

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the Porcelain Stone Ventilated Facade System and the following work:

1. Porcelain Stone panels manufactured with panel support straps and concealed anchors
2. Aluminum unitized sub-frame support system, consisting of Z girts, support clips with isolators, vertical T support tracks, horizontal support rail, fasteners and required accessories.
3. Anchors, fasteners, flashings, and formed metal trim indicated on the drawings of the Porcelain Stone Ventilated Facade System and other accessories required for a complete installation.
4. Thermal Insulation specified in Division 07.
5. Fluid-Applied Membrane air barrier specified in Division 07.

- B. Related Sections include the following:

1. Division 01 Section "General Commissioning Requirements" for building envelope commissioning requirements.
2. Division 04 Section "Unit Masonry" for concrete masonry unit backup supporting Porcelain Stone Ventilated Facade System where indicated.
3. Division 05 Section "Cold-Formed Metal Framing" for support framing supporting Porcelain Stone Ventilated Facade System where indicated.
4. Division 05 Section "Metal Fabrications" for requirements for accent channels and corner angles provided as part of the Porcelain Stone Ventilated Facade System.
5. Division 06 Section "Sheathing" for gypsum wall sheathing over which Porcelain Stone Ventilated Facade System is installed.
6. Division 07 Section "Thermal Insulation" for mineral-wool board insulation.
7. Division 07 Section "Fluid-Applied Membrane Air Barriers" for continuous membrane air and moisture barrier system applied over concrete masonry unit backup and gypsum wall sheathing.
8. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal work not part of Porcelain Stone Ventilated Facade System.

- C. Alternates: Refer to Division 01 Section "Alternates" for description of Work of this Section affected by alternates.

1.3 DEFINITIONS

- A. Porcelain Stone Ventilated Facade System: Porcelain Stone panels manufactured with panel support straps and concealed anchors, aluminum sub-frame support system, consisting of Z girts, support clips with isolators, vertical T support tracks, horizontal support rail, fasteners, and accessories necessary for a complete Porcelain Stone Ventilated Facade System. System includes engineering and shop drawings.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
1. Include material descriptions, dimensions of individual components and profiles, and finishes for each type of porcelain stone panel and sub-frame component.
 2. Include material descriptions, dimensions of individual components, and finishes for each type of accessories, trim and flashing.
- B. Shop Drawings:
1. Show installation layouts of Porcelain Stone Ventilated Facade System; panel profiles, corners, edge conditions, joints, metal support framing and concrete masonry unit backup; location, size and spacing of aluminum sub-frame support members, anchorages, fasteners and accessories, and special details.
- C. Samples for Initial Selection: For each type of porcelain stone panel cladding system include:
1. Porcelain stone panel: Minimum 12 x 12 inches (300 x 300 mm) with expected range.
 2. Aluminum Framing Support Members: 12 inches long.
 3. Accessories: Include thermal isolation pads, fasteners, trim, flashings and other accessories.
- D. Delegated-Design Submittal: Provide engineering analysis data, signed and sealed by the qualified professional engineer responsible for their preparation, for Porcelain Stone Ventilated Facade and sub-frame system.
- E. Product Test Reports: Provide evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- F. Warranty: Sample of special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** A Firm having a minimum of five years' experience in the successful manufacturing of Porcelain Stone Ventilated Facade Systems for projects employing similar materials, applications and performance requirements as specified for this Project.
- B. **Installer Qualifications:** An employer of workers trained and approved by the Porcelain Stone Ventilated Facade System manufacturer, and having experience in the successful completion of projects employing similar materials, applications and performance requirements as specified for this Project.
 - 1. Installer's responsibilities include installing porcelain stone panels and aluminum support system, accent channels and accessories as indicated and providing professional engineering services and shop drawings needed to assume engineering responsibility.
- C. **Testing Agency Qualifications:** Qualified according to ASTM E 329 for testing indicated.
- D. **Source Limitations:** Obtain all components of Porcelain Stone Ventilated Facade System through one source from a single manufacturer.
- E. **Mockup:** Build mockup to verify selections made under sample Submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build separate free-standing mockup of typical Porcelain Stone Ventilated Facade System exterior wall construction as shown on Drawings where directed by the Architect, of size as indicated by full thickness, including, supports, attachments, and accessories.
 - a. Include concrete masonry unit and/or metal studs, sheathing, air and moisture barrier in exterior wall mockup.
 - b. Include glazed aluminum curtain wall window opening framed within mockup.
 - c. Include aluminum angles, trim and accessories as indicated.
 - 2. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockup unless Architect specifically approves such deviations in writing.

F. Pre-installation Conference: Conduct a conference at Project site. Review methods and procedures related to the Porcelain Stone Ventilated Facade System including, but not limited to, the following:

1. Meet with Owner's Representative, Architect, Owner's insurer if applicable, Porcelain Stone Ventilated Facade System Installer, Porcelain Stone Ventilated Facade System manufacturer's representative, structural-support installer, and installers whose work interfaces with or affects the Porcelain Stone Ventilated Facade System, and installer of glazed aluminum curtain wall framing.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to Porcelain Stone Ventilated Facade System installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to, structural members.
5. Review special details and condition of other construction that will affect Porcelain Stone Ventilated Facade System.
6. Review temporary protection requirements for Porcelain Stone Ventilated Facade System during and after installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver porcelain stone panels and aluminum framing support members and other manufactured items so as not to be damaged or deformed. Package porcelain stone panels, and aluminum framing support members for protection during transportation and handling.
- B. Unload, store, and erect Porcelain Stone Ventilated Facade System components in a manner to prevent bending, warping, twisting, and surface damage, in accordance with porcelain stone system manufacturer's written instructions.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of Porcelain Stone Ventilated Facade System to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Back up system, adjacent construction and openings shall maintain tolerances required by Porcelain Stone Ventilated Facade System of $\pm 1/8"$. If applicable and only if permissible by schedule, verify locations of structural members and adjacent construction by field measurements before Porcelain Stone Ventilated Facade System fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Coordinate Porcelain Stone Ventilated Facade System with construction of metal stud framing, concrete masonry unit backup and other adjoining work to provide a leak-proof, secure and noncorrosive installation.

1.9 WARRANTY

- A. Manufacturer shall warrant the material of this Section for a period of 5 years from date of Substantial Completion against possible material defects. The manufacturer warranty shall cover labor and materials.
- B. Installer shall warrant the workmanship of this Section for a period of 2 years from date of Substantial Completion against defects in Workmanship. The installation warranty shall provide that the exterior wall system will remain weather tight during the warranty period and that if any leaks occur due to faulty installation practices, that the system will be repaired or replaced as required to render the system weather-tight, at no cost to the Owner. The installer warranty shall cover labor and materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Crossville-Shackerley SureClad® Porcelain Stone® Ventilated Facade ACCESS System. Each panel shall be independently removable.
- B. Subject to compliance with requirements, and approval by architect and owner provide a system of equal performance.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Porcelain Stone Ventilated Facade System shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 1. Mechanical anchors used to fasten mounting straps to stone panels shall be capable of developing a 500 pound tensile force prior to failure and 1842 pounds shear force, when tested according to ASTM 488-96, *Standard Test Methods for Strength of Anchors on Concrete and Masonry Elements*.
 2. When tested according to AAMA 501.6-09, *Dynamic Test Method for Determining the Seismic Drift Causing Glass Fallout from a Wall System*, the system shall be capable of withstanding in-plane lateral drift of 3" in either direction, without significant damage or release of any component of the system.
 3. When tested according to AAMA 509-09, *Voluntary and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems*, the system shall achieve a value V10/W1 Classification

4. Thermal Cycling -Freeze/Thaw: No specimen shall crack, crumble or fracture, when tested according to AAMA 501.5-07, *Test Method of Thermal Cycling of Exterior Walls*.
 5. When tested according to ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference, AAMA 509-09, the system shall be capable of withstanding a 105 psf negative static pressure force prior to failure.
 6. When tested according to ASTM 1886-05, *Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials*, the façade system shall have no significant falling debris and zero damage to and penetration of the substrate to which it is attached.
- B. Provide Porcelain Stone Ventilated Facade System including anchorage that is capable of withstanding, without failure, the effects of the structural loads, thermal movements, wind loads and seismic criteria as indicated on structural drawings.
- C. Deflection of Aluminum Framing Members:
1. Deflection Perpendicular to Plane of the Supporting Structure: Net deflection of aluminum support members shall not exceed $L/175$ of the span. Span is defined as the distance between centerline of supports for any given component.
 2. Cantilever Deflection: For cantilevered framing members, span is defined as two times the distance between last support centerline and the cantilevered end of the member.
 3. When tested at positive and negative wind-load design pressures, deflection of framing members shall not exceed specified limits.
 - a. When tested at 150 percent of positive and negative wind-load design pressures, net permanent deflection (set) of framing members shall not exceed $L/100$. There shall be no failure or gross permanent distortion of framing members, anchors or connections. At connection points of framing members to anchors, combined movement of anchor relative to the building, and framing member relative to anchor, shall not exceed 0.125-inch net after load is removed.
 - b. Test Duration: As required by design wind velocity but not less than 10 seconds.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss. The Temperature Change (Range) shall be: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- E. Visual Requirements: For determination of acceptability, and compliance with specified criteria, the viewing distance for the exposed work shall be 10 feet when the observer can be within 10 feet of the surface, and 50 feet for the remaining surfaces.

2.3 PORCELAIN STONE VENTILATED FACADE SYSTEM MATERIALS

- A. Basis-of-Design Product: The design for Porcelain Stone Ventilated Facade System is based on Crossville-Shackerley Sureclad® Porcelain Stone® Ventilated Façade ACCESS System as manufactured by Crossville-Shackerley. Contact Professional Consultants International Telephone: 860-673-9529 Ext. 233. rgoldberg@proconweb.com and surecladeast@crossvileinc.com or surecladwest@crossvileinc.com
- B. Subject to compliance with all the requirements of this specification, provide either the named product or a comparable product by one of the following, as approved by the Architect:

2.4 COMPONENTS

- A. Porcelain stone panels: ½" (12 mm) thickness, back ventilated, draining open joint system. Panels shall include a reinforced fabric mesh on the back side and factory drilled and mounted concealed panel anchors and mounting straps. Provide color, textures, sizes, lengths and profiles as indicated on the drawings.
- B. Porcelain stone panels Performance Requirements: Provide porcelain stone panels, meeting or exceeding the following physical characteristics when tested in accordance with the referenced test standard:
1. ASTM C499 – Determination of Dimensions Sides: $\leq \pm 3.0\%$ of nominal dimension; $\leq \pm 1.5\%$ of largest value in the range.
 2. ASTM C499 – Thickness: ANSI 137.1; $\leq \pm 0.04$ INCH
 3. ASTM C502 – Wedging: $\leq \pm 1\%$
 4. ASTM C485 – Warpage: ANSI 137.1; $\leq \pm 1\%$ EDGE; $\leq \pm 0.75\%$ DIAGONAL
 5. ASTM C373 – Water Absorption: ANSI 137.1 – $\leq 0.05\%$
 6. ASTM C648 – Breaking Strength: ANSI 137.1; ≥ 250 lbs.
 7. MOHS HARDNESS – MOHS (7-8 MOH)
 8. ASTM C1243 – Abrasion Resistance 155mm³
 9. ASTM C372 – Coefficient of Linear Thermal-Expansion
 10. ASTM C1026 – Frost Resistance: NO DAMAGE
 11. ASTM C650 – Chemical Resistance: NO DAMAGE
 12. UNI EN ISO 10545-14 – Resistance to Stains
 13. ASTM C501 – Relative Resistance: ≥ 100

C. Aluminum Framing Member Support System: Provide manufacturer's standard sections as required for support and alignment of Porcelain Stone Ventilated Facade System.

1. Aluminum Framing: ASTM B 221 (ASTM B 221M), Alloy 6061-T6
2. Provide horizontal aluminum hat and/or Z shaped girts, aluminum brackets, extruded aluminum vertical T tracks and fastening devices as recommended by the Porcelain Stone Ventilated Facade System manufacturer and in accordance with approved Shop Drawings.
3. The aluminum support and girt system shall support the porcelain stone panels and drain rainwater.
4. Finish: Color Anodic Finish. Black for exposed horizontal aluminum channel and any other exposed sub-frame components. Mill finish for all concealed sub-frame components.

D. Fasteners for Miscellaneous Metal Framing: Provide stainless steel fasteners of type, material, size, holding power, and other properties required to fasten miscellaneous metal framing members to substrates, as recommended by the Porcelain Stone Ventilated Facade System manufacturer. Provide finish in black to match exposed aluminum sub-frame.

2.5 ACCESSORIES

- A. Accessories: Provide components required for a complete Porcelain Stone Ventilated Facade System as recommended by the Porcelain Stone Ventilated Facade System manufacturer, and in accordance with approved Shop Drawings.
- B. Screen Vents: Formed from minimum 0.63-inch-thick, perforated aluminum sheet, ASTM B 209 (ASTM B 209M), Alloy 6061-T6, with 1/16-inch diameter holes spaced 3/32 inch o.c. in staggered rows, with minimum 41 percent open area. Provide perforated color anodic ventilation strips where indicated and as required to provide finished appearance. Locations include, but are not limited to tops and bottoms of porcelain stone ventilated façade system.
- C. Flashing and Trim: Provide flashing and trim as required to seal against weather and to provide finished appearance, as indicated on the drawings and specified in Division 07 Section "Sheet Metal Flashing and Trim". Provide base flashing and window and door head flashing where indicated. Fabricate from aluminum, thickness not less than 0.050 inch (1.27 mm) thick. Finish color Anodic Finish as selected by the architect.
- D. Water Cutoff Mastic: Non-curing butyl mastic sealant by one of the following;
 1. Carlisle SynTec Incorporated; "Sure-Seal Water Cut-Off Mastic".
 2. Tremco Incorporated; "Trempro JS-773".
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, adjacent areas, openings and all related conditions for compliance with Porcelain Stone Ventilated Facade System requirements for installation tolerances.
 - 1. Examine metal wall framing and sheathing, concrete unit masonry backup, concrete and other structural support systems and members and anchorage to verify that installation is within alignment tolerances required by the Porcelain Stone Ventilated Facade System manufacturer, and as follows:
 - a. Plus or minus 1/4 inch (6.35 mm) in 20 feet (6096 mm).
 - b. Plus or minus 1/2 inch (12.7 mm) across building elevation.
 - c. Plus or minus 1/8 inch (3.17 mm) within 5 feet (1524 mm) of any change in plane.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by the Porcelain Stone Ventilated Facade System manufacturer.
- B. Obtain written verification from the owner's inspection agent that air/moisture/vapor barrier or water-resistive barriers have been installed over sheathing and concrete unit masonry substrate to prevent air infiltration or water penetration.
- C. Examine roughing-in for components and assemblies penetrating the Porcelain Stone Ventilated Facade System to verify actual locations comply with Porcelain Stone Ventilated Facade System shop drawings.
- D. Record and report conditions that are not in conformance Porcelain Stone Ventilated Facade System requirements .
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Aluminum Sub-Frame Support Framing: Install complete Porcelain Stone Ventilated Facade System sub-framing, miscellaneous panel support anchorage, flashing and accessories according to Porcelain Stone Ventilated Facade System manufacturer's written instructions and shop drawings.

3.3 PORCELAIN STONE VENTILATED FACADE SYSTEM INSTALLATION

- A. General: Install Porcelain Stone Ventilated Facade System panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on approved Shop Drawings. Anchor porcelain stone panels, aluminum framing support members and other components of the work securely in place using Porcelain Stone Ventilated Facade System manufacturer's recommended clips, screws, and fasteners as indicated on approved Shop Drawings, with provisions for thermal and structural movement.
- B. Porcelain Stone Ventilated Facade System components shall be installed so that, in their final location and position, they are not twisted, out of plane, or exceed manufacturer's specified tolerances. Leave horizontal and vertical joints open unless otherwise indicated. Install Porcelain Stone Ventilated Facade System to allow individual porcelain stone panels to be installed and removed without disturbing adjacent panels.
- C. If required, flash and seal Porcelain Stone Ventilated Facade System at perimeter of all openings as shown on the drawings. Fasten with self-tapping screws. Do not begin installation until air/moisture/ vapor barrier or water-resistive barriers and flashings that will be concealed by Porcelain Stone Ventilated Facade System are installed.
- D. Install trim, accent channels and corner angles (if any) or coordinate with other trades, as Porcelain Stone Ventilated Facade System work proceeds.
- E. Fasteners: Provide 300 Series stainless-steel fasteners for the porcelain stone panel system, unless otherwise recommended by the Porcelain Stone Ventilated Facade System manufacturer.
- F. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
- G. Accessory Installation: Install accessories with positive anchorage to building and weather tight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
- H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, SMACNA's "Architectural Sheet Metal Manual," and as specified in Division 07 Section "Sheet Metal Flashing and Trim". Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
 - 1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
 - 2. Install base flashing with water cut-off mastic at underside of flashing.

3. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (605 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align Porcelain Stone Ventilated Facade System components within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and Inspections if required.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as Porcelain Stone Ventilated Facade System is installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of Porcelain Stone Ventilated Facade System installation, clean finished surfaces as recommended by the Porcelain Stone Ventilated Facade System manufacturer. Maintain in a clean condition during construction.
- B. Replace Porcelain Stone Ventilated Facade System components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 044226