



MAGNUS uPVC 1800 Series
(REHAU Äspekt) Casement/Awning/Picture Windows

SECTION 08 53 45.15

VINYL WINDOWS
("Plastic Windows")

This draft Specification is provided only as an aid in architect's/engineer's development of the final Specification and is not intended as a substitute for sound architectural/engineering judgment. The architect/engineer shall be responsible to convert this draft Specification into a final Specification that meets the functional and aesthetic needs of its client, as well as complying with all applicable codes.

*These specifications describe MAGNUS uPVC 1800 series (based on **REHAU Äspekt Casement/Awning/Fixed Window Designs**). The versatile REHAU Äspekt designs are made by independent window fabricators in North America using high performance North American vinyl window profiles. They allow the designer to create a variety of custom casement and awning windows as well as complimentary fixed windows as well as multi-lite window elements. Many other styles and performance range designs of vinyl windows and doors are also available from REHAU fabricators such as Crystal Windows & Doors throughout North America.*

PART 1 GENERAL

1.01 SUMMARY

Edit the following paragraph to include only those materials and components specific to the project. Where boldface, bracketed alternatives are listed, select one (1) option for each case.

- A. Section Includes: Crystal MAGNUS 1800 (Based on REHAU Äspekt) fully welded vinyl (uPVC) windows as listed below. All windows are factory assembled, and include all required glass and glazing materials; any internal structural metal reinforcement (stiffeners) that may be required to meet design loads, mulling conditions, non-white vinyl reinforcement and/or proper operation; window hardware, weatherstripping and insect screens.
1. Size and Quantity of each type of vinyl window is as shown on drawings
 2. Configuration of windows required:
[Flat Face frame for [casement] [and] [awning] [and] [fixed] windows with integral nailing fin]
or
[Frame with Supplementary Profile Grooves for [casement] [and] [awning] [and] [fixed] windows]

[including]
 3. **[Vinyl (uPVC) supplementary profile(s) snapped into, sealed and fastened to window frame's perimeter accessory grooves]**

Edit the following paragraph to include only those sections applicable to the project.

- B. Related Sections:

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1. Section 07 92 00 Joint Sealants
2. Section 08 22 00 Hinged Vinyl Framed Glass Doors
3. Section 08260 Sliding Vinyl Framed Glass Doors
4. Section 08810 Glass

1.02 REFERENCES

- A. Publications listed below are part of this specification to the extent they are referenced. When publications are cited in these specifications by use of shortened names or by standard number alone, it must be understood that reference is made to the full publication and edition as listed here.

Edit the following paragraphs to include only those sections applicable to the project. You may choose to limit the listing here to the shortened name and standard number and state that all reference standards, including the full name, edition dates and the issuing organization's address are presented in Section 01090 - References

- B. American Architectural Manufacturers Association (AAMA):
1. AAMA/WDMA/CSA 101/I.S.2/A440-11, North American Fenestration Standard/Specification for windows, doors and skylights
 2. AAMA 303 - 08, Voluntary Specification for Rigid Polyvinyl Chloride (PVC) Exterior Profiles
 3. AAMA 502 -12 Voluntary Specification for Field Testing of Newly Installed Fenestration Products
 4. AAMA 800 – 10 Voluntary Specifications and Test Methods for Sealants
- C. American Society of Civil Engineers:
1. ASCE/SEI 7 – 10 Minimum Design Loads for Buildings and Other Structures
- D. American Society for Testing and Materials
1. ASTM E 90 -09 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 2. ASTM E 1332 – 10a, Standard Classification for Rating Outdoor-Indoor Sound Attenuation
- D. Glass Association of North America:
1. GANA Glazing Manual (2004)
- E. National Fenestration Rating Council, Inc.
1. NFRC 100 – 2014, Procedure for Determining Fenestration Product U-Factors
 2. NFRC 200 – 2014, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence
 3. NFRC 500 – 2014, Procedure for Determining Fenestration Product Condensation Resistance Values
 4. NFRC 102 – 2014 Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems
- F. Crystal & REHAU Construction LLC
1. REHAU Äspekt Technical Information, Profile Print
 2. REHAU Äspekt Technical Information, Size Limitations



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- 3. REHAU Äspekt Technical Information, Glazing Instructions
- 4. REHAU Äspekt Technical Information, Reinforcement Guidelines

- G. American Iron and Steel Institute:
 - 1. AISI Steel Products Manual

- H. American Society for Testing and Materials:
 - 1. ASTM A 36 Specification for Structural Steel
 - 2. ASTM A 570 Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality
 - 3. ASTM A 611 Specification for Steel, Cold-Rolled Sheet, Carbon, Structural
 - 4. ASTM B 221 Specification for Aluminum-Alloy Extruded Bars, Wire, Shapes and Tubes
 - 5. ASTM C 1036 – 91 Standard Specification for Flat Glass
 - 6. ASTM E 774 – 97 Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units

1.03 SYSTEM DESCRIPTION

- A. Structural Design Requirements:
 - 1. Design Loads:

Use this section to specify the required strength(s) of windows, keeping in mind that different window designs and different window sizes have different maximum strengths.

In sizes defined by the Standard AAMA/WDMA/CSA 101/I.S.2/A 440-05 or 08 as the minimum for test samples for specific performance classes, these are the maximum design loads (i.e. pressures) permissible for the following Äspekt windows. Note that the windows successfully passed a test pressure 1.5 times the DP given.

| <u>Window Designs: U.S. ratings</u> | <u>DP</u> | <u>Window Rating</u> |
|-------------------------------------|---------------|----------------------------|
| Casement (36" x 72") | 70 psf | (Class CW PG 70 -C) |
| Awning (60" x 36") | 70 psf | (Class CW PG70 -AP) |
| Fixed (59" x 59") | 60psf | (ClassCW -PG60- FW) |

- a. Windows shall be identical in construction to test windows that comply with all requirements of AAMA/CWDMA/CSA 101/I.S.2/A 440 Performance Class for casement windows: **[CW PG 70- 36 x 72 - C]** for awning windows: **[CW PG 70_ 60 x 36 - AP]** for fixed windows: **[CW PG 70- * 60 x 60 - FW]**
- 2. Comply with all applicable Building Codes

- B. Other Performance Requirements:

Edit the following paragraphs as necessary. Where boldface, bracketed alternatives are listed, select only the option(s) applicable to the project.

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1. Allow for thermal movement of the window based on site mean temperature +/- 70 °F, window/element size and coefficient of linear expansion of PVC.
2. If non-white windows are chosen allow for thermal movement of the window based on the solar-heat absorption.
3. Thermal Performance: (values specified from a. – d. are depending on glass chosen)
 - a. Comply with all applicable energy codes and ENERGY STAR®
 - b. The windows, including glass and vinyl framing, shall have a thermal transmittance (U-value) of **[0.17 Btu/hr*ft²*°F up to 0.30] [specify value] for casement/awning configurations and [0.15 Btu/hr*ft²*°F up to 0.30] [specify value] for fixed window configurations**, when tested in compliance with NFRC 100-2014
 - c. The windows, including glass and vinyl framing, shall have a Solar heat gain coefficient (SHGC) of **[0.10 up to 0.44] [specify value] for casement/awning configurations and [0.13 up to 0.52] [specify value] for fixed window configurations** when tested in compliance with NFRC 200-2014
 - d. The MAGNUS 1800 Series (based on REHAU Äspekt) windows, when tested in compliance with NFRC 500-2014, shall have a Condensation Resistance Factor (CRF) of **34** or higher **[specify value up to 79] for casement/awning configurations and 34** or higher **[specify value up to 777] for fixed window configurations**.
4. Acoustical Performance (optional):
 - a. Windows shall meet or exceed requirements of **[OITC 33] for fixed window configurations or [OITC 34] or for casement/awning configurations**, when tested according to ASTM E 1332 or **[STC 40] for casement/awning configurations [STC 39] for fixed window configurations** , when tested according to ASTM E 90.

1.04 SUBMITTALS

- A. Product Data:
 1. Manufacturer's printed literature describing products to be provided shall be submitted in accordance with Section 0133 00.
 2. Crystal & REHAU printed literature describing quality of vinyl extrusions .
- B. Shop Drawings:
 1. Submit dimensioned shop drawings for system. Show materials, anchorage, field connections, sealants and glazing.
 2. Drawings shall show scale elevations and sections. Full size sections shall be shown only when needed for clarity.
- C. Samples:
 1. Selection Samples:
 - a. Submit color samples displaying manufacturer's standard colors and finishes for initial selection by Architect. Submit actual material samples of colors and finishes available.
 - b. Sample Size: Not less than 6" length of vinyl profile
 2. Samples submitted shall be of production type and shall represent minimum quality of finish to be furnished by manufacturer. No work represented by samples shall be fabricated until samples are accepted.
- D. Quality Assurance Submittals:



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1. Test Reports:
 - a. Submit certified test reports from an AAMA and NFRC accredited, independent testing laboratory showing system has been tested and meets or exceeds specified requirements and indicating full compliance with specified performance criteria.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 1. This portion of Work shall be provided by a single firm, who has specialized in fabrication of fully welded vinyl windows.
 2. The window fabricator shall be fully trained by a REHAU technical representative in the approved techniques and methods of fabricating REHAU Äspekt vinyl windows. Training or auditing shall have occurred within two years of the commencement of this project.
 3. The window fabricator shall be an authorized REHAU fabricator in good standing.
- B. Materials:
 1. Only REHAU Quality vinyl extrusions and REHAU approved components shall be used.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 1. Deliver materials in manufacturer's original unopened packaging with labels intact.
 2. A temporary protective covering shall protect exposed surfaces after finishing of products.
- B. Storage and Protection:
 1. Store windows/elements vertically, inside, in a clean, dry location, away from uncured concrete or masonry.
 2. Stacking shall be done in a way to prevent bending.
 3. Cover stacks in a manner to provide air circulation and to protect materials from damage.
 4. Keep on-site handling to a minimum. Exercise particular care to avoid damage to finishes of materials. Damaged or deteriorated materials shall be removed from the site.

1.07 PROJECT CONDITIONS

- A. Environmental Requirements:
 1. Do not proceed with jobsite sealant application when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer.
 2. Sealants shall not be applied when joint substrates are wet due to rain, frost, condensation or other causes.
- B. Field Measurements:
 1. Verify dimensions of surrounding construction by field measurements so work will be accurately designed, fabricated, and fitted to structure. Contractor and manufacturer shall cooperate to establish and maintain these field dimensions. If the contractor guarantees the dimensions, no field measurements are needed.

1.08 SPECIAL WARRANTY



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- A. Provide a written guarantee signed by the window fabricator and the installer agreeing to repair or replace defective materials or workmanship, including evidence of early deterioration, weathering or aging of Work, uncontrolled water penetration or air infiltration, glass breakage due to design defects, deterioration of finishes, failure of operating parts to properly function and other deterioration or failure of Work to comply with performance or other requirements. Warranty period shall be for a period of **[one (1) year] [specify up to 5 years]** from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Vinyl (PVC) Windows :
1. REHAU Window Designs as provided by a **[REHAU Authorized and Trained Fabricator] [Crystal Windows & Doors]**

2.02 MATERIALS

- A. Window System: Crystal MAGNUS uPVC 1800 Series (based on REHAU Äspekt) Vinyl Windows.
1. All extruded vinyl shall be made from RAU PVC 1426
 2. Minimum Nominal Wall Thickness:
 - a. Primary Extrusions (frame and sash) exterior walls: 0.067" (1.7 mm)
 - b. Secondary Extrusions (e.g. glazing stops and closures): 0.059" (1.5 mm)
 3. Face Dimensions (nominal): As indicated on Drawings
 4. The joint between any window frame and its operable sash(es) shall be characterized by a triple seal – three TPE weather seals mounted on the sash profile, spaced to create two separate chambers between frame and sash that act as a barrier to water and air infiltration.
 5. Window frames shall allow for direct glazing from the outside by applying welded glazing bead frames snapping into the frame. Fixed glazing can be achieved either by wet or by tape glazing
 6. Window frame with supplementary profile grooves on interior and exterior edges shall allow for snap-in attachment of vinyl trim profiles and mulled window joint covers. There shall be multiple chambers in the frame providing structural strength and thermal insulation.
 7. Window sash(es) shall be configured to receive glazing beads (stops) that snap in on the interior side of the glass and provide a dry glazing application for easy glass replacement.
 8. Glazing beads (stops) shall incorporate a coextruded black TPE glazing seal.
- B. Reinforcement: Galvanized carbon steel
1. Structural Shapes, Plates and Bars: ASTM A36
 2. Cold Rolled Sheet and Strip: ASTM A611
 3. Hot Rolled Sheet and Strip: ASTM A570
- C. Weatherseals:
1. TPE weatherseals:
 - a. Black polymer thermoplastic, elastomeric seals manufactured by REHAU.

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- b. two sash seals shall be compressible bulb shapes. The sash shall have a coextruded fin seal that contacts the frame to provide a dust barrier.

D. Glass:

1. Glass shall comply with requirements of ASTM C 1036 and ASTM E 774.
2. Insulating glass panels shall have an overall nominal thickness of *select one* [1" (25 mm)] or [1- 3/8" 35 mm].

Note that insulating glass of any kind and description can be incorporated in REHAU windows. The specifier must provide sufficient information here to describe all applicable features of glass required, including color, coating types and surface location, gas fill, spacer type, performance requirements and any other attributes important to the project.

3. *[Specifier: provide complete glass descriptive data here, or refer to another section, e.g. § 08800 Glazing]*

E. Hardware:

1. Provide manufacturer's standard roto gear sash operator.
2. Provide manufacturer's standard [single-point sash cam lock(s) and keeper(s)] [multi-point sash lock with keepers].
3. Any exposed operator housing, operator handle and lock handle(s) shall have [white] [other] electrostatically applied baked enamel painted finish.

The specifier may choose to allow the REHAU window fabricator to use his preferred and proven hardware type without specifying it directly, or should contact the fabricator to learn the type to specify by name (e.g. Truth, G-U, Roto). Brass plated and solid brass hardware may be available.

4. Casement hinges shall be [standard type (which slide the sash horizontally as the window opens outward, creating a space between sash and frame that allows access to the exterior glass for washing from inside the room)] [egress type (which pivot the sash creating the widest possible clear opening)].
5. Hinges shall be made of [zinc chromate coated steel] [stainless steel].

2.03 ACCESSORIES

A. Fasteners: Stainless Steel: AISI 300 Series

1. Fasteners shall be selected to prevent galvanic reaction with any reinforcement materials fastened.
2. Above criteria is applicable to screws used to secure internal reinforcement and to fasteners used in window mulling connections, if required.
3. Avoid exposed fasteners to greatest extent possible.
4. Where exposed fasteners are unavoidable in finished surfaces, use flat-head countersunk Phillips head screws.

B. Sealants:

1. Sealants shall comply with requirements of AAMA 800.

2.04 FABRICATION

A. General Requirements:

1. Follow all requirements of the REHAU fabrication guidelines

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2. Miter cut and fusion weld (i.e. thermally weld) all frame and sash corners as well as external glazing beads for fixed glazing applications.
 3. Complete fabrication, assembly, finishing, hardware application, and other work for each individual window unit before shipment to Site. Field assembly to connect two or more mulled windows is permitted.
 4. Provide baffled drainage holes to drain moisture to exterior.
- B. Welding:
1. Welding shall be done in compliance with applicable recommendations and shall be done with materials and equipment as recommended by REHAU.
 2. Welds shall be finished and dressed.
- C. System:
1. Window construction, edge clearance and placement of installation fasteners shall allow for expansion and contraction per the specified system performance requirements.
 2. Provisions shall be made in frame and sash construction for minimum glass edge clearance, nominal edge cover, and nominal pocket width, in compliance with GANA Glazing Manual, for thickness and type glass needed.
 3. Framing shall be provided with reinforcing members as necessary. Provide aluminum or steel members as needed to reinforce frame and/or sash components as recommended by REHAU to develop needed strength of assembly.
 4. Framing members shall be structurally adequate to carry dead load, accommodate thermal movement, and resist wind loads.
 5. Flashing and other materials used around window opening shall be corrosion resistant, non-staining, non-bleeding, and compatible with adjoining materials.

2.05 SHOP FINISHES

Typical windows are supplied with an integral [white] [beige] [clay] color for all vinyl parts; other surface colors or finishes are optional.

- A. Laminated Coatings:
1. Application of laminated color foils from RENOLIT shall be performed under specification issued by RENOLIT, and REHAU.
 2. The laminated surface shall be uniform and free from streaks, blisters, sags, or other surface imperfections.
 3. Laminated profiles must meet requirements of AAMA 303.
- B. Protection:
1. Provide film to protect exposed finished surfaces during shipment, storage, and installation whenever possible.
 2. Film shall not affect factory finish after finished component is installed and film is stripped, no residue, adhesive, or film covering, visual non-uniformity or other deleterious effects or substances shall remain on surfaces.
 3. Factory applied protective film must be removed immediately after installation.
 4. When cleaning agents/paint etc. are applied to the building the windows must be protected.

PART 3 EXECUTION

3.01 EXAMINATION



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- A. Site Verification of Conditions:
 - 1. Examine window openings and adjacent building structure where windows will be applied for conditions that will prevent proper execution of this portion of Work and endanger permanency.
 - 2. Do not proceed with installation until defects have been corrected.
 - 3. Verify sealant compatibility and adhesion to vinyl in conjunction with sealant manufacturer.

3.02 PREPARATION

- A. Coordination:
 - 1. Coordinate installation with work of other trades.

3.03 INSTALLATION

- A. General Requirements:
 - 1. Comply with manufacturer's instructions and recommendations for installation of work.
 - 2. Do not erect warped, bowed, deformed or otherwise damaged or defaced members. Replace materials that are damaged during installation as directed.
 - 3. Set units level, plumb, and true to line, with uniform joints. Support units on shims and secure in place by approved installation anchors/fasteners that properly engage into to supporting structure.
 - 4. Insulation must be used around the perimeter of the window in accordance with shop drawings and the insulation manufacturer's guidelines. Insulation must allow for expansion and contraction of the installed window.
 - 5. Flashing and other materials used around the window opening shall be corrosion resistant, non-staining, non-bleeding and compatible with adjoining materials.
- B. Erection Tolerances:
 - 1. Variations from Plumb: $\pm 1/8$ " maximum in window height.
 - 2. Variations from Level: $\pm 1/16$ " maximum in 10' run, non-cumulative.

3.04 FIELD QUALITY CONTROL

- A. Field Check for Water Leakage:
 - 1. After completion of installation and nominal curing of sealant and glazing compounds, but before installation of interior finishes, perform AAMA 502 test. Architect will determine the quantity and type(s) of window(s) to be tested.
 - 2. In case of water penetration take corrective action and re-test as necessary until the problem is resolved.

3.05 ADJUSTING

- A. Weather seal contact shall be checked. Required final hardware adjustments shall be made for proper operation and performance of units.

3.06 CLEANING



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- A. Clean completed system in compliance with manufacturer's recommendations, inside and out, promptly after erection and installation of glass and sealants. Remove excess glazing and joint sealants, dirt, and other substances from finished surfaces promptly after erection.
- B. Remove protective material from prefinished surfaces.
- C. Wash down exposed surfaces using a solution of mild detergent in warm water applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.07 PROTECTION

- A. Institute protective measures and other precautions needed to assure Work will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION