DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07320—Roof Tiles

REPORT HOLDER:
LUDOWICI ROOF TILE, INC.
4757 TILE PLANT ROAD
NEW LEXINGTON, OHIO 43764
www.ludowici.com

EVALUATION SUBJECT:
LUDOWICI AND CELADON CLAY ROOFING TILES

1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2006 International Building Code® (IBC)
- 2006 International Residential Code® (IRC)
- 1997 Uniform Building Code™ (UBC)

Properties evaluated:
- Roof covering
- Fire classification
- Wind resistance

2.0 USES

The Ludowici and Celadon clay roofing tiles, when installed in accordance with this report, are recognized as a Class A roof covering under the IBC and the IRC and as noncombustible roof covering under the UBC.

3.0 DESCRIPTION

3.1 General:
The roofing tiles comply with ASTM C 1167 and are manufactured from southeastern Ohio shale and fire clay, ground and screened to particle size suitable for the extrusion process. The clay is mixed with water and extruded in dies or pressed in molds to form various shapes. A surface treatment of glazing is applied before drying and firing. Accessory tiles such as ridge, rake and hip tiles are produced in the same manner as the roofing tiles, using the same materials.

3.2 Materials:

3.2.1 XL Interlocking Tiles: The XL Interlocking Tiles are flat with interlocking edges. See Table 1 for dimensions and installed weights of the six different types of XL Interlocking Tiles. Two nail holes are provided at the top of each tile. See Figure 1 for additional details. The tiles are installed with a 3-inch (76 mm) headlap on roofs having a minimum slope of 3:12 (25%).

3.2.2 Interlocking Tiles: The Interlocking Tiles are flat with interlocking edges. See Table 1 for dimensions and installed weights of the five different types of Interlocking Tiles. Two nail holes are provided at the top of each tile. See Figures 2 and 3 for additional details. The tiles are installed with a 3-inch (76 mm) headlap on roofs with a minimum slope of 3:12 (25%).

3.2.3 Shingle Tiles: The Shingle Tiles are flat, shingle-type tiles. See Table 1 for dimensions and installed weights of the eight different types of shingle tile. Two nail holes are provided at the top of each tile. The tiles are installed with headlaps as shown in Figure 4 on roofs with a minimum slope of 5:12 (42%).

3.2.4 Medium Profile Tiles: The Medium Profile Tiles have locks on all four edges reflecting French architectural features. See Table 1 for dimensions and installed weight of the tiles. One nail hole is provided at the top of each tile. See Figure 5 for additional details. The tiles are installed with a 3-inch (76 mm) headlap on roofs with a minimum slope of 3:12 (25%).

3.2.5 One-Piece, High Profile Barrel Tiles: The One-Piece, High Profile Barrel Tiles are S-shaped and have two nail holes at the top of each tile. Table 1 shows dimensions and installed weights. See Figure 6 for additional details. The tiles are installed with a 3-inch (76 mm) headlap, on roofs with a minimum roof slope of 4:12 (33%).

3.2.6 Two-Piece, High Profile Barrel Tiles: The Two-Piece, High Profile Barrel Tiles consist of pan and cover units having one nail hole at the top. Table 1 shows dimensions and installed weights. See Figures 7, 8 and 9 for additional details. The tiles are installed with a 3-inch (76 mm) headlap on roofs with a minimum slope of 5:12 (42%).

4.0 INSTALLATION

4.1 Field Tile:
Unless otherwise noted in this report, the tiles must be applied to solid-sheathed decks in accordance with IBC Table 1507.3.7, IRC Section R805.3 or UBC Tables 15-D-1 or 15-D-2, as applicable. The deck surfaces must be clean and dry prior to installation of underlayment. Foreign particles must be cleaned from all interlocking areas, to ensure proper seating and to prevent water damming. Cracked or broken tile must be replaced. See Figure 10 for additional details.

The decking must be minimum 3/4-inch-thick (19.1 mm) plywood, nominally 1-by lumber, or other solid decking complying with the applicable code. The decking must be structurally adequate to support the loads involved.
Underlayment must comply with IBC Section 1507.3.3, IRC Section R905.3.3 or UBC Section 1507.7 and Tables 15-D-1 and 15-D-2, as applicable. The underlayment must be installed over the sheathing. Two layers of underlayment must be applied on rough surfaces, hips, valleys and ridges. Underlayment must be lapped 2 1/2 inches (63.5 mm) horizontally and 6 inches (152 mm) vertically, and extended 6 inches (152 mm) up vertical surfaces behind flashings.

For all roof slopes, each tile must be fastened in accordance with IBC Section 1507.3.6, IRC Section R905.3.3 or UBC Tables 15-D-1 and 15-D-2 to the plywood or wood deck with No. 11 gage corrosion-resistant nails having head diameters of 5/16 inch (8 mm) or larger. Ring shank nails must be used for plywood decks, and smooth shank nails for lumber decks. The nails must have sufficient length to penetrate the deck a minimum of 1/4 inch (19.1 mm) or through the underside of the deck, whichever is less. On roof slopes greater than 7:12 (58%) but less than 21:12 (175%), approved wind locks or hurricane clips, as shown in Figure 11, must be attached to each tile, in addition to the nails described above.

When installed with battens, nominally 1-by-2 wood battens must be spaced parallel to the eave to achieve the required minimum 3-inch (76 mm) headlap set forth in Section 3.2 between successive tile courses. End joints of batten boards must be separated by 1 inch (25.4 mm) every 4 feet (1219 mm) for drainage. Battens must be nailed to the deck with 8d corrosion-resistant box nails at 24 inches (610 mm) on center.

All valleys must have a minimum 16-ounce per-square-foot (4882 g/m²), 0.0216-inch-thick (0.549 mm) copper flashing extending a minimum of 11 inches (279 mm) from the valley centerline each way, with a splash diverter rib not less than 1 inch high (25.4 mm) at the flow line formed as part of the flashing. Sections of flashing must have a minimum end lap of 4 inches (102 mm). Directly under the flashing, a minimum 36-inch-wide (914 mm), coated base sheet underlayment, complying with ASTM D 226, and having a minimum sheet weight of 43 pounds per 100 square feet (2.1 kg/m²), must be provided in addition to regular underlayment required in Section 4.1.

4.2 Hip, Ridge and Rake Tiles:

Hip and ridge tiles must be installed with ridge boards as shown in Figure 10. One layer of underlayment must be applied over the ridge board prior to installation of the hip and ridge tiles. Each ridge and hip tile must be nailed with one No. 11 gage corrosion-resistant nail driven into the ridge board. A bead of plastic cement must be spread across the nail head so that the butt end of each succeeding tile is securely fixed. Gable rake tiles must be fastened with two copper nails. Plastic cement for gable rakes, hip rolls, ridges, stringers and other conditions must be nonrunning, heavy-body flashing cement composed of mineral ingredients meeting the requirements of ASTM D 4586. Sealant, when used in lieu of plastic cement, must be silicone, and must be applied in accordance with the silicone manufacturer’s published recommendations.

4.3 Roof Slope Limitations:

Minimum roof slopes must be as specified for the specific tiles in the applicable subsections of Section 3.2. Tiles installed on roof slopes less than those set forth in this report must be considered as decorative only, and must be installed over an approved roof covering complying with the applicable code.

4.4 Ice Dam Protection (IBC and IRC):

In areas where the average daily temperature in January is 25°F (-4°C) or less, or where there is a possibility of ice forming along the eaves and causing a backup of water, a membrane that consists of at least two layers of underlayment, complying with ASTM D 226, cemented together with an approved cementing material, or of a self-adhering polymer modified bitumen sheet complying with ASTM D 1970 or the ICC-ES Acceptance Criteria for Roof Underlayment for Use in Severe Climate Areas (AC48), must be used in lieu of normal underlayment. The underlayment must extend from the eave’s edge to a point at least 24 inches (610 mm) inside the exterior wall line of the building and under all metal valley flashing.

4.5 Severe Climate Areas (UBC):

In areas subject to wind-driven snow, ice buildup, or wind-driven dust or sand, or in other areas designated by the code official, underlayment must include, in addition to the underlayment required by Section 4.2 of this report for the field of the roof, an extra layer of felt extending from the eave to a point 24 inches (610 mm) inside the exterior wall line of the building. Underlayment must be applied and cemented together as required in UBC Table 15-D-1 or 15-D-2. Metal valley flashing underlayment must be solid, cemented to the roofing underlayment required by Section 4.2 for slopes less than 7:12 (58%).

4.6 Roof Classification:

The Ludowici and Celadon clay roof tile installed in accordance with the report is a Class A roof covering in accordance with IBC Section 1505.2 and IRC Section R902.1, and a noncombustible roof covering in accordance with UBC Section 1504.2.

4.7 Reroofing Application:

The existing roof covering must be removed and the new roof installed in accordance with IBC Section 1510, IRC Section R907, UBC Appendix Chapter 15, and this report.

4.8 Wind Resistance:

4.8.1 IBC and IRC: When installed in accordance with this report, the Ludowici and Celadon clay roof tiles must be limited to areas subject to a maximum basic wind speed (3-second gust) of 100 mph (161 km/h) on structures having a mean roof height of 40 feet (12.2 m) or less (IBC) or 60 feet (18.3 m) or less (IRC).

4.8.2 UBC: When installed in accordance with this report, the Ludowici and Celadon clay roof tiles are limited to areas subject to a maximum basic wind speed (fastest mile) of 80 mph (129 km/h) on structures having a mean roof height of 40 feet (12.2 m) or less.

5.0 CONDITIONS OF USE

The Ludowici and Celadon clay roofing tiles described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Tiles must be manufactured, identified and installed in accordance with this report and the manufacturer’s published installation instructions. If there is a conflict between this report and the manufacturer’s published installation instructions, this report governs.

5.2 The tiles are limited to use in those areas described in Section 4.8 of this report.

5.3 Maximum allowable roof slope is 60 degrees from the horizontal.
6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Clay and Concrete Roof Tiles (AC180), dated August 2007.

7.0 IDENTIFICATION

Affixed to each shipping pallet is a tag bearing the company name and address (Ludowici Roof Tile, Inc., or Celadon Company), product name, the installed weight, tile quantity, product code number and the evaluation report number (ICC-ES ESR-1646). Additionally, the name "Ludowici" is embossed on each tile, with the exception that the name "Celadon" is embossed on the Celadon Ceramic Slate tiles.

### TABLE 1—PRODUCT DESCRIPTIONS

<table>
<thead>
<tr>
<th>TILE PROFILE CATEGORY</th>
<th>PRODUCT NAME</th>
<th>LENGTH (inches)</th>
<th>WIDTH (inches)</th>
<th>THICKNESS (inch)</th>
<th>INSTALLED WEIGHT (lbs/sq.ft.)</th>
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For SI: 1 inch = 25.4 mm, 1 psf = 4.88 kg/m².
FIGURE 1—XL INTERLOCKING TILES: XL AMERICANA, XL CLASSIC, XL LANAI, XL WILLIAMSBURG, XL IMPERIAL SLATE

FIGURE 2—IMPERIAL XL INTERLOCKING TILE

FIGURE 3—INTERLOCKING TILES: AMERICANA, CLASSIC, LANAI, WILLIAMSBURG

FIGURE 4—SHINGLE TILE

For SI: 1 inch = 25.4 mm.
FIGURE 5—MEDIUM PROFILE TILE

FIGURE 6—ONE-PIECE, HIGH-PROFILE BARREL TILE

FIGURE 7—TWO-PIECE, HIGH PROFILE BARREL TILE

FIGURE 8—TWO-PIECE, HIGH PROFILE BARREL TILE

FIGURE 9—TWO-PIECE, HIGH-PROFILE BARREL TILE—CABANA

For SI: 1 inch = 25.4 mm.
For SI: 1 inch = 25.4 mm.

FIGURE 10—INSTALLATION DETAILS
For SI: 1 inch = 25.4 mm.

FIGURE 10—INSTALLATION DETAILS (Continued)
FIGURE 10—INSTALLATION DETAILS (Continued)

For SI: 1 inch = 25.4 mm.

FIGURE 11—HURRICANE CLIPS