

## **SECTION 074213.23 – 4mm METAL COMPOSITE MATERIAL (MCM) RAINSCREEN SYSTEM SPECIFICATION**

### PART 1 – GENERAL

#### 1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

#### 1.02 SUMMARY

- A. Definition:
  - 1. Metal Composite Material (MCM) System includes MCM, joints, attachment system components and miscellaneous materials as appropriate for the design of the project to provide a weather-resistant exterior cladding system.
- B. Section Includes: MCM system installations
  - 1. Applications of MCM system installations include:
    - a. Exterior installation and performance of MCM and MCM system components.
    - b. Interior installation and performance of MCM and MCM system components (if applicable).
- C. Related Sections: Section(s) related to this section include:
  - 1. Cold-Formed Metal Framing: Division 05 Metal Framing Sections
  - 2. Weather Barrier in Cavity Behind MCM: Division 07 Air and Vapor Barrier
  - 3. Sheet Metal Flashing and Trim: Division 07 Flashing and Trim Section
  - 4. Joint Sealants: Division 07 Joint Treatment Section
  - 5. Aluminum Windows: Division 08 Aluminum Windows Section
  - 6. Glazing: Division 08 Glass and Glazing Section
  - 7. Metal Framed Curtain Wall: Division 08 Curtain Wall Sections

#### 1.03 REFERENCES

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed have either been identified by the International Building Code (IBC), local building code, or specific requirement for this building construction type.
- B. Aluminum Association (AA)
  - 1. Aluminum Design Manual
  - 2. AA-M12C22A41: Anodized - Clear Coating
  - 3. AA-M12C22A44: Anodized - Color Coating
- C. American Society of Civil Engineers (ASCE)
  - 1. ASCE/SEI 7 Minimum Design Loads for Buildings and Other Structures
- D. American Society for Testing and Materials (ASTM) International:
  - 1. ASTM D635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
  - 2. ASTM D1781 Standard Test Method for Climbing Drum Peel for Adhesives
  - 3. ASTM D1929 Standard Test Method for Determining Ignition Temperature of Plastics
  - 4. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
  - 5. ASTM E283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the

Specimen

6. ASTM E330 Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference
  7. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Curtain Wall, and Doors By Uniform Static Air Pressure Difference
  8. ASTM E1233 Standard test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Air Pressure Differential
- E. American Architectural Manufacturers Association (AAMA):
1. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels
  2. AAMA 501 Methods of Test for Exterior Walls
  3. AAMA 508 Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems
  4. AMMA 509 Voluntary Test and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems
- F. National Fire Protection Association (NFPA):
1. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

#### 1.04 SYSTEM DESCRIPTION

- A. Performance Requirements:
1. General Performance: Provide installed MCM system designed to withstand specified loadings while maintaining allowable deflection, thermal movement performance as defined by the Manufacturer, Fabricator, or Installer required by this section without defects, damage or failure.
- B. Deflection and Thermal Movement: Provide installed MCM systems that have been designed to resist to the wind loading, acting inward and outward, defined for this project:
1. Perimeter Framing Deflection: Deflection of panel perimeter framing member shall not exceed  $L/175$  normal to plane of the wall where L is the unsupported span of the perimeter framing member.
  2. Panel Deflection: Deflection of the panel face shall not exceed  $L/60$  at design load where L is the unsupported span of the panel.
  3. Anchor Deflection: At connection points of framing members to anchors, anchor deflection in any direction shall not exceed 0.0625 inch (1.6 mm).
  4. At 150% pressure, no permanent deformation exceeding  $L/1000$  or failure to structural members is permitted.
  5. Thermal Movements: Allow for free and noiseless horizontal and vertical thermal movement due to expansion and contraction of component parts over a temperature range of  $-20^{\circ}\text{F}$  ( $-29^{\circ}\text{C}$ ) to  $+180^{\circ}\text{F}$  ( $82.2^{\circ}\text{C}$ ) at the material surface.
    - a. Buckling, opening of joints, undue stress on fasteners, failure of sealants, or any other detrimental effects of thermal movement will not be permitted.
    - b. Fabrication, assembly and erection procedures shall take into account the ambient temperature range at the time of the respective operation.
- C. System Requirements: (System Type Dependent)
1. Drained and Back Ventilated Rainscreen System (DBVR) – (Tested to AAMA 509 Standard)
    - a. ASTM E283 – Air Leakage – When tested to AAMA 509 standards, the air flow measurement across the MCM system (excluding jamb conditions) shall be measured to determine the V-axis classification on chart 1b from AAMA 509.

- b. ASTM E331 and AAMA 501.1 – Water Infiltration Measurement - When tested to AAMA 509 standards, at pressures of 6.24 psf (300 Pa) and 12.0 psf (575 Pa) for ASTM 331 and AAMA 501.1, the average water from the four (4) tests shall be collected, measured, and averaged to determine the W-axis classification.
  - i. The system shall have a classification where the V-axis classification number is greater than or equal to the W-axis classification number as presented on the AAMA 509 Chart 1a or 1b. (i.e. V2/W2 is acceptable, V1/W2 is not acceptable)
- c. ASTM E330 (Modified AAMA 509) – Structural Performance – MCM system must be engineered to meet the project design loads, however the MCM system must meet or exceed the following criteria when tested to a minimum pressure of 30.0 psf (1436 Pa). Note: ASTM E330 test shall be conducted with MCM system joinery closed (taped or sealed) producing the required static loads on the MCM system. The AWB is not to be loaded for the measurement:
  - i. Deflections do not exceed limitations defined within the section on Deflection and Thermal Movement.
- D. Fire Performance: Where required by governing code, provide fire retardant MCM that has been evaluated and is in compliance with code requirements specified herein.
  - 1. Fire Performance: Wall assemblies containing MCM System shall meet the requirements of the Intermediate Scale Multi-story test, NFPA 285, where required by code based for the design of this project.

#### 1.05 SUBMITTALS

- A. General: Provide submittals in accordance with Conditions of the Contract and Division 01 Submittal Procedures Section.
- B. Product Data: For each type of product indicated, include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of MCM System and accessory.
- C. Shop Drawings: Submit shop drawings showing elevations and layouts, profiles, and product components, including anchorage, accessories, finish colors, and textures.
  - 1. Include details showing thickness and dimensions of the system parts, details of edge conditions, attachment system, corners, fastening and anchoring methods, locations of joints and gaskets, location and configuration of joints necessary to accommodate thermal movement, and all trim and flashings.
  - 2. Provide signed and sealed drawings by a qualified Design Professional in the project jurisdiction, of the MCM System showing conformance with the performance requirements and design criteria identified for this project.
- D. System Calculations: Submit MCM System Fabricator's complete system design and engineering analysis/calculations including, but not limited to the following:
  - 1. Show governing MCM types, mounting system including anchorages, connections, and fasteners. Indicate location, type magnitude, and direction of loads imposed on the building structural frame.
  - 2. Analysis/Calculations shall be signed and sealed by a qualified Design Professional in the project jurisdiction that the MCM system shows conformance with the performance requirements and design criteria identified for this project.
- E. Samples: Submit selection and verification samples for finishes, colors and textures
  - 1. Selected Samples: Manufacturer's color charts or chips illustrating full range of colors, finishes and patterns available for MCM with factory applied finishes. Custom color selection requires color sample to be submitted for approval. Approval signatures are required by Owner and/or Architect.

2. Verification Samples:
  - a. MCM System assembly: 12 inch × 12 inch (305 mm × 305 mm) MCM system samples in thickness specified, including clips, anchors, supports, fasteners, closures and other panel accessories. Panel sample need not be provided in the specified color.
  - b. Two samples of each color or finish selected, approximately 3 inch x 4 inch (76.2mm x 101.6mm) minimum.
  - c. Custom color samples may contain drawn down lines. Sizes for custom color samples are limited.

F. Quality Assurance Submittals: Submit the following:

1. MCM Manufacturer's material test reports: Certified test reports showing compliance with specified performance requirements, and a third-party listing documenting compliance to a comparable code section.
2. Certificates: Product certificates signed by MCM Manufacturer when requested certifying MCM complies with specified performance requirements indicated in this specification.
3. MCM System Fabricator's certified system test reports: Certified system test reports showing system compliance with specific performance characteristics or a third-party listing documenting compliance to a comparable code section. Performance requirements shall be based on the type of MCM systems provided:
  - a. Drained and Back Ventilated Rainscreen System (DBVR)
    - i. Tested to AAMA 509 Standard

G. Closeout Submittals: Submit the following:

1. Warranty: MCM Manufacturer, Fabricator, and Installer warranty documents as specified within the warrantee section of this specification.

## 1.06 QUALITY ASSURANCE

A. Qualifications:

1. MCM Manufacturer Qualifications: Company with a minimum of 10 years of continuous experience manufacturing MCM of the type specified in North America:
  - a. Able to provide specified warranty on finish.
  - b. Able to provide a list of other projects of similar size, including approximate date of installation and name of Architect for each.
2. MCM System Fabricator Qualifications: The MCM System Fabricator of this project's MCM System must be:
  - a. A Certified MCM Fabricator by the Metal Construction Association (MCA) or
  - b. Meet the Fabricator Requirements shown in this section and provide supporting documentation ten (10) days prior to Bid.
    - i. Fabricator Requirements:
      - a) The MCM System Fabricator shall demonstrate and offer written attested certification by at least one (1) specified MCM Manufacturer that he has fabricated; a minimum of 150,000 square feet (13935 square meters) of architectural walls per year, that are used as the building weathering envelope, utilizing MCM of at least 4mm (0.157 inch) thickness.
      - b) System components shall be shop fabricated.
      - c) Fabrication of other types of panels or fabricator's goods is not considered as meeting the above requirement.
      - d) MCM System Fabricator shall have been in business under its present name for at least five (5) years prior to the start of this project.
      - e) MCM System Fabricator shall not have filed for protection from creditors under state or federal insolvency or debtor relief statutes or codes.

- f) MCM System Fabricator shall substantiate a track record of one of the Manufacturers listed in this specification working with the Fabricator/Installer for three (3) consecutive years and at a scale of operations cited above.
3. MCM System Installer Qualifications:
    - a. The MCM System Installer shall have been in business under the present name for at least five (5) years prior to the start of this project and have experience with similar sized MCM system projects. The MCM System Installer must be capable of providing field service representation during construction.
    - b. The MCM System Installer must be an approved installer by a MCA Certified Fabricator for the installation of their MCM System and have undergone proper training for the specified system thereof.
  - B. Regulatory Code Agencies Requirements: Provide MCM system which have been evaluated and are in compliance with the following, where required:
    1. International Code Council (ICC)
    2. City of Los Angeles (Research Report)
    3. Miami/Dade County Florida (Notice of Acceptance)
    4. State of Florida (Florida Product Approval)
  - C. Mock-Ups: Install at project site a job mock-up using acceptable products and Fabricator approved details. Obtain Owner's and Architect's acceptance of finish color (draw down samples to be used for color approval of nonstandard coil coated colors), texture and pattern and workmanship standard. Comply with Division 01 Quality Control, Mock-Up Requirements Section.
    1. Mock-Up Size: To provide as detailed in the construction documents if a standalone Mock-Up is required.
    2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
    3. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.
    4. Additional Cost: Material required for custom color mock-ups may require special small quantity material runs that may increase cost and require additional time to obtain material.
  - D. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, and system Fabricator's installation details.

#### 1.07 PROJECT CONDITIONS

- A. Substrate Tolerances: The General Contractor is responsible for providing a substrate with a tolerance of 1/4 inch in 20.0 feet (6mm in 6m), on level, plumb, and location control lines as indicated and within 1/8 inch (3mm) offset of adjoining faces of alignment of matching profiles tolerances are noncumulative.
- B. Field Measurements: Verify locations of wall framing members and wall opening dimensions by field measurements prior the fabrication of the MCM System. Indicate measurements on the "As Built Shop Drawings". Field measurements to be taken once all substrate materials and adjacent materials are installed.
- C. Project Schedule: Provisions in the project schedule must accommodate the time interval between field measurements and fabrication/installation.

#### 1.08 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. MCM Manufacturer's Material Warranty: Submit, to the Owner, the manufacturer's standard warranty.
  1. Warranty Period:
    - a. MCM Material Integrity: Five (5) plus 1 years from date of shipment

- b. MCM Painted Finish: Twenty (20) plus 1 years from date of shipment
  - c. MCM Natural Metal Surface: No finish warranty
  - d. Anodized Finish: Five (5) plus 1 years from date of shipment
- C. MCM System and System Installation Warranty: Submit to the Owner, the MCM Fabricator system's standard warranty document executed by authorized company official. The MCM system's assembly warranty is in addition to and not a limitation of, other rights Owner may have under the Contract Documents.
- 1. Warranty Period
    - a. MCM System Workmanship: One (1) year warranty period commencing on Date of Substantial Completion.
    - b. Special Warranty: The MCM System Fabricator will repair or replace components of the MCM System that fails in materials or workmanship within the specified one (1) year warranty period above.
      - i. Failures include: deterioration of metals and other materials beyond normal weathering; structural failures including rupturing, cracking, puncturing, or loss of bond/adhesion characteristics.

## PART 2 – PRODUCTS

### 2.01 METAL COMPOSITE MATERIAL (MCM) Manufacturers and Premium MCM System Fabricators

- A. MCM Manufacturers:
  - 1. Alpolic material manufactured by Mitsubishi Chemicals – [www.alpolic-americas.com](http://www.alpolic-americas.com)
  - 2. Alucobond material manufactured by 3A Composites USA, Inc. – [www.alucobondusa.com](http://www.alucobondusa.com)
  - 3. Reynobond material manufactured by Alcoa Architectural Products – [www.reynobond.com](http://www.reynobond.com)
- B. MCM System Fabricators:
  - 1. Basis of Design: CEI Composite Materials, LLC – [www.CEIComposites.com](http://www.CEIComposites.com)
  - 2. Premium Certified MCM Fabricators recognized by the Metal Construction Association

### 2.02 METAL COMPOSITE MATERIAL (MCM)

- A. Material Description
  - 1. MCM Composition:
    - a. Two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process with no glues or liquid adhesives between dissimilar materials. The core material shall be free of voids and/or air spaces and not contain foamed insulation material. Products that are laminated sheet by sheet in a batch process using glues or adhesives between materials shall not be acceptable.
  - 2. MCM Thickness: 4mm (0.157 inch)
  - 3. MCM Face Sheets:
    - a. Thickness: 0.5mm (0.02 inch) (nominal)
  - 4. MCM Product:
    - a. Standard core material product acceptable for use:
      - i. Less than 40 feet (12.2m) above grade in general accordance with the provisions of IBC Section 1407, or
      - ii. Up to 50 feet (15.2m) above grade when used in general accordance with the specific provisions of IBC Section 1407.11.2 and complying with the performance requirements of ASTM D1929, or
      - iii. Up to 75 feet (22.9m) above grade when used in general accordance with the specific provisions of IBC Section 1407.11.3 and complying with the performance

- requirements of ASTM D1929, ASTM D635 or
- iv. Up to 75 feet (22.9) above grade when used in general accordance with the specific provisions of IBC Section 1407.11.4 and complying with the performance requirements of ASTM D1929, ASTM D635 or
  - v. Type V construction
- b. Fire Retardant core material product acceptable for use:
- i. On any construction where standard core material is allowed for use or
  - ii. On Types I, II, III, and IV Construction to any height above grade in general accordance with the specific provisions of IBC Section 1407.10.
5. Fire Performance: (Class A Material)
- a. ASTM E84: MCM shall have a flame spread index of not more than 25 when tested in the maximum thickness intended for use.
  - b. ASTM E84: MCM shall have a smoke developed index of not more than 450 when tested in the maximum thickness intended for use.
6. Bond Integrity: Tested for resistance to delamination as follows:
- a. Peel Strength (ASTM D1781): 22.5 in-lb/in (100 N-m/m) minimum as manufactured.
  - b. No degradation in bond performance after 8 hours of submersion in water at 212°F (100°C) or 21 days of immersion in water at 70°F (21°C).
  - c. Thermally bonded to the core material in a continuous process under heat, pressure, and tension.

## 2.03 FINISH

- A. Exterior Finish: Finish shall meet the performance criteria of AAMA 2605.

**[CHOOSE ONE – IF MULTIPLE COLORS ARE NEEDED BE SURE TO PROPERLY LABEL EACH COLOR AND THEIR LOCATIONS ON ALL APPLICABLE DRAWINGS]**

1. Standard 2-coat finish:
  - a. Selected from a Manufacturer's standard color chart
2. Standard 2-coat Mica finish:
  - a. Selected from a Manufacturer's standard color chart
3. Standard 3-coat finish:
  - a. Selected from a Manufacturer's standard color chart
4. Custom 2-coat finish:
  - a. Selected by the Owner or Architect
5. Custom 2-coat Mica finish:
  - a. Selected by the Owner or Architect
6. Custom 3-coat finish:
  - a. Selected by the Owner or Architect
7. Standard 1-coat FEVE Clear finish:
  - a. Selected from a Manufacturer's standard color chart
8. Standard Specialty finish:
  - a. Selected from a Manufacturer's standard color chart

- 9. Natural Metal finish:
  - a. Selected by the Owner or Architect

#### 2.04 ACCESSORIES

- A. General: Provide Fabricator's standard MCM system accessories, including fasteners, clips, anchorage devices, and attachments for specific applications indicated on contract documents.

#### 2.05 RELATED MATERIALS

- A. General: Refer to other related sections in Related Sections paragraph specified herein for related materials, including cold-form metal framing, flashing and trim, joint sealants, aluminum windows, glass and glazing and curtain walls.

#### 2.06 FABRICATION

- A. General: Shop-fabricate panels to sizes and joint configurations indicated on drawings.
  - 1. Fabricate panels to dimensions indicated on drawings based on an assumed design temperature of 70°F (21°C). Allow for ambient temperature range at time of fabrication.
  - 2. Formed MCM panel lines, breaks and angles to be sharp and true, with surfaces that are free from warp or buckle.
  - 3. Fabricate panels with sharply cut edges and no displacement of face sheet or protrusion of core.
- B. Fabrication Tolerances: Shop-fabricate panels to sizes and joint configurations indicated on drawings.
  - 1. Width: +/- 0.079 inch (+/- 2mm) @ 70°F (21°C)
  - 2. Length: +/- 0.079 inch (+/- 2mm) @ 70°F (21°C)
  - 3. Squareness: +/- 0.079 inch (+/- 2mm) @ 70°F (21°C)
- C. System Type
  - 1. R4000 Drained and Back Ventilated Rainscreen System
    - a. System must provide an open joint design with allowance for adequate ventilation while preventing excessive water infiltration to contact the air/water barrier. The moisture barrier and sheeting must be installed and compliant to related sections. All Drained and Back Ventilated Rainscreen systems must have undergone the voluntary test and classification of AAMA 509.
- D. Attachment System Components
  - 1. Formed from extruded aluminum as indicated on Contract Drawings to meet the specified design loads and system test performance according to each MCM System Fabricator's design. Galvanized cold formed steel clips or staggered aluminum angles are not acceptable for panel to panel attachment.
  - 2. Panel stiffeners, as required, shall be positively engaged in the perimeter extrusion or mechanically fastened to the perimeter extrusion and *shall* be secured to the rear face of the composite panel with silicone or high-strength double-sided bonding tape of sufficient size and strength to maintain panel's specified deflection under load. Structural calculations shall be provided to show the adequacy of this connection to resist the applied loads. Galvanized steel and MCM are not to be used as stiffener elements. Only panel stiffeners composed of extruded aluminum or 300 Series stainless steel shapes shall be adequate.

### PART 3 – EXECUTION

#### 3.01 MCM FABRICATOR/INSTALLER INSTRUCTIONS

- A. Compliance: Comply with Manufacturer's product data, including product technical bulletins and product packaging instructions.

#### 3.02 EXAMINATION



- A. Site Verification of Conditions: Verify that conditions of substrates previously installed under other sections are acceptable for the MCM system installation. Documentation should be provided indicating any conditions detrimental to the performance of the MCM System.

### 3.03 PREPARATION

- A. Miscellaneous Framing: Install miscellaneous MCM system support members and anchorage according to MCM System written instructions and drawings supplied by the MCM System Fabricator.
- B. If required per project conditions, field measurements of the site condition are to be taken prior to beginning fabrication work and notification of any material modifications and resulting schedule adjustment shall be formally documented.

### 3.04 INSTALLATION

- A. General:
  - 1. Install the MCM system plumb, level and true in compliance with MCM System fabricator's recommendations.
  - 2. Anchor the MCM system securely in place in accordance with Fabricator's approved shop drawings.
  - 3. Comply with the MCM System Fabricator's instructions for installation of concealed fasteners and with provisions of Section 079000 for installation of joint sealants.
  - 4. Installation Tolerances: Maximum deviation from horizontal and vertical alignment of installed panels: 0.25 inch in 20 feet (6.4mm in 6.1m), noncumulative.
  - 5. Do not cut, trim, weld, or braze component parts during erection in a manner which would damage the finish, decrease strength, or result in visual imperfection or a failure in performance. Return component parts which require alteration to shop for modification, if possible, or for replacement with new parts.
  - 6. Separate contact of dissimilar metals with bituminous paint, approved plastic shims, or other approved methods as defined within the Aluminum Design Manual (ASD). Use gasketed or approved coated fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.
- B. Related Products Installation Requirements: Refer to other sections in Related Sections paragraph herein for installation of related products.

### 3.05 FIELD QUALITY REQUIREMENTS

- A. Field Quality Control: When required by contract, mock up shall be constructed and tested at the expense of the Architect/Owner/General Contractor, conduct water-spray test on the mock-up of the MCM System, testing for water penetration according to AAMA 501.2.
- B. Testing Agency: If required, the Owner shall engage a qualified testing agency to perform tests and inspections.

### 3.06 ADJUSTING and Cleaning

- A. Adjusting:
  - 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.
  - 2. Removal of panels damaged by other trades shall be the responsibility of the General Contractor.
  - 3. Repair components of the MCM system with minor damage such that repairs are not discernible at a distance of 10 feet (3m) from the surface at a 90° angle per AAMA 2605.
  - 4. Remove and replace components of the MCM system damaged beyond repair.
  - 5. Remove protective film immediately after installation of MCM and immediately prior to

completion of the MCM system work. Masking intentionally left in place after panel installation on an elevation at the direction of the General Contractor, shall become the responsibility of the General Contractor.

6. Any additional protection, after installation, shall be the responsibility of the General Contractor.
7. Make sure weep holes and drainage channels are unobstructed and free of dirt and sealants.
8. Remove from project site damaged MCM panels, protective film and other debris attributable to work of this section.

B. Cleaning:

1. Final cleaning shall not be part of the work of this section.

END OF SECTION