the existing window frame or new sub-framing. Anchors shall be installed through both the interior and exterior frames. Anchoring screws will be countersunk into the main frames to avoid any interference with sash, balances or hardware. Anchoring through the tubular interior or exterior sill frames shall not be acceptable. Anchors must be adequate to handle thermal and building movement, and specified uniform load requirements.

- D. Caulking shall be a one-part non-sag polyurethane sealant (Type II Class A).

**3.04 ADJUST AND CLEAN**

- A. Operate installed windows to assure a proper installation has occurred. Make any appropriate adjustments.
- B. Remove excess sealant, dirt, window labels and wipe dust off frame and glass.