

## 07415: ALUMINUM RAIN SCREEN (PERS) WALL CLADDING

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### PART 1: GENERAL

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#### 1.01 SCOPE

##### A. SECTION INCLUDES:

1. The extent of Pressure Equalized Rain Screen (PERS) panel system work is indicated on the drawings and in these specifications.
2. Panel system requirements include the following components:
  - a. Aluminum Faced Composite panels applied on a vertical plane with vertical gutters and adjustable 2 piece horizontal mounting system to permit vertical and horizontal wall alignment. Panel mounting system includes shims, furring, fasteners, internal gaskets, flashing and seals to air/water barrier and protective film (as required) for a complete installation.
  - b. Additionally, panels formed from matching materials to sizes and shapes indicated including parapet coping, column or beam wraps, cornices, soffit, sills, border, and filler items indicated as integral components of the panel system or as designed.
    - 1) Joints located on horizontal surfaces or to dissimilar products to receive silicone caulk in lieu of open joint system.

##### B. RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, and Technical Specification Divisions 2 through 16 apply to this Section.

##### C. RELATED WORK SPECIFIED ELSEWHERE:

1. Division 5: Structural Steel, Cold Formed Metal Framing. **Note: 16 gage minimum is required to resist fastener pullout for exterior metal framing.** All exterior wall supports design shall comply with ASCE 7-02.
2. Division 6: Back Up Walls, Exterior Sheathing
3. Division 7: Insulation, Air Water Barriers, Sheet Metal Flashings, Caulking and Sealants

#### 1.02 QUALITY ASSURANCE

1. Composite Metal Panel System Fabricator shall have a minimum of 10 years experience in the manufacturing of this type of solid aluminum panel product.
2. Installer: Shall have experience installing metal cladding system similar to that required for a period of not less than 10 documented years.
3. Maximum deviation from vertical and horizontal alignment of erected panels: 1/4" in 20' non-accumulative.
4. **Source Limitations:** Panel fabricator/installer shall assume undivided responsibility for all components of the exterior panel system from face or air/water barrier out.
5. Shop Drawings shall be prepared by the Fabricator of the PERS systems.
6. Systems shall be previously tested for Performance criteria specified herein prior to bidding the project.
7. Panels will be back-cut for bends and the perimeters pattern cut to within .040" plus or minus tolerances through the use of CNC programmable router table or equivalent.

8. Coordination: Panel system shop drawings shall be coordinated with references to benchmark elevations and horizontal controls provided by GC/CM with all the other adjacent exterior wall trades drawings to including but not limited to:
  - a. Exterior Studs and sheathing: 16 ga min to avoid fastener pullover.
  - b. Other Wall Cladding systems: Brick, Precast, Stone or other metal systems etc
  - c. Fenestration: Windows, storefront and curtain walls, louvers.
  - d. Air/water barriers and flashing to openings, roofing and adjacent materials.
  - e. Release into production: identify how areas of work are best suited to be released for fabrication to avoid unnecessary production delays:
    - 1) Approved as noted: From approved or approved as noted shop drawings
    - 2) Verify prior to fabrication: after verifying the construction of the substrate is compliant with contract drawings and coordinated shop drawings.

### **1.03 SUBSTITUTIONS:**

- A. The parameters specified herein establish the minimum level of quality required. Substitutions must meet or exceed the performance requirements, testing, materials, fabrication methods, tolerances and aesthetics noted.
- B. Substitution requests will include:
  1. Comprehensive description of system panel system including all accessories required to meet specified performance.
  2. Panel details and coordination details of joint designs and all interfaces with dissimilar products.
  3. Test of certified results conducted by an ASTM certified testing facility.
  4. Panel samples including a 4 way joint.

### **1.04 REFERENCES**

- A. ALUMINUM ASSOCIATION - AA.
  1. Aluminum Standards and Data.
- B. AMERICAN ARCHITECTURAL MANUFACTURER'S ASSOCIATION - AAMA.
- C. AMERICAN SOCIETY FOR TESTING OF MATERIALS – ASTM

### **1.05 SUBMITTALS**

1. Product Data Sheet describing properties and standards for the product selected.
  2. Samples:
    - a. Panel System Assembly: Two samples of typical assembly, 12" x 12" minimum.
    - b. Two samples of each color or finish selected, 3" x 4" minimum.
  3. Shop Drawings: Submit shop drawings showing project layout plans and elevations; fastening and anchoring methods; detail and location of joints, sealants including joints necessary to accommodate thermal movement; trim; flashing; expansion joints and accessories. Show products and details of adjacent trades with references to GC/CM's benchmarks or controls including but not limited to curtain walls/storefronts, structural steel, cold formed metal framing, pre-cast concrete, masonry, roofing, louvers and flashings to air/water barrier.
  4. As Built Drawings: Show final in- place work as it relates to as built conditions.
- B. CALCULATIONS:
- Provide calculations or wind load charts prepared by a professional engineer certifying the system's compliance with design pressures for panel deflection and fastener loads.

C. **SECONDARY SUPPORTS DESIGN:**

Design, fabricate, and install secondary structural components of the metal cladding system (which may be required in conditions of beam or column enclosures, cornices or other three dimensional shapes) with a factor of safety not less than 1.5 (basis for design calculations shall be 1.5 times the maximum design wind pressure), such that failure of any panel component shall not occur at less than 1.5 times the maximum design wind pressure. Failure is defined as breakage, component disengagement, or permanent distortion.

D. **LEED INFORMATION:**

1. Local/Regional Materials: Supply products manufactured within a 300 mile radius of project site.

**1.06 WARRANTY**

A. **SUBMIT IN ACCORDANCE WITH DIVISION 1 – CLOSEOUT SUBMITTALS.**

B. **WORKMANSHIP WARRANTY:**

1. Written warranty signed by manufacturer (and installer if a separate entity) warranting that portions of the work involving metal panels are of good quality, free from defects, and in conformance with the requirements of the Contract Documents. Further guarantee to repair or replace defective work during a one year period following Substantial Completion of the work.
2. Defective is defined to include failure of the system to meet structural performance requirements and/or permanent deformation resulting from pressures within the design criteria.

C. **FINISH WARRANTY:**

1. The Aluminum Composite Material manufacturer shall warrant the finish in accordance with AAMA 2605 for twenty years against Max 5 fade based on ASTM D2244 and Max 8 chalk based on ASTM D4212 and de-lamination of the paint finish. Upon notification of defects within the warranty period, make necessary repairs or replacement at the convenience of the owner.
2. The Aluminum Composite material manufacturer shall warrant for a period of 5 years the bond integrity of the sheet material.

**1.07 DELIVERY, STORAGE AND HANDLING:**

- A. Deliver units and other components so they will not be subject to damage or deformation. Deliver panel units in crates designated for specific locations on the building as coordinated between GC and installer. Crates shall be able to withstand hoisting loads necessary for the safe placement of the materials on the building prior to installation.
- B. Storage: Stack components off the ground/floor on suitable skids in fully enclosed space. Protect against warping, scratches, damage from moisture, exposure to direct sunlight and other surface contamination.
- C. Handling: Exercise care in loading, unloading, storing, and installing units so as to preclude bending, warping, twisting, and surface damage.
- D. Protective films or packaging: protect exposed surfaces of each panel by applying strippable film or foam inter-layers.

## PART 2: PRODUCTS

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### 2.01 PANEL SYSTEM

#### A. ARCHITECTURAL METAL PANEL SYSTEM:

1. Manufacturers offering products which may be incorporated in the work, but are not limited to, the following:
  - a. Basis of Design is **Metalwërks® Arcwall ACM - PERS** Pressure Equalized Rain Screen by Metal Sales & Service Inc. of Kennett Square, PA 19348 (800-321-7816 or website: ([www.metalwerksusa.com](http://www.metalwerksusa.com))). Overall System depth is 3 ¾" minimum including adjustable furring.
2. Cladding Panels: Form panels to 1 ¾" depth with Continuous Panel Frame.
  - a. Extruded aluminum frames are continuous 6063-T6 profiles which are factory assembled with the face skins to make up a panel unit.
  - b. Panel frames are mechanically corner keyed to form a monolithic assembly.
  - c. Systems relying on ACM sheet material with intermittent attachment clips alone will not be considered.
  - d. Horizontal Joints: Form a minimum 2" tall vertical leg to deflect moisture to exterior. Shop assembled extruded aluminum gutter channel painted to match panels will form a positive interlock to resist pullout while simultaneously permitting pressure equalization of the chambers behind the panels.
  - e. Vertical Joints: Vertical flanges are cee-shaped to marry with extruded silicone vertical gaskets shop assembled with an extruded aluminum back gutter.
  - f. Extruded aluminum vertical gutter: Back gutter has inward protruding legs to maintain rigidity and consistency of extruded silicone gaskets to resist moisture intrusion and will be drained to the exterior surface of the wall. **Continuous field applied sealants between gutter and panels will not be permitted.**
  - g. Panel sizes: Panels can be formed up to 16'0" optimal lengths and modules up to 60" tall. Other lengths are available, consult Sales for size limitations. Total system depth is 3 ¾" including a ½" nominal shim space to allow for construction tolerances.
3. Furring: 2" min. depth Adjustable wall furring: Extruded and/or formed aluminum or formed T304 Stainless Steel furring, as required to shim and plumb the exterior walls, create an adequate air cavity for pressure equalization, drainage and accommodate specified exterior insulation thickness.
4. Joint Size: Open 5/8" nominal joints unless noted otherwise. Consult with **Metalwërks®** for alternative design options.
5. Sealants: Exposed sealants will be permitted only at horizontal surfaces, perimeter of panels at adjacent materials and openings in the wall system. Where necessary a minimum 5/8" wide joint filled with closed cell foam backer rod and appropriate silicone sealants will be used. See separate Div 7 specifications for appropriate sealants.
  - a. Intermediate panel stiffeners, where required by design loads applied to the panels, shall be structurally welded at ends to the panel flanges and shall be secured to the rear face of the panel with silicone of sufficient size and strength to maintain panel flatness. Stiffener material and/or finish shall be compatible with the silicone.
6. Panel fasteners shall be stainless steel or other corrosion resistant coated fastener for panel attachment in size and spacing as dictated by structural review.

### 2.02 MATERIALS

#### A. GENERAL:

1. Facing Material shall be selected from one of the following (**Select one thickness only**):

- a. 4mm thick (.158") Polyethylene core aluminum composite material made up of an interior and exterior skin of .020" thick coated aluminum sheets chemically bonded to a polyethylene core as supplied by:
    - 1) Reynobond® as manufactured by Alcoa Cladding Systems.
    - 2) Alucobond® as manufactured by Alcan Composites USA.
  - b. 6mm thick (.237") Polyethylene core aluminum composite material made up of an interior and exterior skin of .020" thick coated aluminum sheets chemically bonded to a polyethylene core.
2. Physical characteristics of the facing material are as follows:
- a. Bond Integrity: When tested for bond integrity, in accordance with ASTM D 1781 (simulating resistance to panel de-lamination), there shall be no adhesive failure of the bond a) between the core and the skin nor b) cohesive failure of the core itself below the following values:  
 Peel Strength:
    - 100 N·mm/mm (22.5 in·lb/in) as manufactured
    - 100 N·mm/mm (22.5 in·lb/in) after 8 hours in water at 200°F (93°C)
    - 100 N·mm/mm (22.5 in·lb/in) after 21 days soaking in water at 70°F (21°C)
  - b. Fire Performance:
    - 1) ASTM E 84: Flame spread 0, Smoke developed 0
    - 2) ASTM E 162: No surface flaming
    - 3) UBC 17-5: No flame spread along interior face or penetration through the wall assembly.

**B. COMPOSITION:**

Two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process with no glues or adhesives between dissimilar materials. The core material shall be free of voids and/or air spaces and not contain foamed insulation material. Products laminated sheet by sheet in a batch process using glues or adhesives between materials shall not be acceptable.

**C. ALUMINUM FACE SHEETS:**

Thickness: 0.5mm (0.019") nominal  
 Alloy: AA3105 H25 Series (Painted material)

**D. PANEL WEIGHT:**

1. 4mm (0.158"): 5.47 kg/m<sup>2</sup> (1.12 lb/ft<sup>2</sup>)
2. 6mm (0.236"): 7.28 kg/m<sup>2</sup> (1.49 lb/ft<sup>2</sup>)

**E. TOLERANCES:**

1. Panel Bow: Maximum 0.8% of any 1828mm (72") panel dimension.
2. Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.
3. Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle.
4. Maximum deviation from panel flatness shall be 1/8" (3.2mm) in 5'0" (1.52m) on panel in any direction for assembled units. (Non-accumulative - No Oil Canning)

## 2.03 FINISHES

- A. Fluoropolymer (Two) or (Three) Coat Coating System (***Architect Must Specify***): Manufacturer's standard two or three coat, thermo-cured system composed of specially formulated inhibitive primer, fluorocarbon color coat, and a clear fluorocarbon topcoat (applicable with three coat system). Both color coat and clear topcoat shall contain not less than 70% polyvinylidene resin by weight in compliance with AAMA 2605 for testing, performance, and application procedures.
1. Coil coated Kynar® 500 or Hylar® 5000 based Polyvinylidene Fluoride (PVDF) or Fluoro Ethylene – Alkyl Ether (FEVE) resin in conformance with the general requirements of AAMA 2605.
  2. Standard colors as selected by the Architect/Engineer from manufacturer's standard color charts.
  3. Custom colors are available and are subject to minimum quantities. Consult Sales Dept.
- B. CONSULT **METALWÉRKS®** FOR OTHER MATERIAL FINISHES AVAILABLE.

## 2.04 PERFORMANCE CRITERIA

- A. Architectural Metal panels shall be capable of withstanding building movements and weather exposures based on the following test standards required by the Architect and/or the local building code.
- B. Wind Load Panels shall be designed to withstand the Design Wind Load specified herein as Positive \_\_\_\_ PSF & Negative \_\_\_\_ PSF at typical zones and Positive \_\_\_\_ PSF & Negative \_\_\_\_ PSF at corner zones. Wind load testing shall be conducted in accordance with ASTM E 330 or verified through PE certified calculations to obtain the following results.
1. Deflection: Normal to the plane of the wall between supports, deflection of the secured perimeter panel flanges shall not exceed L/175.
  2. Normal to the plane of the wall, the maximum panel face deflection shall not exceed L/60 of the full span. No permanent deformation of the panel system will be allowed.
- C. Pressure Equalization and Airflow: The horizontal joint shall be designed to minimize water penetration through the rainscreen while permitting air to flow freely through the rainscreen element thus venting the cavity between the rainscreen and the air and water barrier backup. To achieve this performance the product must pass AAMA 508-07 @ 15 psf pressure difference ***with an imperfect air barrier***. Mockup specimen shall be 96" x 96". Testing with a fully sealed air barrier is not acceptable.
1. Air Leakage: ASTM E283-04 (Static): Air leakage measured through through the air/water barrier shall not exceed .13 cfm/square ft. when tested at 1.57 PSF (25 MPH)
  2. Water Penetration: When tested at 15 PSF:
    - i. ASTM E 331-00 (Static) allowable up to .22 SF of moisture penetration.
    - ii. AAMA 501.1 (Dynamic): allowable up to .53 SF of moisture penetration.
  3. Pressure Cycle testing: ASTM E 1233-06 Modified- 100 cycles from 5 to 25 PSF; pressure equalization must occur in less than .08 seconds.
- D. Compartmentalization: If required by the design of the project, Individual chambers will be isolated from each other in "compartments" to reduce horizontal and vertical airflow behind the panel system and promote vertical drainage to exterior within each compartment.

## 2.05 ACCESSORIES

1. Sealants within the panel system shall be as per manufacturer's standards to meet performance requirements.
2. Internal baffles: Reticulated 50 PPI polyurethane foam

3. Internal Flashing: sheet metal flashing which may be required at base or penetration conditions will be produced in the same material finish as the adjacent panels but will be provided in minimum .040" thickness or 24 ga 304 2B Stainless steel.
4. Coping: Wall copings will be produced with the same material as the wall panel system unless otherwise noted. Sheet metal flashing extensions will be acceptable in non-viewing areas in accordance with Manufacturer's recommended details.
5. Furring: Wall panels will be attached to minimum 16 ga. Type 304 stainless steel or .125" thick aluminum furring.
6. Fasteners: Panel fasteners shall be stainless steel or other corrosion resistant coated fastener for panel attachment in size and spacing as dictated by structural review.
7. Insulation: Exterior insulation for use in behind the panel air cavity and in front of the air/water barrier where required by Contract Documents.

## **PART 3: EXECUTION**

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### **3.01 INSPECTION**

1. Surfaces to receive panels shall be even, smooth, sound, clean and free from defects detrimental to work. The air water barrier will be fully installed prior to panel system installation and will be free of tears, penetrations and continuous. All adjacent systems will be fully integrated with the air water barrier including but not limited to roofing membranes, masonry backup flashings, curtain wall/window and other penetration flashings. Notify contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with erection until unsatisfactory conditions have been corrected.
2. Surfaces to receive panels shall be structurally sound as designed by the project Architect/Engineer. Note: 16 ga min. thickness spaced at 16" o.c. use of exterior wall studs necessary to resist fastener pullover.
  - a. Insert Technical requirements for CFMF here.

### **3.02 INSTALLATION**

1. Lay out wall grids from horizontal and vertical controls provided by Contractor/CM. Coordinate layout with adjacent trades' shop drawings.
2. Inspect air water barrier for penetrations, tears or inadequate lapping into adjacent materials and report any defects to CM/GC.
3. Erect panel furring plumb, level, and true using adjustable furring.
4. Seal any punctures created by furring installation through air water barrier using compatible tapes or sealants recommended by air water barrier manufacturer.
5. Panel attachment shall allow for the free vertical and horizontal thermal movement due to expansion and contraction for a material temperature range of -20°F to +180°F (-29°C to +82°C). Buckling of panels, opening of joints, undue stress on fasteners, failure of seals or any other detrimental effects due to thermal movement will not be permitted.
6. Flashing will be installed behind panel system and furring to marry the air water barrier to the flashing backup at openings and panel perimeters. Use a compatible sealant or tape to seal between flashing, furring fastener penetrations and air water barrier.
7. Panels shall be erected in accordance with an approved set of shop drawings.
8. Anchor panels securely and in accordance with approved shop drawings to allow for necessary thermal movement, compartmentalization and structural support.
9. Conform to panel fabricator's instructions and/or approved shop drawings for installation of concealed fasteners.
10. Do not install panels that are observed to be defective, including warped, bowed, dented, abraded, and cracked panels. Contact manufacturer for replacement and/or repairs.
11. Do not cut, trim, weld, or braze panels in a manner which would damage the finish, decrease strength, or result in visual imperfection or a failure in performance. Return panels which require alteration to shop for re-fabrication, if possible, or for replacement with new parts.

12. Separate dissimilar metals where needed to eliminate the possibility of corrosive or electrolytic action between materials.
13. Installation Tolerances: Shim and align panel units within installed tolerances of 1/4 inch in 20 feet, non-cumulative, on level/plumb/slope and location/line as indicated, and within 1/16 inch offset of adjoining faces and of alignment of matching profiles.

### **3.03 ADJUSTING AND CLEANING**

1. Remove and replace panels damaged beyond repair as a direct result of the panel installation. After installation, panel repair and replacement shall become the responsibility of the General Contractor/CM.
2. Repair panels with minor damage.
3. Remove protective film as soon as possible after installation.
4. Any additional protection, after installation, shall be the responsibility of the General Contractor/CM.
5. Final cleaning shall not be part of the work of this section.