

SECTION 07400

TERRA COTTA CLAY TILE RAINSCREEN SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The terra cotta clay tile elements and aluminum support system shall be manufactured by **NBK Keramik GmbH** as represented by **NBK North America**, be the basis of design, and consist of the following:
1. **NBK TERRART-LARGE** tiles and **TERRART-Baguettes** as manufactured by **NBK North America**
 2. Horizontal aluminum hat, extruded aluminum 'T' shaped, or zee subgirts, and adjustable aluminum angle clips as designed and manufactured by **NBK North America**
 3. Vertical aluminum extrusion carrier tracks with gaskets to which **NBK** zinc cast tile clips are attached and furnished by **NBK North America**
 4. **NBK North America** zinc cast tile clips for attachment of Terra Cotta tiles to aluminum support system.
 5. **NBK** removable baguette hardware consisting of aluminum extrusion (factory installed), receiving plates, angle profile, and holding cap for attachment of baguettes to vertical aluminum supports.
 6. Baguette supporting Armature for baguettes.
 7. Devices for fastening aluminum and/or stainless steel components

1.02 WORK NOT INCLUDED

- A. The building structure is not included. The building structure includes the following:
1. Structural steel, windows, doors, and/or fixed glazing.
 2. Insulation, flashing, sheathing, membrane, and metal stud support system.
 3. Flashings, window surrounds, reveals, copings, trims.
- B. Section 07900 Sealants

1.03 REFERENCES

- | | |
|----------------|---|
| A. AA ASD-1-82 | Aluminum Standards and Data |
| B. AAMA 501 | Methods of Test for Exterior Walls; 1994 |
| C. ASTM C 67 | Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile |
| D. ASTM E 783 | Standard Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors; |

E. ASTM E 1105	2002 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference; 2000
F. ASTM C 126	Standard Specification for Ceramic Glazed Structural Clay Tile
G. ASTM C 484	Standard Test for Thermal Shock Resistance for Glazed Tile
H. ANSI A58.1-82	Minimum Design Loads for Buildings and Other Structures
I. ANSI H35. 1-82	Alloy and Temper Designation for Aluminum
J. ASTM B209-89	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
K. ASTM B221-88	Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
L. DIN EN	German Standards

1.04 QUALITY ASSURANCE

- A. The basic design of the aluminum support system for **NBK TERRART-LARGE** 40mm tiles and **TERRART-Baguettes** must be based upon the rainscreen principle.
- B. Building components must be designed to accommodate imposed loads from the aluminum support system and terra cotta tile. Building components must be designed so their deflection under imposed loading will not cause deflection of aluminum support system to exceed specified tolerances.
- C. The support system for the Terra Cotta tiles and Baguettes must comply with applicable codes and regulations, at project site, which includes:
 1. Design Terra Cotta tiles, Baguettes, Baguette hardware and armature, aluminum subgirt/clip system, vertical aluminum carrier tracks, NBK zinc cast tile clips, and fastening devices to withstand specified wind load, dead load and/or live loads
 2. Design corners for simultaneous wind-induced design pressure (Architect to select wind load design pressures)
- D. Backup wall for rainscreen Terra Cotta clay tiles and aluminum support system shall comply with requirements of applicable codes, and regulations for air and water infiltration and exfiltration.
- E. Complete structural analysis and calculations prepared by an engineer registered in the state in which the project is located.
- F. Aluminum support and Terra Cotta ceramic tile system manufacturers who, having been in the business for at least 10 years, are experienced in designing and manufacturing rainscreen systems.
- G. Rainscreen Terra Cotta ceramic tile and aluminum support system installer who, having been in the business for at least 5 years, can demonstrate competence in the erection of similar aluminum support systems equal to the complexity of the specified project.

1.05 SYSTEM DESCRIPTION

- A. The rainscreen terra cotta ceramic clay tile elements, and aluminum support system shall consist of **NBK TERRART-LARGE** double-leaf, through body color terra cotta clay tiles, **NBK** aluminum support system, zinc cast tile clips, and gaskets, **NBK TERRART-Baguettes** and hardware, anchors, fastening devices, and accessories.
1. **NBK** Terra Cotta clay tiles and Baguettes, **TERRART-LARGE**, **40 mm** thickness (Length: max. 1824 mm, Height: 600 mm), back ventilated, with self-draining open joint system. Tiles shall be double-leaf construction and have labyrinth top and bottom returns to prevent easy water excess behind tiles.
 2. **NBK** aluminum support system: horizontal aluminum hat shaped, 'T' shaped, or zee girts, adjustable aluminum wall brackets, extruded aluminum vertical carrier tracks with gaskets, zinc cast tile clips, and fastening devices for **NBK** Terra Cotta clay tile elements. The aluminum girt system, vertical aluminum carrier tracks with gaskets, and zinc cast tile clips, shall serve to support Terra Cotta ceramic tiles and drain rainwater. Design system to accommodate thermal movement. **NBK** Terra Cotta tiles must be removable, without breakage or disruption to adjacent tiles. Tile clips must be concealed.
 3. Vertical spacer (**Optional**)
 4. **NBK TERRART- Baguettes** and hardware (aluminum extrusion, receiving plates, angle profile, and holding cap) shall be provided in one piece (length) and in a size and shape as shown on the drawings.
 5. Supporting aluminum Armature for **NBK TERRART-Baguettes** shall be extruded aluminum and finished to match curtainwall.
 6. **NBK** Terra Cotta tiles and Baguettes must be provided in the colors, finishes, textures, sizes (one piece), and profiles specified and shown on the drawings.
 7. **NBK** Terra Cotta tiles must have natural finish (standard color – non-grey or blue), and without silicone glaze or sealers.
 8. Fastening devices: stainless steel screws and metal devices (**NBK** aluminum support system) attached to building shall transmit imposed loads from the Terra Cotta and support system to building.
 9. Wet sealants will not be permitted.

1.06 PERFORMANCE CRITERIA

- A. Design Terra Cotta clay tile façade, aluminum support system, Baguettes, Baguette Armature, and Baguette hardware, to provide expansion and contraction of various components as caused by extreme temperature ranges without undue stress on the fasteners or other detrimental effects.
- B. Aluminum support system shall conform to the following criteria:
1. Perpendicular to the plane of the building structure, net deflection of the aluminum support members shall not exceed $L/175$ of span. A span is defined as the distance between centerline of anchor to building fastening. For cantilever, span is defined as two times the distance between last anchor to the building fastening centerline and the cantilever end.

2. The system shall have a design load of positive and negative pressure to meet local building codes.
 3. Parallel to plane of building, net deflection of aluminum support members shall not exceed 0.125 inch.
 4. At connection points of aluminum support framing members to anchors, combined movement of anchor relative to building, and framing member relative to anchor, shall not exceed 0.063 inch in any direction.
 5. At 1.5 times design pressure loads for aluminum support framing members, net permanent deflection (set) 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 set after load is removed.
- C. Movement: Design, fabricate, and install system to withstand building, seismic, and thermal movements including deflections, temperature change without buckling, distortion, joint failure, or undue stress on system components, anchors, or permanent deformation of any kind.
1. Provide for thermal movement over an ambient temperature range of 120 degrees F, and a surface temperature of 180 degrees F.

1.07 SUBMITTALS

- A. Comply with section 01430 shop drawings, product data, and samples.
- B. Shop drawings shall show building elevations and floor/roof plans with Terra Cotta clay tiles identified specifically. Large scale drawings and details of the Terra Cotta and aluminum support system shall be provided showing Terra Cotta tile dimensions and dimensioned relationship to other system and building components. Terra Cotta ceramic tiles must be furnished in the sizes shown on the Architect's drawings. Drawings shall indicate location, size, and spacing of aluminum framing members, fasteners and other components of the Terra Cotta tiles, aluminum support system, Baguettes, Armature, and Baguette hardware.
- C. Product data shall consist of published data from **NBK North America**, materials to be furnished, standard test reports, warranties, components, and fasteners.
- D. Suitcase size sample mock-up shall consist of Terra Cotta clay tiles, Baguettes and hardware, horizontal and vertical aluminum support system with gaskets, and zinc cast tile clips.
- E. Visual mockup (**optional**) will be arranged as per the architect's request with consideration for size and the associated costs.

1.08 VISUAL REQUIREMENTS

- A. For determination of acceptability, and the meeting of specified criteria, the viewing distance for the exposed work shall be 10 feet for interior surfaces and 10 feet for exterior

surfaces when the observer can be within 10 feet of the surface, and 50 feet for the remaining surfaces.

1.09 WARRANTY

- A. NBK North America** warrants that the rainscreen aluminum support system and terracotta ceramic tiles shall be free of material defects for a period of 5 years due to faulty workmanship. Failure or defects are to be determined by representatives of **NBK North America**.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A.** This section is based on the **NBK** aluminum rainscreen support system for **NBK TERRART-LARGE** tiles and **TERRART-Baguettes**, and is the basis of design as manufactured by **NBK North America**:
 1. Other manufacturers may be submitted for review 10 days prior to the bid in compliance with section 01300.
 2. Submittals must show evidence of compliance with this specification and the drawings. Submittals must provide proof of manufacture and successful performance of the rainscreen principle for systems of similar size and complexity as this project for the past 10 years.
 3. Manufacturer shall provide a reference list of at least US 50 projects, including names, addresses, and phone numbers where large tiles and baguettes have been used.

2.02 FABRICATION

- A.** Manufacture aluminum support system for Terra Cotta clay tiles, Baguettes, Baguette Armature, and hardware in conformance with approved shop drawings so that tolerances are not exceeded.
- B.** Fabricate aluminum components and Terra Cotta to the sizes, profiles, colors and textures per manufacturers standards.
- C.** Provide intermediate aluminum supports as necessary to meet specified load requirements.
- D.** Aluminum components shall be furnished with a technical anodized industrial coating.
- E.** Use only stainless steel fasteners in exposed areas and wet zone.
- F.** Aluminum support system and tiles clips must be designed so that ceramic clay tiles can be removed independent of other tiles.

2.03 TOLERANCES

A. Terra Cotta Clay Tiles

1. **Width** - Deviation of the tile length from nominal dimensions (cuts) shall not exceed +/- **1.0 mm**
2. **Height** - Deviation of the tile height up to **300 mm** shall not exceed +/- **2.0 mm**, and up to **600 mm +/- 3.0 mm**
3. **Thickness** - Deviation of tile thickness shall not exceed +/- **1.5 mm**
4. **Diagonal Flatness** - Deviation of the tile flatness shall not exceed 0.25% up to a **max. 2.0 mm**
5. **Straightness** – Deviation shall not exceed 0.25% up to a max. **2.5 mm**

B. Terra Cotta Baguettes

1. **Straightness** - +/- **3mm**

2.04 FINISHES

- A. Provide technical anodized aluminum finish on aluminum framing members.
- B. Provide manufacturers Terra Cotta tiles and Baguettes in standard colors and finishes.

2.05 TESTING OF TERRA COTTA CLAY TILES

- A. Water Absorption: Test according to ASTM C 67 using 24-hour submersion and 5 hours boiling (separate sets of specimens, minimum 5 specimens each). Absorption by submersion shall not exceed 5 percent average, 7 percent individual specimen. Absorption by boiling shall not exceed: 7 percent average, 8 percent individual specimen.
- B. Freeze/thaw: Test according to **ASTM C 67** for 100 cycles. No specimen shall crack, crumble or fracture.
- C. Thermal Shock Resistance: Test according to ASTM C 484 for glazed tiles. Minimum of 5 specimens. Specimens shall pass one cycle.
- D. Efflorescence: Test according to ASTM C 67. Minimum 10 specimens. Specimens to be rated “non-effervescence”.

2.06 PERFORMANCE TESTING

- A. Air Infiltration: By Testing per section 08910
- C. Water Penetration: No uncontrolled water penetration shall occur beyond the plane of the back of the terra cotta clay tile that is not contained or drained back to the exterior. “Controlled” water or condensation shall drain harmlessly to the exterior of the work without “wetting” adjacent surfaces or insulation, and not visible in the final surrounding conditions.
 1. Provisions shall be made to drain rainwater to the exterior face of the work, including any water entering the joints and/or condensation occurring within the

work. The wall shall be designed to collect and remove all secondary water from the surrounding conditions.

2. No uncontrolled water penetration shall occur as measured by testing per Section 08910.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examination of building components to receive the rainscreen Terra Cotta clay tiles and aluminum support system. This includes:
 1. Making certain that building components are positioned properly, secured and prepared to receive the rainscreen Terra Cotta clay tiles, aluminum support system, Baguettes, Baguette Armature, and Baguettes hardware.
 2. Reporting deficiencies in writing to the general contractor.
 3. Do not erect the rainscreen Terra Cotta, aluminum support system, and/or Baguettes until deficiencies have been corrected.

3.02 INSTALLATION

- A. Install the **NBK** aluminum support system and **NBK** Terra Cotta elements in compliance with erection drawings and per instructions from **NBK North America**.
- B. The **NBK TERRART-LARGE** Terra Cotta clay tiles, aluminum support system, **TERRART-Baguettes**, Armature, and hardware, shall be installed so that, in their final location and position they are not twisted, out of plane, or exceed manufacturers specified tolerances. Terra Cotta tiles and baguettes must be removable.

3.03 INSTALLATION TOLERANCES

- A. Measurements are on the surface exposed to view. The aluminum support system shall not exceed manufacturer's tolerances. Measurements are taken after installation of the Terra Cotta clay tiles, aluminum support system, Baguettes and hardware at project site.
- B. Securely fasten aluminum support system, Terra Cotta clay tiles, and Baguettes to building structure and adjust to maintain specified tolerances.

3.04 CLEANING AND PROTECTION

- A. Final cleaning must be according to the instruction of **NBK North America**.
- B. Protection of the aluminum components and Terra Cotta from damage for the duration of construction is the responsibility of the general contractor.
- C. Any materials that may have become damaged during shipment, and/or if damaged by the

installer, shall be repaired or replaced at no additional cost to the owner.

END SECTION