**Guide Specification:**

**Envelope 2000® - RainScreen (RS) System**

**Citadel Architectural Products, Inc.**

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SECTION 07 42 43 - COMPOSITE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

 A. Section Includes:

 1. Wall panel assembly consisting of:

 a. Metal Composite Material (MCM)

 b. Installation System

 c. Accessories

 2. The extent of the wall panel assembly as indicated in these specifications

 and in the drawings.

 B. Related Sections:

 1. Section 05 10 00 - Structural Metal Framing

 2. Section 06 10 00 - Rough Carpentry

 3. Section 07 20 00 - Thermal Protection

 4. Section 07 60 00 - Flashing And Sheet Metal

 5. Section 07 90 00 - Joint Protection

 6. Section 08 80 00 - Glazing

 7. Section 08 40 00 - Entrances, Storefronts, And Curtain Walls

 8. Section 08 50 00 - Windows

1.2 REFERENCES

 A. American Society For Testing And Materials (ASTM)

 1. ASTM B117 Standard Practice For Operating Salt Spray (Fog) Apparatus

 2. ASTM B137 Standard Test Method For Measurement Of Coating Mass Per Unit

 Area On Anodically Coated Aluminum

 3. ASTM B211 Standard Specification For Aluminum And Aluminum-Alloy Rolled

 Or Cold Finished Bar, Rod, And Wire

 4. ASTM B680 Standard Test Method For Seal Quality Of Anodic Coatings On

 Aluminum By Acid Dissolution

 5. ASTM C267 Standard Test Methods For Chemical Resistance Of Mortars, Grouts,

 And Monolithic Surfacings And Polymer Concretes

 6. ASTM C297 Standard Test Method For Flatwise Tensile Strength Of

 Sandwich Construction

 7. ASTM C1371 Standard Test Method For Determination Of Emittance Of Materials

 Near Room Temperature Using Portable Emissometers

 8. ASTM D523 Standard Test Method For Specular Gloss

 9. ASTM D635 Standard Test Method For Rate Of Burning And/Or Extent And

 Time Of Burning Of Plastics In A Horizontal Position

 10. ASTM D714 Standard Test Method For Evaluating Degree Of Blistering Of Paints

 11. ASTM D968 Standard Test Methods For Abrasion Resistance Of Organic Coatings

 By Falling Abrasive

 12. ASTM D1308 Standard Test Method For Effect Of Household Chemicals On Clear

 And Pigmented Organic Finishes

 13. ASTM D1781 Standard Test Method For Climbing Drum Peel For Adhesives

 14. ASTM D1929 Standard Test Method For Determining Ignition Temperature

 Of Plastics

 15. ASTM D2244 Standard Practice For Calculation Of Color Tolerances And

 Color Differences From Instrumentally Measured Color Coordinates

 16. ASTM D2247 Standard Practice For Testing Water Resistance Of Coatings In 100%

 Relative Humidity

 17. ASTM D2248 Standard Practice For Detergent Resistance Of Organic Finishes

 18. ASTM D2794 Standard Test Method For Resistance Of Organic Coatings To The

 Effects Of Rapid Deformation (Impact)

 19. ASTM D3359 Standard Test Methods For Measuring Adhesion By Tape Test

 20. ASTM D3363 Standard Test Method For Film Hardness By Pencil Test

 21. ASTM D4145 Standard Test Method For Coating Flexibility Of Prepainted Sheet

 22. ASTM D4214 Standard Test Methods For Evaluating The Degree Of Chalking

 Of Exterior Paint Films

 23. ASTM D5420 Standard Test Method For Impact Resistance Of Flat, Rigid

 Plastic Specimen By Means Of A Striker Impacted By A

 Falling Weight (Gardner Impact)

 24. ASTM E84 Standard Test Method For Surface Burning Characteristics

 Of Building Materials

 25. ASTM E283 Standard Test Method For Determining Rate Of Air Leakage

 Through Exterior Windows, Curtain Walls, And Doors Under

 Specified Pressure Differences Across The Specimen

 26. ASTM E330 Standard Test Method For Structural Performance Of Exterior

 Windows, Doors, Skylights And Curtain Walls By Uniform

 Static Air Pressure Difference

 27. ASTM E331 Standard Test Method For Water Penetration Of Exterior

 Windows, Skylights, Doors, And Curtain Walls By Uniform

 Static Air Pressure Difference

 28. ASTM E903 Standard Test Method For Solar Absorptance, Reflectance And

 Transmittance Of Materials Using Integrated Spheres

 B. 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

 C. 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

1.3 DEFINITIONS

 A. Metal Composite Material (MCM):

 A factory manufactured panel consisting of metal skins bonded to a plastic core,

 as defined by the International Building Code (IBC) Section 1402.

 B. Leadership In Energy And Environmental Design (LEED):

 A set of guidelines set forth by the United States Green Building Council (USGBC)

 to promote the building of environmentally responsible and sustainable structures.

 C. ISO 9001:2008

 A set of guidelines set forth by the International Organization For Standardization (ISO)

 to provide guidance and tools for companies and organizations who want to ensure that

 their products and services consistently meet customer’s requirements, and that quality is

 consistently improved.

1.4 SYSTEM DESCRIPTION

 A. Design Requirements:

 1. Rainscreen (Cavity Wall) System:

 Wall panel assembly shall be designed in accordance with manufacturer's guidelines

 to allow air movement behind the panels as well as providing weep holes and channels

 through which any incidental moisture that enters the system can escape, thus providing

 a rainscreen (cavity wall) system.

 2. Expansion And Contraction:

 Wall panel assembly shall be designed with provisions for thermal expansion and

 contraction of the component parts to prevent buckling, failure of joint seals,

 undue stress on fasteners or other detrimental effects due to accumulation

 of dead loads and various live loads.

 3. Windload:

 Wall panel assembly shall be designed to withstand a positive and negative windload pressure acting inward and outward normal to the plane of the wall to

 meet the requirements of the latest adopted Local Building Code.

 B. General Performance:

 Wall panel assembly shall comply with performance requirements,

 as determined by the following testing performed by a qualified agency.

1.5 SUBMITTALS

 A. Product Data:

 1. Submit manufacturer's datasheet for specified product.

 2. Submit manufacturer's installation guidelines for specified product.

 3. Submit manufacturer's literature indicating pre-consumer and

 post-consumer percentages of recycled content in the context of

 LEED MR Credit 4.1 and/or MR Credit 4.2.

 4. Submit manufacturer's literature indicating compliance with the

 American Recovery & Reinvestment Act (ARRA), Section 1605.

 B. Shop Drawings:

 Submit shop drawings indicating project layout and elevations, fastening and anchoring

 methods, dimensions of individual components and profiles, detail and location of joints,

 sealants and gaskets, flashing and accessories.

 C. Samples:

 1. Submit two (2) samples 3" x 5" of each product specified.

 2. Submit two (2) samples 3" x 5" of each finish specified.

 D. Test Reports:

 Submit test reports indicating compliance of products with specified performance

 requirements from an independent testing agency.

 E. Warranty:

 Submit manufacturer's warranty meeting the requirements of this section.

1.6 QUALITY ASSURANCE

 A. Qualifications:

 1. Manufacturer:

 Manufacturer shall have a minimum of ten (10) years experience

 in the manufacture of this product, shall be an ISO 9001:2008 Registered

 Company, and shall be located within the United States of America.

 2. Installer:

 Installer shall be experienced in performing work of this section and in

 work of similar scope required by this project.

 B. Pre-Installation Meeting:

 Conduct pre-installation meeting to verify project requirements, substrate conditions,

 manufacturer's installation instructions, and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

 A. Acceptance At Site:

 Materials to be packaged to protect against transportation damage. Examine materials

 upon receipt to insure that no damage has occured during shipment.

 B. Storage And Protection:

 1. Storage:

 Materials should be stored horizontally on pallets or platforms, covered with

 a suitable ventiliated and weathertight covering. Do not store materials where accumulation of moisture may occur or in contact with materials that might

 cause staining, denting, or other damage.

 2. Material Handling:

 Use care in unloading, storing, and erecting the materials to prevent bending,

 warping, and twisting. Protect finish and edges from damage. The protective

 film on the panel surface is to remain in place until installation and shall be

 removed immediately upon completion.

1.8 PROJECT CONDITIONS

 A. Field Measurements:

 Verify location and dimension of all elements related to the installation of the

 wall panel assembly. Indicate those measurements on the shop drawings.

 B. Limitations:

 Proceed with installation of the wall panel assembly only when existing site conditions

 comply with manufacturer's recommendations.

1.9 WARRANTY

 A. Metal Composite Material (MCM):

 1. Panel:

 The integrity of the panel bond will remain intact for a minimum of five (5)

 years from the Date Of Substantial Completion.

 2. Finish:

 a. Polyvinylidene Fluoride (PVDF):

 1) The finish will not have a Fade Differential of greater than 5E units.

 Testing shall be in accordance with ASTM D2244.

 2) The finish will not have a Chalk Rating of less than 8.

 Testing shall be in accordance with ASTM D4214.

 3) The finish will not check, peel, lose adhesion or fracture (other

 than minute fractures which may develop due to fabrication and

 which are acceptable by industry standards on the Date Of

 Substantial Completion).

 4) Warranty period shall be thirty (30) years from the Date Of

 Substantial Completion.

 b. Anodized:

 1) The finish will not check, peel, lose adhesion or fracture (other

 than minute fractures which may develop due to fabrication and

 which are acceptable by industry standards on the Date Of

 Substantial Completion).

 2) Warranty period shall be twenty (20) years from the Date Of

 Substantial Completion.

 B. Installation System:

 1. Fabricator and/or installer standard form in which they agree to repair or replace

 components of metal-faced composite wall panel assemblies that fail in materials or

 workmanship within specified warranty period.

 2. Weathertight warranties or other such guarantees regarding installation shall be the

 responsibility of the installing contractor.

 C. Accessories:

 Warranties or other such guarantees regarding accessories used during installation shall

 be the responsibility of the installing contractor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

 A. Acceptable Manufacturer:

 Citadel Architectural Products, Inc.; 3131-A North Franklin Road; Indianapolis, IN 46226

 ph: (800) 446-8828; fax: (800) 247-2635; www.citadelap.com; info@citadelap.com

 B. Subtitutions:

 1. Not permitted without approval of the architect 10 days prior to bid.

 2. Items being submitted for consideration must be of the same function

 and meet the performance requirements set forth in this section.

 C. Requests for substitutions will be considered in accordance with provisions of

 Section 01 60 00 - Product Requirements.

 1. Product Data:

 Submit product data including testing performed by a qualified agency

 indicating compliance with performance requirements specified in this section.

 2. Samples:

 Submit two (2) samples 3" x 5" of each proposed product substitution.

2.2 WALL PANEL ASSEMBLY

 A. Metal Composite Material (MCM):

 1. Panel:

 Envelope 2000® as manufactured by Citadel Architectural Products, Inc.

 a. Composition:

 Face: .024" (min) prefinished smooth aluminum

 Core: .105" thermoset phenolic resin

 Back: .010" primed smooth aluminum

 b. Thickness: 4mm (nominal)

 c. Weight: 1.25 lbs/ft²

 d. Tolerance:

 Thickness: ±1/32"

 Length / Width: +0, -1/8"

 Squareness: 1/64" per lineal ft

 e. Performance:

 1) Surface Burning Characteristics:

 Panel shall have a Class A rating with a Flame Spread Index

 less than 25, and a Smoke Developed Index less than 450.

 Testing shall be in accordance with ASTM E84.

 2) Bond Integrity:

 Panel shall have a minimum peel strength of 34.5 lb-in/lb.

 Testing shall be in accordance with ASTM D1781.

 3) Ignition Temperature:

 Panel shall have a minimum self-ignition temperature of 900° F.

 Testing shall be in accordance with ASTM D1929.

 4) Impact Resistance:

 Panel shall not have a deformation measuring larger than 0.186" in

 diameter or 0.007" in depth after being struck by a falling ball at 24 in-lb.

 Testing shall be in accordance with ASTM D5420.

 5) Rate Of Burning:

 Panel shall have a CC1 Classification indicating a burning extent

 of 1" (25.4mm) or less when tested at a nominal thickness of

 .060" (1.5mm) or thickness of intended use.

 Testing shall be in accordance with ASTM D635.

 6) Tensile Strength:

 Panel shall have a mean value of 1650 lbs.

 Testing shall be in accordance with ASTM C297.

 2. Finish:

 a. Polyvinylidene Fluoride (PVDF):

 1) Type:

 Kynar 500® coating using 70% resin.

 Finish shall be in conformance with AAMA 2605.

 2) Color:

 a) As selected by Architect from manufacturer's color guide.

 b) Custom color to match Architect's standard.

 3) Composition:

 a) Two-Coat Colors:

 0.2-mil primer coat, 0.8-mil color coat

 b) Three-Coat Colors:

 0.2-mil primer coat, 0.8-mil color coat, 0.7-mil clear coat

 4) Performance:

 a) Gloss:

 Finish shall have a gloss value of 20-35 at 60°.

 Testing shall be in accordance with ASTM D523.

 b) Solar Reflectance:

 Finish shall have a value of >25% initial, >15% after

 3 years for Steep Slope and a value of >65% initial, >50%

 after 3 years for Low Slope.

 Testing shall be in accordance with ASTM E903.

 c) Emissivity:

 Finish shall have a value of 0.80 (80%) min.

 Testing shall be in accordance with ASTM C1371.

 d) Pencil Hardness:

 Finish shall have a value of F-2H.

 Testing shall be in accordance with ASTM D3363.

 e) Flexibility:

 Finish shall have a value of 0-2 T-bend, no pick off.

 Testing shall be in accordance with ASTM D4145.

 f) Adhesion:

 Finish shall have a value of No Adhesion Loss.

 Testing shall be in accordance with ASTM D3359.

 g) Reverse Impact:

 Finish shall have a value of No Cracking Or Adhesion Loss.

 Testing shall be in accordance with ASTM D2794.

 h) Abrasion:

 Finish shall have a value of 65-85 l/mil.

 Testing shall be in accordance with ASTM D968.

 i) Mortar Resistance:

 Finish shall have a value of No Effect.

 Testing shall be in accordance with ASTM C267.

 j) Detergent Resistance:

 Finish shall have a value of No Effect using 3% detergent

 @ 100 F° (72 hrs).

 Testing shall be in accordance with ASTM D2248.

 k) Acid Resistance:

 Finish shall have a value of No Effect using 10% muriatic

 acid (24 hrs) and No Effect using 20% sulfuric acid (18 hrs).

 Testing shall be in accordance with ASTM D1308.

 l) Acid Rain:

 Finish shall have a value of No Objectionable Color Change

 after 15 cycle min.

 Testing shall be in accordance with Kesternich SO2, DIN 50018.

 m) Alkalai Resistance:

 Finish shall have a value of No Effect using 10%, 25%

 NaOH (1 hr).

 Testing shall be in accordance with ASTM D1308.

 n) Salt Spray Resistance:

 Finish shall have a value of No Face Blistering; Max average

 1/16" scribe creep, passes 4000 hrs using 5% salt fog @ 95° F.

 Testing shall be in accordance with ASTM B117.

 o) Humidity Resistance:

 Finish shall have a value of Passes 4000 hrs, No #8 blisters

 using 100% relative humidity @ 95° F.

 Testing shall be in accordance with ASTM D714, ASTM D2247.

 p) Exterior Exposure:

 Finish shall have a value of Max 5 fade and Max 8 chalk at

 10 yrs @ 45°, south Florida.

 Testing shall be in accordance with ASTM D2244, ASTM D4214.

 b. Anodized:

 1) Type:

 AA-C22-A21 (clear)

 AA-C22-A23 (colored)

 2) Color:

 As selected by Architect from manufacturer's color guide.

 3) Composition:

 i. Anodized (clear):

 barrier, aluminum oxide, nickel/hydrate seal

 ii. Anodized (colored):

 barrier, aluminum oxide, colorant, nickel/hydrate seal

 4) Performance:

 a) Salt Spray Resistance:

 Testing shall be in accordance with ASTM B117.

 b) Acid Dissolution:

 Testing shall be in accordance with ASTM B680.

 c) Gloss:

 Testing shall be in accordance with ASTM D523.

 d) Coating Mass:

 Testing shall be in accordance with ASTM B137.

 B. Installation System:

 1. RainScreen (RS) System:

 a. Description:

 Shop-fabricated installation system consisting of routed and formed

 metal composite material (MCM), mounting extrusions, mechanical fasteners,

 and accessories to provide a rainscreen (cavity wall) system. Proper allowance

 shall be made for expansion and contraction of the wall panel assembly.

 No systems that restrict proper thermal movement, such as those utilizing

 single 'L' clips on all four sides, shall be permitted.

 b. Performance:

 1) Air Infiltration:

 Installation system shall not allow air infiltration in excess of

 0.06 cfm/ft² at 1.57 psf.

 Testing shall be in accordance with ASTM E283.

 2) Structural Performance:

 Installation system shall have a design load of 35.0 psf applied in the

 positive and negative direction. There shall be no deflection in excess of

 L/175 of the span of any support member nor shall there be any failure of

 the system. At a structural test load equal to 1.5 times the specified

 design load, no support member shall have permanent deformation in

 excess of 1/1000 of its span nor shall there be any failure of the system.

 Testing shall be in accordance with ASTM E330.

 3) Water Penetration:

 Installation system shall not have uncontrolled water penetration to the

 room side at a static air pressure differential of 15.0 psf.

 Testing shall be in accordance with ASTM E331.

 4) Fire Performance:

 Installation system shall have a value of pass, and comply with the

 criteria set forth in the standard.

 Testing shall be in accordance with NFPA 285 (UBC 26-9 equivalent).

 C. Accessories:

 1. Extrusions:

 a. Shall conform with ASTM B211 and the manufacturer's recommendations.

 b. Shall be applied in accordance with the panel manufacturer's installation

 guidelines.

 2. Sealants:

 a. Selected from the panel manufacturer's approved list of sealants.

 b. Shall be applied in accordance with both the panel manufacturer's installation

 guidelines and the sealant manufacturer's recommendations.

 3. Fasteners:

 a. Selected by contractor to suit project requirements.

 b. Shall be applied using the recommended fastener schedule in accordance

 with panel manufacturer's installation guidelines.

 c. Shall be coated to prevent corrosion and/or reaction with other materials.

 d. Shall be concealed except where unavoidable. Exposed fasteners shall

 be finished to match adjoining metal.

 4. Flashing:

 a. Selected by contractor to suit project requirements.

 b. Shall be installed in such a manner to maintain the integrity of the wall system

 against moisture intrusion.

 5. Stiffeners:

 a. Selected by contractor to suit project requirements.

 b. Shall be applied in accordance with the panel manufacturer's installation

 guidelines.

 c. Shall be applied to all panels 36" x 36" or larger.

PART 3 - EXECUTION

3.1 EXAMINATION

 A. Examine substrate to receive the work of this section to verify that the conditions are

 acceptable for installation.

 1. Substrate to receive panels shall be even, smooth, sound, clean, dry, and free from

 defects detrimental to work. Notify contractor in writing of conditions detrimental to

 proper and timely completion of the work.

 2. Substrate to receive panels shall be in vertical and horizontal alignment with no

 more deviation than 1/4" in 20'.

 B. Proceed with installation only after all unsatisfactory conditions have been corrected in

 a manner acceptable to installer. Starting work within a particular area will be construed

 as installer's acceptance of surface conditions.

3.2 PREPARATION

 A. Verify dimensions as required.

 B. Protect adjacent work areas and finished surfaces to prevent damage that otherwise

 might occur during the work of this section.

3.3 INSTALLATION

 A. Wall panel assembly shall be installed in accordance with the manufacturer's written

 installation guidelines and the approved set of shop drawings.

 B. Erect wall panel assembly level and true to the intended plane.

 C. Maximum deviation from vertical and horizontal alignment of erected wall panel assembly

 shall be no more than 1/4" in 20'-0".

 D. Maximum deviation in panel flatness shall be 0.6% of the assembled units.

 E. Seal all joints as required using methods and materials as recommended by the panel

 manufacturer.

3.4 CLEANING

 A. Remove panel masking immediately after installation. Delay will result in difficulty

 with removal and possibly residue on the panel surface.

 B. Remove temporary coverings and protection to adjacent work areas.

 C. Remove and legally dispose of construction debris from project site.

END OF SECTION