

SECTION 074622 - TERRA COTTA PANEL RAINSCREEN SYSTEM

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. Work of this Section includes, but is not limited to, installation of a Terra Cotta Panel Rainscreen System, consisting of the following:
 - 1. Extruded hollow terra cotta panels installed on an Aluminum vertical or horizontal carrier track system, Silicone gaskets and isolators or spring holder to be manufactured by the terra cotta panel manufacturer.
 - 2. System shall be designed utilizing Rainscreen Cladding Design principles, which includes incorporating moisture control at the outer face of the cladding system, structural design of the cladding and sub-framing system, design of the rainscreen cavity (for ventilation, thermal and acoustic performance) and design of the WRB for inner moisture control.

1.02 RELATED SECTIONS

- A. Flashing and Sheet Metal - Section 076200

1.03 REFERENCES

- A. ASTM International
 - C67 Standard Test Method for Sampling and Testing Brick and Structural Clay Tile; 2013a.
 - C126 Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick and Solid Masonry Units.
 - C484 Standard Test Method for Thermal Shock Resistance of Glazed Ceramic Tile; 1999(2009). Applicable for glazed tiles only.
 - E84 Surface Burning Characteristics of Building materials.
 - E330 Standard Test Method for Structural Performance of Curtain Walls by Uniform Static Air Pressure Difference.

1.04 DESIGN

- A. The Contractor shall provide the Panel Rainscreen System for the work as per drawings and specifications, which indicate sizes, profiles, finishes, colors, dimensional requirements and layout.

- B. Support spacing is to be based on the panel manufacturer's requirements as well as the support system manufacturer's requirements and shall be demonstrated by calculations. Each material has a different maximum length between supports. Calculations for the entire rainscreen system (cladding and support) is part of the work of the cladding support section.
- C. System shall be designed as a "drained and back ventilated rain screen system" to allow for the following:
 - 1. Pressure equalization in the air space behind the terra cotta panel and allow for subsequent drying within the cavity via ventilation.
 - 2. Movements within the structure, on structural drawings
- D. Flatness: System shall be flat with no noticeable warp, buckling, deflections or other surface irregularities within manufacturer's specified tolerances.
- E. Performance Loads: per Section 084413.

1.05 SUBMITTALS

A. Product Data

For each type of product indicated, include Technical Summary/Installation Guide, construction details, material descriptions, dimensions of individual components and profiles, and finishes.

- 1. In addition, the following Product Data shall be provided:
 - a. Color Specification Guidelines
 - b. Color Variation Example
 - c. Anchor Product Data Sheet
 - d. Anchors and/or fasteners Test Reports
 - e. Attachments Components Product Data
 - f. Attachment Components Installation Instructions.

B. Shop Drawings

- 1. Drawings shall include plans, elevations, sections, details and attachments to other work. Include installation layouts of panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Include section details of window head, jamb and sill, parapet and base details.

2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1½" per 12" (1:8).
- C. Samples
1. Samples for Initial Selection: Panels including related accessories.
 2. Samples for Verification: For each type, color, texture and pattern required.
 - a. 8x11 inch sample of each type and color panel.
 - b. Trims: Horizontal, inside & outside corners.
- D. Quality Control Submittals
1. Product Certificates: For each type of panel from manufacturer.
 2. Single-source affidavit for granite panels.
 3. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for rainscreen panels.
 4. Research/Evaluation Reports: For each type of panels required, from the ICC.
 5. Qualifications
 - a. Rainscreen panel manufacturer.
 - b. Rainscreen panel installer.
 6. Mock-ups
- E. Guarantee and Warranty
1. Manufacturer's Special warranty
- F. Maintenance Data: For each type of panel and soffit and related accessories to include in maintenance manuals.
- G. Stamped and signed by a licensed professional engineer, registered in State of New Jersey.
- H. Design Calculations
- Comprehensive analysis of design loads, including dead loads, live loads, wind loads and thermal movement based on panel selected.

1.06 QUALITY ASSURANCE

A. Qualifications

1. Rainscreen Panel Manufacturer: Shall have a minimum of 5 years experience in manufacturing panels similar to those specified.
 - a. The terra cotta panel rain screen system, including panels, vertical carrier track or horizontal carrier track, clips and gaskets/isolators, shall be provided by the same Manufacturer unless otherwise noted.
2. Installer: Installer to be ~~Factory~~ Approved by manufacturer. The installer shall have a minimum of 5 years experience and at least six projects with similar quantity of materials.

B. Labeling: Provide panels that are tested and labeled according to ASTM C67 by a qualified testing agency acceptable to authorities having jurisdiction.

C. Source Limitations: Obtain each type, color, texture, and pattern of panels including related accessories, from single source from single manufacturer.

D. Mock-ups: Build sample installation to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build sample of typical wall area, 1 story in height and approximately 20' long minimum.
2. Build samples for outside corner and inside corner.
3. Mock-up Wall to include insulation, supports, attachments and accessories for typical conditions/parts.
4. Approval of samples does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Architect specifically approves such deviations in writing.
5. Approved samples may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store materials on platforms or pallets, in a well-ventilated, weathertight space.

1. Do not stack platforms or pallets one on top of another.

B. Do not store terra cotta panels in contact with other materials that might cause staining, surface damage, or other deleterious effect.

C. Protect components from adverse job conditions prior to installation.

- D. Protect components from other trades after installation.

1.09 COORDINATION

- A. Coordinate installation with flashings, insulation and other adjoining construction to ensure proper sequencing.

1.10 WARRANTY

- A. Warranty: Manufacturer of terra cotta tiles warrants that it's terra cotta tiles and its proprietary carrier track, support clips with isolators or spring holders are manufactured in accordance with its applicable material specifications and are free from defects in materials and workmanship.

- 1. Failures include, but are not limited to, the following:

- a. Structural failures including cracking, deforming, and fading.
- b. Surface Failure: Efflorescence, fading, discoloration.

- 2. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 4 Hunter color-difference units as measured according to ASTM D2244.

- 3. Warranty Periods

- a. Manufacturer's Warranty for Terra cotta tiles and Components: 10 years from date of Substantial Completion.
- b. Installer's Warranty: Installer shall Warrant the workmanship for a period of 3 years from date of Substantial Completion against defects in Workmanship. The Installer shall repair replace components of the system as required due to faulty installation practices, at no cost to the Authority (Owner). The Warranty shall cover labor and materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Terra Cotta Panel Rain Screen System

Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Boston Valley Terra Cotta USA, "TerraClad" (BASIS OF DESIGN)
6860 S. Abbott Road,
Orchard Park, NY 14127
Tel. 888-214-3655
2. Argeton Terracotta Rainscreen
Telling Architectural Systems, LLC,
125 High Rock Avenue, Suite 211
Saratoga Springs, NY 12866
Tel. 518-886-8745
3. NBK North America, Inc., "Terrart"
40 Tioga Way Suite 250
Marblehead Ma 01945
Tel. 781-639-2662

2.02 PANEL MATERIALS/PERFORMANCE

A. Hollow Core Terra Cotta Panels

1. General: Hollow Terra Cotta Panels, Flat or Profiled, Double Skin, Glazed or Unglazed with finishes and colors as specified in drawings and within this section to be manufactured to comply with ASTM C67 and ASTM C126. Hollow Core Terra Cotta Panels are to be hung on a pre-engineered aluminum carrier track system with aluminum clip supports, gaskets, springs and trim.
 - a. The system shall consist of terra cotta panels supported by extruded aluminum clips attached to aluminum vertical or horizontal carrier track (Carrier Track to be supplied by the Terra Cotta Manufacturer).
 1. Terra Cotta Panel Body Thickness: 1¼" (30 mm), minimum up to 1½" (40 mm) Maximum.
 2. Terra Cotta panel sizes: Vary and as indicated on panel/part plan.
 3. Vertical Carrier Track: Aluminum alloy 6105 T5, mill finished.
 4. Horizontal Carrier Track: Aluminum alloy 6063 T6, mill finished.
 - b. Silicone gaskets inserted into Carrier Track and silicone isolators wrapped around clips or spring holder should be installed as per manufacturer's requirements to prevent wind induced rattle of the panels.
2. Panel Performance Requirements
 - a. General: Design, fabricate and install components so that the completed exterior wall system will withstand live loads stipulated by the Building Code in effect for this project.

- 1) The system shall have a design load of positive and negative pressures up to 45 psf when tested in accordance with ASTM E 330.
 - 2) Deflections within the system are to be limited to $L/360$ of their clear span or 5/8", whichever is less when tested in accordance with ASTM E330.
- b. Movement: Design fabricate and install system to withstand building seismic and thermal movements including deflections, temperature change without buckling, distortion, joint failure, panel fallout or breakage or undue stress on system components, anchors or permanent deformation of any kind in accordance with AAMA 501.4 for Static Seismic and Wind Induced Inter-story Drifts, and AAMA 501.6 for Dynamic Seismic Drift.
- c. Water Infiltration: The complete rainscreen system is to be designed to evacuate any moisture which penetrates beyond the outside surface materials and to weatherproof with membrane flashing around all perimeters and openings through the system.
- d. Exterior Ventilation: The work of this section shall be constructed to incorporate exterior ventilation within the cladding system design.
- 1) Water that penetrates the cavity behind the rain screen cladding element of the wall system and is on the exterior side of the air/water barrier shall be directed to the exterior by use of flashing, and weeps.
- e. Color/Finish: Terra Cotta Panels shall be fired clay materials that achieve their final through-body or glaze color and texture through a kiln firing process forming permanent bonds.
- f. Testing:
- 1) Absorption (ASTM C67): 24-hour soak: No greater than 7.0%.
 - 2) Modulus of Rupture (ASTM C67): 2,500 PSI minimum.
 - 3) Density (ASTM C67): 130 to 135 lbs/cu.ft.
 - 4) Weight per Unit Area (standard panel): 13 to 16 lbs/sq.ft.
 - 5) Linear Coefficient of Thermal Expansion: 3.5×10^{-6} in/in/°F.
 - 6) Freeze and Thaw (ASTM C67): 300 cycles, No cracks or breakage observed.
 - 7) Hardness (Various Standard Colors): 7 to 9 Mohs scale.

- 8) Efflorescence (ASTM C67): Not effloresced.
 - 9) Chemical Resistance (ASTM C126): No change in color or texture.
 - 10) Flexural Strength (ASTM C880-09): 2,200 psi minimum.
- g. Fabrication tolerances:
- 1) Dimensional Tolerance: 0.0625 inch for any cut length up to 60 inches.
 - 2) Height: Plus or minus 0.0625 inch up to 10 inches; plus or minus 0.09375 inch up to 15 inches; plus or minus 0.125 inch up to 20 inches; plus or minus 0.156 inch up to 24 inch.
 - 3) Thickness, Cross Section of Panel: Plus or minus 0.0625 inch.
 - 4) Straightness (“sweep”): Plus or minus 0.25% of length.
 - 5) Diagonal Flatness: Plus or minus 0.25% of diagonal.
 - 6) Vertical Flatness: Plus or minus 0.25% of height.
 - 7) Torsion: Plus or minus 0.25% of diagonal.
- h. Surface burning characteristics (ASTM E84):
- 1) Flame spread – Pass
 - 2) Smoke developed – Pass
 - 3) Class A
3. Panel Finishes
- a. Color and finishes as selected by Architect in Manufacturer’s standard color range. Panel faces shall be free of joint marks, grain, or other obvious defects.
 - b. Design reference sample:
 - 1) Panel Profile(s): Large and Small reveals – See Panel Drawings
 - 2) Panel Orientation Horizontal and Vertical
 - c. Maximum Terra Cotta Panel Module Sizes:
 - 2) 40 mm Thickness: Height-20” maximum, Length - 60” maximum.

- d. Panel sizes: Vary and as indicated on panel/part plan.
- e. Corner Configurations:
 - 1) Y-Shape corner trim – Refer to drawing details

B. Carrier Track and Hanger Hooks

The Terra Cotta Panel manufacturer is to provide their own manufactured aluminum carrier track and aluminum hanger hook clips with silicone isolators or spring holders of the type required for the specific panel and to be compatible with the cladding support system.

2.03 INSULATION

- A. Mineral wool, non-corrosive, ASTM C665, semi-rigid, with a minimum R-value of 4.3/inch of thickness, when tested in accordance with ASTM C518.
 - 1. Noncombustible when tested in accordance with ASTM E136.
 - 2. Maximum moisture absorption: 0.03% by volume when tested in accordance with ASTM C1104.
 - 3. Surface burning characteristics in accordance with ASTM E84 and UL tests: Flame Spread – 0, Smoke Developed – 0.
 - 4. Insulation density: Shall be based on Manufacturer's recommendations according to thickness and structural integrity, with a minimum consistent density of 4.4 pcf.
- B. Products
 - 1. Cavityrock Insulation, by ROCKWOOL, Milton, ON
 - 2. Thermafiber Rainbarrier 45 or Rainbarrier HD Insulation, by Thermafiber Inc., Toledo, Ohio
 - 3. JM Cladstone Water & Fire Block Insulation, by Johns Manville, Denver, CO

2.04 INSULATION ATTACHMENT

- A. General: Insulation to be secured to backup wall with Mechanical fasteners as recommended by insulation manufacturer.

2.05 FABRICATION

- A. Terra Cotta Panels
1. Fabricate terra cotta panels and accessory items in accordance with manufacturer's recommendations and approved submittals.
 2. Site cut terra Cotta panels using power, wet masonry saw with diamond type blade. Prevent broken corners, edges and chips.
 3. Fabricate all panels to profiles, colors and textures per samples and approval selected by the Architect.
 4. Fabricate panels in accordance with manufacturer's Quality Management System Tolerances and Acceptance Criteria.

2.06 CLADDING SUPPORT SYSTEM

- A. Cladding Support System Manufacturers for Terracotta Panels and ACM with Tracks and Concealed Clips:
1. The cladding support system manufacturer shall supply all components, except for the horizontal or vertical carrier rail and clips.
 - a. NVELOPE USA, LLC.
1546 NW 56th Street, Seattle WA 98107
"NVELOPE NV1-System" Vertical Support System or "NVELOPE NH3-System" Horizontal Support System
 - b. ECO Cladding
420 N Cedros Avenue, Suite 103,
Solana Beach, CA 92075
"Alpha or Sigma VCI.10 Vertical Support System" or "Alpha or Sigma HCI.10 Horizontal Support System"
 - c. or approve equal.
 2. All aluminum vertical or horizontal carrier rails and all aluminum clips are to be supplied by the individual panel manufacturer that is supplying the panels. The carrier rail and clip product shall be the type required for the specific panel.
- A. General: Thermally broken, non-continuous, aluminum cladding support System, made from 6000 series architectural grade aluminum. The system shall be comprised of stainless steel self-shimming brackets with a thermal break and aluminum L-Profile vertical or horizontal framing.
- B. Gauge, Configuration, Dimensions and Spacing: Minimum gauge and as required to conform to design criteria as per Manufacturer's specifications.

Material: Alloy – 6000 series architectural grade aluminum appropriate for rainscreen cladding support system. Stainless steel shall be grade 304.

- C. Wall Brackets
 - a. Stem for connecting L-Profile vertical or horizontal framing rail to bracket: Must not penetrate exterior layer of insulation.
 - a. Pre-punched Holes: For easy engagement and placement of stainless steel self-tapping hex-head screws for use in attaching L-Profile vertical or horizontal framing rail.
 - b. Brackets shall be stainless steel, self-shimming for out of plumb conditions.
 - c. Brackets shall include a thermal barrier pad/isolator.

MATERIALS NOT ACCEPTED

- A. Continuous framing profiles (including C- or Z-shaped sections or furring) penetrating insulation.
- B. Components made from galvanized steel, galvalume or other carbon based metals.
- C. Components made from FRP or fiberglass materials.
- A. Material:
 - 1. Injection molded Polypropylene Copolymer.
- B. Size:
 - 1. Size to accommodate plate
 - a. Framing member to framing member isolation. Minimum 0.125 inch thick
 - b. Isolator must match support bracket and must not decrease structural performance of system.
- C. Recommended Product
 - 1. As recommended by Cladding Support System manufacturer.
- A. Screw Fasteners
 - 1. Minimum 304 series stainless steel fasteners and anchors of type, size and spacing required for type of substrate and Project conditions, to meet performance requirements as indicated in design calculations and shop drawings.

2.06 SOURCE QUALITY CONTROL

- A. Single Source Responsibility: Furnish engineered design and fabrication by or under direct responsibility of single manufacturer.

2.07 PREINSTALLATION CONFERENCE

- A. Before fabrication of the panels is scheduled to commence, a conference will be called by the Authority's Representative at the site for the purpose of reviewing the mock-up panels, the Drawings and the Specifications and discussing requirements for the Work. The conference shall be attended by Authority's representatives (Construction management and CID), the Contractor, the authorized fabricator's Company Field Advisor and Engineer, the certified installer's Company Field Advisor, the superstructure contractor, Special Inspection Agency and the Architect/Engineer of Record.

2.07 PRE-INSTALLATION CONFERENCE

- A. Before the panel installation work is scheduled to commence, a conference will be called by the Authority's Representative at the site for the purpose of reviewing the Drawings and the Specifications and discussing requirements for the Work. The conference shall be attended by the Contractor, the support system installer, panel installer, the panel and support system manufacturer's representative, the Authority's Construction Inspection Division Inspector, and the Architect/Engineer of Record's representative.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of panels and related attachments and accessories.
- B. Coordinate with installation of air/water barrier and thermal insulation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.03 INSTALLATION

- A. General

Comply with panels and soffit manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Do not install broken, chipped or cracked panels.
2. Isolate aluminum surfaces from direct contact to steel, cementitious and dissimilar materials with high-impact plastic shims, paint or membrane.
3. Install terra cotta panel rain screen system to wall assembly specified in accordance with the approved shop drawings and their manufacturer's instructions.
4. Place terra cotta panels in stack or running bond to lines and levels, plumb, with uniform, parallel joints, in accordance with their manufacturer's instructions.
 - a. Use caution to prevent damage to terra cotta panels.
 - b. When field-cutting, use caution to ensure that cuttings do not remain on exposed surfaces. Cut edges shall be sharp, without spalling.
 - c. Cutting shall only be performed with a diamond tipped wet saw.
5. Ensure that assembly is plumb, level and free of warp or twist; maintain dimensional tolerances and alignment with adjacent work.
6. Built-in work:
 - a. As work progresses, build in flashing and other items.
 - b. Where applicable, remove protective film from finished aluminum surfaces.

B. Terra Cotta Panel Rainscreen Tolerances

1. Accurately align and locate components to column lines and floor levels; adjust work to conform to the following tolerances:
 - a. Plumb: 1/8-inch in 10 feet; 1/4-inch in 40 feet; non-cumulative.
 - b. Level: 1/8-inch in 20 feet; 1/4-inch in 40 feet; non-cumulative.
 - c. Alignment: Limit offset to 1/16-inch where surfaces are flush or less than 1/2-inch out of flush, and separated by less 2 inches (by reveal or protruding work); otherwise limit offsets to 1/8 inch.
 - d. Location: 3/8-inch maximum deviation from measured theoretical location (any member, and location).
 - e. Lipping between units: 1/16 inch maximum.
 - f. Finished work shall be viewed from a distance of 15 feet per ASTM C216.

C. Granite Base Panels

Installation tolerances shall match that of the terra cotta panels.

3.04 QUALITY CONTROL

- A. The Authority will assign under the requirements of Section BC 1705.20 of the 2022 NYC Building Code a Special Inspector who will inspect the Panel construction. Where post-installed anchors are utilized, the Special Inspector will perform Special Inspection on post-installed anchors as per Section BC 1705.37. Adhesive anchors installed in concrete in a horizontal or upwardly inclined position supporting sustained tension loads shall be installed under continuous Special Inspection as required by paragraph D9.2.4 of ACI 318-11.
- B. The Special Inspector will make inspections and any testing deemed necessary. The Contractor shall pay for all tests if they verify improper work.
- C. If any results are found to be not in conformance with the applicable ASTM, industry practice, and the Specifications, the Anchors and or Panels in question shall be removed and redone. The Contractor shall pay for testing if results of testing verify improper workmanship or proportions not in conformance with the specifications and ASTM standards.
- D. The installing contractor shall perform daily inspections of panel installation to maintain and confirm that tolerances are being met and that panel manufacturer's DIM (Design & Installation Manual) is complied with.

3.05 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or new otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.
- C. Protect cladding from roof run-off, splashed water, mud, sealants, bitumen, and other contaminants from remaining construction activities.
- D. Without damaging completed work, provide protective boards at exposed external corners, which may be damaged by construction activities.

END OF SECTION