* **PART 1 GENERAL**
* **SECTION INCLUDES [EDIT AS REQUIRED]**
* Supply and install rain screen aluminum composite material (“ACM”) architectural wall panels with snap-lock tab-over attachment system and accessories as required, to form a rain screen panel wall system over [a framed and sheathed substrate] [concrete] [with girts over concrete].
* **related REQUIREMENTS [EDIT AS REQUIRED]**
* [Section 03 30 00 - Cast-In-Place Concrete]
* [Section 05 10 00 - Structural Steel Framing]
* [Section 05 41 00 - Structural Metal Stud Framing]
* [Section 06 10 00 - Rough Carpentry]
* [Section 07 21 13 - Board Insulation]
* [Section 07 25 13 - Modified Bituminous Air and Vapor Retarders]
* [Section 07 62 00 - Sheet Metal Flashing and Trim]
* [Section 07 92 00 - Joint Sealants]
* **References**
* Aluminum Association, Inc. (AAI), Current edition
* DAF-45, Designation System for Aluminum Finishes.
* American Architectural Manufacturers Association (AAMA), Current editions
* AAMA 508 - Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems.
* AAMA 2605 - Specification for Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
* ASTM International (ASTM), Current editions
* ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
* ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
* ASTM D523 - Standard Test Method for Specular Gloss.
* ASTM D696 – Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer.
* ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints.
* ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
* ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
* ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
* ASTM D2244 - Standard Practice for Calculation of Colour Tolerances and Colour Differences from Instrumentally Measured Colour Coordinates.
* ASTM D2248 - Standard Practice for Detergent Resistance of Organic Finishes.
* ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
* ASTM D3359 – Standard Test Methods for Rating Adhesion by Tape Test.
* ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test.
* ASTM D4145 – Standard Test Method for Coating Flexibility of Prepainted Sheet.
* ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
* ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
* ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
* ASTM E1288 – Standard Test Method for The Durability of Biomass Pellets.
* Canadian General Standards Board, (CGSB), Current editions
* CAN/CGSB-S102 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
* CAN/ULC-S134 – Standard Method of Fire Test of Exterior Wall Assemblies.
* International Organization for Standardization (ISO), Current edition
* ISO 2360 - Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating thickness - Amplitude-sensitive eddy-current method.
* U.S. Green Building Council (USGBC), Current edition
* LEED V4 for Building Design and Construction
* LEED V4.1 for Building Design and Construction
* **system description [EDIT AS REQUIRED]**
* Architectural panel system comprised as follows:
* Aluminum-faced [polyethylene core] [fire-rated mineral core] panels with high performance fluorocarbon finish coating.
* Extruded aluminum panel frame and perimeter frame assembly, including back plates, top caps, inside and outside corner frames, and end frames.
* Fiberglass reinforced plastic (“FRP”) system clips.
* [OPTIONAL- Adhesive tape for permanent adhesion of I-beam stiffeners to the back side of the ACM panel to reduce deflection.]
* Extruded aluminum snap-lock top cap with high performance fluorocarbon finish for final attachment of panels to frame assembly.
* Design Requirements
* Structural Design: Composite wall panel system capable of withstanding dead loads, wind loads, snow loads and normal thermal movement without evidence of buckling, oil canning or other permanent deformation of assemblies or components.
* Dead Load, as required by applicable building code:
* Uniform pressure Inward of [\_\_\_] psf ([\_\_\_] kPa)
* Uniform pressure Outward of [\_\_\_] psf ([\_\_\_] kPa)
* Live Load, as required by applicable building code:
* Uniform pressure Inward of [\_\_\_] psf ([\_\_\_] kPa)
* Uniform pressure Outward of [\_\_\_] psf ([\_\_\_] kPa)
* Wind Load Inward:
* Uniform pressure Inward of [\_\_\_] psf ([\_\_\_] kPa)
* Uniform pressure Outward of [\_\_\_] psf ([\_\_\_] kPa)
* General Panel Properties:
* Thermal Expansion: ASTM D696, 2.4x10-5 per degree C
* Fire Propagation: CAN/ULC-S102
* Mineral Core Panel to ULC-S102
* 1. Smoke Developed = 5
* 2. Flame Spread = 1
* Wind-Pressure Resistance: ASTM E330: Tested. See Technical Data Sheet (Wind Loads).
* Pressure Cycling: ASTM E1288: Passed 100 cycles.
* Fire Resistance: CAN/ULC-S134
* Passed:
* Allowable average limit – ULC-S134: < 35 kW/m2;
* Visual flame spread – ULC-S134: did not exceed 3 m.
* High Performance Fluorocarbon Finish Coating:
* Minimum Thickness - ISO 2360: 27 micrometers
* Gloss - ASTM D523: 20-45%
* Pencil Hardness - ASTM D3363: 2H
* Toughness - ASTM D4145: 2T no rift
* Adhesive Force - ASTM D3359: 4B
* Impact Resistance - ASTM D2794: >100 kg.cm
* Abrasion Resistance - ASTM D968: 64.6 L/mil
* Mortar Resistance - AAMA 2605.2: 24 hrs no blister
* Humidity Resistance - ASTM D714: 3000 hrs no blister
* Boiling Water Resistance - ASTM D3359: passed
* Salt-Spray Resistance - ASTM B117: 3000 hrs no blister
* Acid Resistance - ASTM D1308: No effect
* Alkali Resistance - ASTM D1308: Passed
* Solvent Resistance - ASTM D2248: Passed
* Colour Retention - ASTM D2244: Delta E = 0.34
* Chalk Resistance - ASTM D4214: No chalking
* Gloss Retention - ASTM D2244: >80 percent
* **LEED CREDIT CONTRIBUTIONS**
* Coordinate LEED project and submittal requirements with Section 01 35 11 - LEED Requirements.
* **Action Submittals / information submittals**
* LEED Submittals: Coordinate LEED submittal requirements with Section 01 35 11 - LEED Requirements.
* Product Data: Submit manufacturer's product data, standard drawing details, installation instructions and Material Safety Data Sheets (MSDS) for system and individual components.
* Submit shop drawings in accordance with Section 01 33 00 – Submittals:
* Indicate layout, profiles and product components including anchorage, accessories, finish colours and textures.
* Include details showing thickness and dimensions of the various system parts, fastening and anchoring methods, locations of joints and gaskets and location and configuration of movement joints.
* Include references for wind load requirements.
* Colour Charts: Submit panel manufacturer’s colour charts showing full range of standard colours and finishes.
* Close-out Submittals: Upon project completion, submit manufacturer’s warranties, including limitations and conditions. Coordinate LEED Close-out Submittal requirements with Section 01 35 11  LEED Requirements.
* Warranties: Submit manufacturer’s product warranties.
* **Quality Assurance [EDIT AS REQUIRED]**
* Coordinate requirements with Section 01 45 00 - Quality Control.
* Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, manufacturer’s installation instructions, and manufacturer’s warranty requirements.

* Participants: General Contractor, installation subcontractor, [Construction Manager,] [Owner,] [Consultant], [Architect,] and [Engineer].
* Review wall framing for potential interference and conflicts; coordinate layout and support provisions for interfacing work.
* Review construction schedule and confirm availability of products, installation personnel, equipment and facilities.
* Review regulatory, insurance and certification requirements.
* Review field quality control procedures.
* Mock-Ups: Mock up complete system at location as directed by [Consultant] [Architect] [Engineer].
* In mock-up, demonstrate prepared substrate, support/attachment framing, panel façade, exterior finishes and aesthetic appearance.
* Verify mock-up as conforming to manufacturer’s instructions and provisions of Contract Documents.
* Do not commence work of this Section until after mock-up has been accepted in writing by [Consultant] [Architect] [Engineer] [Owner’s Representative].
* Protect and maintain accepted mock-up as standard of quality for work of this Section.
* Accepted mock-ups may be incorporated into the work of this Section with written acceptance and approval by [Consultant] [Architect] [Engineer].
* **Delivery, Storage and Handling**
* Ordering: Conform to manufacturer’s ordering instructions and lead time requirements to avoid construction delays.
* Deliver materials and components in manufacturers’ unopened containers or bundles, fully identified by name, brand, type and grade. Prevent damage during unloading, storing and installation.
* Store, protect and handle materials and components in accordance with manufacturer’s recommendations to prevent twisting, bending, mechanical damage, contamination and deterioration.
* Store materials off ground on clean pallets and keep clean, dry, flat, and free of dirt and other foreign matter.
* Do not expose panels with strippable film to direct sunlight or extreme heat.
* **Project/Site Conditions**
* Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work
* Undertake installation work only when weather conditions meet manufacturers’ specific environmental requirements and when conditions will permit work to be performed in accordance with manufacturer recommendations and warranty requirements.
* **WASTE MANAGEMENT AND DISPOSAL [EDIT AS REQUIRED]**
* Separate waste materials for recycling in accordance with Section [01 74 21 – Waste Management and Disposal].
* **Warranty [EDIT AS REQUIRED]**
* Manufacturer’s Product Warranties:
* Panel System: Fifteen Year Limited Product Warranty against physical defects of systems and products that are properly installed and maintained according to the manufacturer’s published application instruction.
* Finish Coating: Twenty Year Limited Finish Warranty against the following:
* Peeling and checking of finish, except slight crazing or cracking as may occur on tightly roll-formed edges or brake bends at time of forming.
* Chalking of exterior paint in excess of eight when measured in accordance with ASTM D4214
* Fading or colour changes in excess of five colour difference units when measured in accordance with ASTM D2244 on exposed painted surfaces.
* Contractor’s Labor Warrantees: [One-year] [Two-year] labor warranty, starting from [date of Owner acceptance of completed work] [Substantial Performance], to cover repair of materials found to be defective as a result of installation errors.
* **PART 2 PRODUCTS**
* **2.1 Manufacturer**
* AL13® Architectural Systems, Tel: 855-438-2513, Info@AL13.com, [www.AL13.com](http://www.al13.com/).
* **2.2 Architectural Panels [EDIT AS REQUIRED]**
* Aluminum-faced composite architectural panels:
* Panel Size: 4 feet x 8 feet (1220mm x 2440mm). [Custom sizes as required up to 1324mm x 3048mm (5 foot x 10 foot).]
* Panel Thickness: [3mm (0.12 inch)] [4mm (0.157 inch)]
* Core Material: [polyethylene] [fire-rated mineral core (non-combustible)].
* Panel Weight:
* Polyethylene core:
* 3mm/0.50mm (0.12 inch/0.02 inch): 4.71 kg/m2 (0.96 lb/ft2 )
* 4mm/0.50mm (0.16 inch/0.02 inch): 5.71 kg/m2 (1.17 lb/ft2)
* Fire-rated mineral core:
* 3mm/0.40mm (0.12 inch/0.12 inch): 6.20 kg/m2 (1.27 lb/ft2))
* 4mm/0.50mm (0.16 inch/0.02 inch): 8.18 kg/m2 (1.68 lb/ft2))
* Aluminum face sheets: AA A3003-H24 alloy aluminum sheet with nominal thickness of 0.5mm (0.020 inches).
* Finish: fluorocarbon coating per AAMA 2605.
* Colour: [as selected by Owner from manufacturer’s standard finish guide] [custom colour matched].
* Acceptable Materials:
* AL13® Architectural Panels as manufactured by Anenda Systems Inc.
* **2.3 ATTACHMENT FRAMING [EDIT AS REQUIRED]**
* Girts: Fabricated from minimum 18-gauge (1.27mm) thickness galvanized steel to ASTM A653, Grade 230 with Z275 coating. Material visible after assembly of wall panel shall be finished to match aluminum panels.
* Subgirts: Structural quality steel to ASTM A653, with Z275 zinc coating to ASTM A792, adjustable double-angle profile as indicated to accept panel with structural attachment to building frame.
* Back Plates, Corner Frames and End Frames: AA 6063-T5 extruded aluminum, wall thickness generally 1.57mm (0.062 inches) thick.
* Panel Joint Top Caps: AA 6063-T5 extruded aluminum snap-lock top cap providing 46.5mm (1.83 inch) wide flat cap and 13mm (0.51 inches) deep reveal by 13.1mm (0.52 inches) [at bottom] to 15.1mm (0.59 inches) [at top]. The reveal has drafted side walls of 5 degrees.
* Coating: High performance fluorocarbon finish.
* Colour: [as selected by Owner from manufacturer’s finish guide] [custom colour matched].
* Acceptable Materials:
* As recommended by manufacturer.
* **2.4 Accessories [EDIT AS REQUIRED]**
* AL13® adhesive tape for permanent adhesion of I-beam stiffeners to the back side of the ACM panel for added panel rigidity (optional application).
* Acceptable Material: AL13® Adhesive Tape as manufactured by Anenda Systems Inc.
* Fasteners:
* Attachment of System frame components to Steel Substrate: #10-16 x 19.05mm (¾ inch) self-drilling screws with corrosion-resistant coating. Installed every 60.96cm (24 inches) on center.
* Acceptable Materials:
* #10-16 x ¾ inch AL13® Hex-Head Fastener, coated with drill-point.
* Attachment of System frame components to Wood Substrate: #12-14 x 38mm (1 ½ inch) mini drill-point fasteners with EPDM composite washers and corrosion-resistant coating. Installed every 40.64cm (16 inches) on center, unless securing a segmented (8.25cm) (3 ¼ inch) backplate (installed 40.64cm (16 inches) on center), in which case two fasteners per segmented piece are required.
* Acceptable Materials:
* #12-14 x 1 ½ inch AL13® Hex-Head Fastener, coated with mini-drill point.
* Attachment of System frame components to Concrete Walls: 6.35mm (¼ inch) diameter threaded stainless steel concrete screw anchor. Minimum embedment into concrete of 31.75mm (1 ¼ inch). Ultimate withdrawal resistance shall be a minimum of 750 lbf. Installed every 60.96cm (24 inches) on center.
* Acceptable Materials:
* ¼ inch stainless steel AL13® Hex Head Screw Anchor, with matched tolerance drill bit.
* For larger installed areas over concrete, it is recommended to install a furring bar or Z-girt for panel attachment. Attaching frame components directly to concrete is time consuming.
* Fastener Corrosion Resistance:
* Carbon Steel: Coated to provide not less than 1,700 hours of ASTM B117 salt spray performance with no white or red rust; 18 cycles of ASTM G87 (DIN 50018) SO2 Kesternich testing with not more than 15 percent red rust.
* Stainless Steel: 304, 305, or 316 Series Stainless Steel.
* Isolation Tape: Manufacturers standard material for separating dissimilar metals from direct contact.
* Insulation Fastenings: Corrosion resistant, hot dipped galvanized bugle head screws with 38mm (1 ½ inch) diameter washer, 25mm (one inch) minimum penetration into framing.
* Insulation: Rigid type [4] [3] [2] as specified in Section 07 21 13.
* Air/Vapor Retarder: Selfadhesive membrane as specified in Section 07 27 13.
* System Sealants: Sealants within the panel system, as recommended by manufacturer, colour [as selected by Consultant] [to match adjacent surface].
* Gaskets: Santoprene or EPDM.
* Flashings: Fabricate flashing from 1.57mm (0.062 inch) minimum thickness aluminum sheet. Where exposed to view, finish to match adjacent panels. Provide lap strip under flashing at abutted conditions; with lapped surfaces sealed with a fullbed of nonhardening sealant.
* **2.5 FABRICATION**
* Aluminum wall panels and components shall comply with details as indicated on shop drawings.
* All components shall be factory fabricated ready for field installation. All components shall match quality and installation of accepted mockup specified above.
* Tolerances:
* Panel bow shall not exceed 0.8 percent of panel overall dimension in width or length.
* Panel dimensions shall allow for field adjustment and thermal movement.
* Panel lines, breaks and curves shall be sharp, smooth and free of warps or buckles.
* Panel shall be visually flat.
* Panel surfaces shall be free of scratches or marks caused during fabrication or installation.
* **PART 3 EXECUTION**
* **3.1 MANUFACTURER’S INSTRUCTIONS**
* Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
* **3.2 PREPARATION [EDIT AS REQUIRED]**
* Installing Contractor shall obtain all dimensions from job site.
* Ensure all structural support is aligned, planar and in acceptable condition.
* Building surfaces shall be smooth, clean and dry, and free from defects detrimental to the installation of the system. Notify [Owner’s Representative] [General Contractor] [Architect] [Consultant] of conditions not acceptable for installation of system.
* Inspect wall system and components before installation and verify that there is no shipping damage.
* Do not install damaged panels; repair or replace as required for smooth and consistent finished appearance.
* **3.3 Installation**
* Install panel system and components in accordance with manufacturer’s published installation instructions and shop drawings.
* Ensure continuity of building envelope air barrier and vapor retarder systems.
* Erect components plumb and true.
* Attachment system shall allow for vertical and horizontal thermal movement due to thermal changes. The product shall not be installed where surface temperatures are anticipated to exceed 82°C (180°F). Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement shall not be permitted.
* Drill 6.35mm (0.25 inch) drainage weep holes length of horizontally oriented bottom end frames located at base of panelized wall areas as recommended by building envelope engineer.
* Adjust assembly to secure panels safely to wall while allowing for expansion and contraction of components. Ensure extrusion tabs overlap panel edges by at least half of extrusion tab depth.
* Do not install defective component parts, including warped, bowed, dented, abraised, and broken members.
* Do not cut, trim, weld, or braze component parts during erection in manner which would damage finish, decrease strength, or result in visual imperfection or failure in performance. Return component parts which require alteration to shop for further fabrication, if possible, or for replacement with new parts.
* Site Tolerances:
* Variation from plane or location shown on shop drawings: 10mm over 10m (0.4 inches over 33feet) length to maximum of 20mm over 100m (0.79 inches over 328 feet).
* Deviation of vertical and horizontal members: 3mm maximum over 8.5m (0.12 inches over 28-feet) run.
* Offset between two adjacent members abutted end-to-end, in line: maximum 0.75mm (0.03 inch) from true alignment.
* Touch-Up Painting: Inspect completed wall system and apply matching touch-up paint as needed to correct minor paint flaws.
* **3.4 Field Quality Control**
* Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
* **3.5 Cleaning and Protection [EDIT AS REQUIRED]**
* Remove and replace panels damaged beyond repair as direct result of panel installation.
* Repair panels with minor damage
* Remove protective film from finish panels within 60 days once installation is complete or as otherwise directed by the [Owner] [Owner’s Representative] [Architect] [Consultant] [Engineer].
* Provide additional protection required after installation to protect assembly and finishes during construction.
* Weep holes and drainage channels shall be unobstructed and free of dirt and sealants.
* Upon final acceptance of installation, remove surplus and protective materials, excess materials, rubbish, tools and equipment from site.
* Leave panels clean and free of debris and residue. Where required, clean exposed panel surfaces using non-abrasive detergent and clean water in accordance with manufacturer’s instructions.

**END OF SECTION**