



Attachment 7

7th EDITION

# Florida High Wind Concrete and Clay Tile Installation Manual



FRSA-TRI Alliance December 31, 2023 (12-31-23)

## TILE INSTALLATION

**Layout Horizontal** – Chalk horizontal lines beginning one tile length from eave less desired overhang. Overhang shall be 3/4" to 2" depending on tile type, use of a gutter or other functional requirements. All roof tile installations shall have a minimum 3" headlap unless restricted by product design. When battens are used, the top course should be held down approximately 1-1/2" from the ridge frame.

**Layout Vertical** – Choose one of the following:

• **Staggered/Cross Bond Tile Installation.**

**Gable Roofs** – When using rake tile, chalk vertical lines the width of one full tile plus the desired stagger and an additional 1" to 2" from starting gable to accommodate the rake tile. When using a flush finish (point up), chalk vertical lines the width of one full tile plus the desired stagger and an additional 1/4" from starting gable to accommodate flush finish. Chalk additional lines if necessary to maintain alignment.

**Hip Roofs** – Chalk vertical line 90 degrees from eave line. Chalk second line parallel to first to accommodate staggered/cross bonded tile. Chalk additional lines if necessary to maintain alignment.

• **Straight Bond Tile Installation** – Not recommended for flat/low profile tile.

**Gable Roofs** – When using rake tile, chalk vertical lines one full tile width plus 1" to 2" from starting gable to accommodate the rake tile. When using a flush finish (point up), chalk vertical lines one full tile width plus 1/4" from starting gable to accommodate flush finish. Chalk additional lines if necessary to maintain alignment.

**Hip Roofs** – Chalk vertical line 90 degrees from eave line. Chalk second line parallel to first to accommodate straight bond tile. Chalk additional lines if necessary to maintain alignment.

**Batten Installation** – Horizontal battens shall be a maximum of 4' in length. The batten material may be longer in length provided there are 1/2" weep holes every 4'. Battens are optional for 4:12 pitch and above. Install top edge of horizontal batten to horizontal line.

Horizontal battens to be a minimum nominal 1" x 2". Batten shall be fastened and secured a maximum 24" on center with fasteners of sufficient length to penetrate the sheathing a minimum 3/4" or through the thickness of the sheathing.

If utilizing staples, then the battens shall be attached at 12" on center with staples 7/16" crown, No.16 gauge corrosion resistant allowing for 3/4" penetration into roof deck or through the sheathing whichever is less. Staples cannot be used with adhesive set systems.

Leave 1/2" space between batten ends and between batten and metal edge returns. Fasteners shall be compatible with batten material.

**Note:** Elevated or counter batten systems require FBC Product Approval. Contact the roof tile manufacturer for Product Approval and installation instructions.

**Tile Installation** – Stack tile to facilitate installation and minimize tile movement. See Drawing FHW-27. Choose one of the following eave closures:

- **Metal Eave Closure** – Install closure strip along eave. Fasten minimum 18" on center. If metal closure is inclusive of the drip edge, fasten 6" on center. See Drawing FHW-14.
- **Prefabricated Rubber Eave Closure** – Install closure strip along eave. Fasten with minimum three fasteners per 36" strip. See Drawing FHW-14.
- **Raised Fascia/Wood Starter Strip** – See Drawing FHW-14.
- **Prefabricated Concrete or Clay Eave Closure** – Apply per manufacturer's instructions.
- **Mortar** – Install mortar to elevate eave tile on granular surfaced underlayments only. Apply mortar along the eave edge, applying enough mortar to elevate the eave end of the tile to be on plane with the remaining roof tile. Point and smooth finish flush to eave line. A minimum 3/8" weep hole flush with the roof underlayment shall be formed at the spacing of not less than one weep hole per tile.

### Fastening Options for Adhesive Set Tile Installations

For roof slopes 2:12 up to and including 6:12, fasteners are not required in addition to the adhesives.

For roof slopes greater than 6:12 and up to and including 7:12, fasten every tile in the first course and every third tile every fifth course in addition to the adhesive, preferably in through the nail hole closest to overlock of tile being fastened.

For roof slopes greater than 7:12, fasten every tile in addition to the adhesive, preferably through the nail hole closest to overlock of tile being fastened.

When utilizing battens and tiles with protruding anchor lugs, fastening is not required in addition to the adhesive.

**Note:** Foam applied systems require FBC Product Approval. Refer to the roof tile foam adhesive manufacturer for Product Approval and installation instructions.

**Flat/Low, Medium and High Profile Tile** – Tile shall be attached to resist the aerodynamic moment as determined when using the design pressures for the building and the attachment calculations set forth in the local building code.

Starting at the eave, make certain the tile overhangs the drip edge uniformly along the first course. The tile shall overhang the eave line by at least 3/4" but not more than 2". Secure tiles with nails, screws, foam/adhesive or mortar. For allowable uplift resistance of mechanically-attached tile, see Table 3.

Cut/break tile for proper staggering of tile courses when using staggered/cross bond method of installation. Set tile in stepped course fashion or in a horizontal and/or vertical fashion when utilizing straight bond method. Lay succeeding courses of field tile in same manner. Cut/break field tile to form straight edge at center of hip/ridge.

**Valleys** – It is not recommended to install trim tile in the valleys. It may be necessary to remove the lugs from the field tile at walls and valley flashings for proper positioning of cut field tiles. Choose one of the following:

#### • Valley Metal without Water Diverters.

- **Closed Valley** – Miter tile to meet at center of valley. See Drawing FHW-06.
- **Open Valley** – Chalk a line minimum 2" on both sides of valley center. Place bed of mortar along outside edge of chalk lines on granular surfaced underlayments only. Miter tile to form straight border and point mortar to finish. See Drawing FHW-06.

#### • Valley Metal with Water Diverters.

- **Closed Valley** – Miter tile to form straight border on either side of water diverters. See Drawing FHW-06.
- **Open Valley** – Miter tile to form straight border on either side of the two water diverters. See Drawing FHW-06.

## HIP AND RIDGE INSTALLATION

**General** – The following recommendations are only for products approved by the FBC and tested according to SSTD 11-99 via third-party independent FBC approved laboratories. They will determine the wind uplift limitations of the various hip and ridge attachment methods or by installation methods currently recognized in the High Velocity Hurricane Zone (HVHZ) section of the FBC. There are three basic attachment methods of hip and ridge tiles: mechanical attachment, adhesive-set and mortar-set attachment systems. The minimum headlap when installing hip and ridge tiles is 2" unless restricted by product design. Any exposed fasteners should be covered with a UV resistant sealant.

**Field Tile Cuts at Hip or Ridge** – All cut field tiles adjacent to a hip or ridge shall be attached to the cap sheet and/or the adjacent tile with an approved adhesive, mortar or mechanical fasteners and adhesive.

The following table outlines the different parameters for the hip and ridge attachment options. See Drawings FHW-15, FHW-16 and FHW-17.

HIP AND RIDGE ATTACHMENT TABLE

| Field Tile Attachment        | Structural Support | Member Attachment           | Trim Tile Attachment        | Weatherblocking | Finish  |
|------------------------------|--------------------|-----------------------------|-----------------------------|-----------------|---------|
| Foam<br>Mechanical<br>Mortar | Metal              | Mechanical<br>or Foam       | Foam                        | Foam            | Coating |
|                              |                    |                             |                             | Mortar          | Mortar  |
|                              | Plastic            | Foam                        | Foam                        | Foam            | Coating |
|                              |                    |                             |                             | Mortar          | Mortar  |
|                              | Wood               | Foam<br>H-Bracket<br>Straps | Foam                        | Foam            | Coating |
|                              |                    |                             |                             | Mortar          | Mortar  |
|                              |                    |                             | Mechanical with<br>Adhesive | Foam            | Coating |
|                              |                    |                             |                             | Flexible        | Dry     |
|                              |                    |                             |                             | Mortar          | Mortar  |
| Foam<br>Mortar               | Mortar             | Mortar                      | Mortar                      | Mortar          | Mortar  |

**Hip and Ridge Attachment** – Choose one of the following:

- **Metal Member** – Seal all nail penetrations with compatible roof cement unless the underlayment meets ASTM D-1970 Sec. 7.9. Fasten 6" on center on each side of the metal flange with minimum 1-1/4" ring shank roofing nails. If mechanical attachment of the member is not used, install the member with foam per the manufacturer's instructions.
- **Plastic Member** – Install the member with foam per the manufacturer's instructions.
- **Wood Member** – Fasten 18" on center with four #8 screws per metal strap or H-bracket. Each attachment point shall have two fasteners on each side of the wood member. The fasteners shall be spaced evenly on the metal strap or H-bracket with

the attachment holes parallel to the hip or ridge. The straps and H-brackets shall be a minimum of 26 gauge. All materials must be compatible with each other. If mechanical attachment of the wood member is not used, install the member with foam per the manufacturer's instructions. Seal all nail penetrations with compatible roof cement unless the underlayment meets ASTM D-1970 Sec. 7.9.

- **Mortar** – When using foam or mortar field tile attachment, mortar can be used as a structural attachment. Place a full bed of pre-bagged mortar under the entire tile. Each tile must be fully embedded into the mortar. The field tile secured to the underlayment along with the mortar on each trim tile creates the structural bond. The entire cavity under the trim tile should be filled with approved mortar. See Drawing FHW-18.

**Starter Tiles** – All starter tiles must be secured at both ends of the tile either with mechanical fasteners, mortar and/or adhesive.

When the field tile is installed with foam or mortar, the starter tile may be installed with an approved mortar.

If using a structural member, choose one of the following:

- **Metal Member** – Place foam under starter tile per manufacturer's recommendations or secure the head of the tile with one #8 screw and apply adhesive in the gap between the structural support and the tile. The member may need to be cantilevered to provide a base for the adhesive. The starter tile must make contact with the adhesive. See manufacturer's recommendations.
- **Plastic Member** – Place foam under starter tile per manufacturer's recommendations.
- **Wood Member** – Place foam under starter tile per manufacturer's recommendations or drill a hole in the lower third of the starter tile and secure with a mechanical fastener into the wood member a minimum of 1". Seal the head of the fastener with a UV-resistant sealant. Adhesive may be used in lieu of a fastener as long as the wood member has been cantilevered to provide a base for the adhesive. The adhesive between the structural support and the tile must make continuous contact with both the structural support and the tile. See manufacturer's recommendations.

Miter or point up the hip starter tile to match the intersecting eaves.

**After the Starter Tile** – Install the next tile centering over the structural support and/or the starter tile. Continue in same manner working from the lowest point toward the highest point of the roof. At intersecting junctions (i.e., hip/ridge, ridge/gable, ridge/valley), cut tile to form a solid fit and ensure the first and the last hip/ridge tile is securely fastened. Any exposed fasteners shall be sealed with a UV-resistant sealant. Foam must come in contact with the bottom of the tile and structural support member.

**Weather Blocking** – Hip and ridge tiles need to have weather blocking. Choose one of the following. See Drawing FHW-16 for more details.

- **Mortar** – Pre-bagged or job-site mix is used to weather block the longitudinal edges of the hip and ridge tiles and provide aesthetics. A full bed of mortar is placed along the longitudinal edges of the hip and ridge tile either during the application of the hip and ridge tiles or may be packed in after the hip and ridge tiles are installed and the adhesive has cured. Install mortar to seal all voids between the field tile and the hip/ridge tile. Care should be taken to ensure enough mortar is used. The mortar should create a wedge to keep the mortar from dislodging from under the hip/ridge and the field tile junction. Ensure areas are sealed to prevent water entry. After the mortar is packed into place, then apply point up mortar to the desired finish.
- **Foam** – Is used to weather block the entire cavity of the adjoining planes of field tile to the sides of the structural support. This system uses foam as the weather blocking. There is no mortar placed along the longitudinal edges of the hip and ridge tile. Foam is placed where the field tile abuts the structural support. A bead of foam is placed parallel to the hip and/or ridge and the structural support to tile junction to act as a weather block and is applied prior to the attachment of the hip and ridge tile. Install foam to seal all voids between the field tile and the structural support. Care should be taken to ensure all areas are sealed with adhesive to prevent water entry. Apply a polyurethane compatible coating to protect the foam from UV exposure.
- **Flexible Self-Adhered Membrane** – This system can be used with a wood structural support. The flexible self-adhered membrane is applied in a continuous or step fashion, sealing to both sides of the adjoining field tile a minimum of 2" prior to the mechanical attachment of the trim tile to the wood structural support. The flexible flashing may be visible, but should not extend onto the field tile beyond the outside edges of trim tile.

## RAKE/GABLE AND OTHER CONDITIONS

**Rake/Gable** – Choose one of the following:

- **Rake Tile** – Cut and install first rake tile the exposed length of first course of field tile with factory finish of rake tile towards the eave. Fasten rake tile with a minimum two 10d nails of sufficient length to penetrate the framing a minimum of 3/4". Abut each succeeding rake tile to the nose of the field tile above and maintain a constant headlap. See Drawing FHW-19.
- **Mortar Finish** – Place mortar bed along roof edge. Point smooth to a straight edge finish.

**Wall Abutments** – It may be necessary to remove lugs from the field tile and/or install batten extenders at wall flashing for proper positioning of cut field tiles. For mechanically attached tile systems, tiles installed at wall abutment shall be attached with an adhesive. The adhesive shall be installed to the underlayment or the tile below/next to the tile being installed to meet the required uplift. Cut the tile to fit within 1" of the base of finished wall. Point-up mortar is optional. See Drawing FHW-12.

**Plumbing Stacks/Soil Stacks** – Choose one of the following:

- **Pre-Formed Soil Flashing (with returns)** – A lead skirt flashing or flexible flashing with minimum 18" x 18" base shall be used. This flashing shall be woven in with the tile coursing. See Drawing FHW-21.

- **Pre-formed Flashing (without returns)** – Cut tile to fit close to plumbing stack; fill void with mortar and point to finish. See Drawing FHW-20.

**Coatings** – (Optional) Sealer may be applied to exposed mortar. Color coordinated paint may be applied to metal flashings.

**Tile Replacement/Damaged Tile** – Break out and replace damaged roof tile. Do not disturb underlayment. Repair underlayment if necessary. The lugs of the tile may need to be removed to position tile. Apply adhesive per adhesive manufacturer's recommendations. Immediately set replacement tile in position assuring proper contact.

**Small Valley and Hip Cuts** – Elevate nose end of tile in course above small cut tile. Apply adhesive per adhesive manufacturer's recommendations. Immediately set tile in course above in a position which assures proper contact. For roof slopes greater than 7:12 on hip cuts only, mechanical fastening may be required.

**Clean Up** – Remove all broken tile, debris and excess tile from roof.

**Miscellaneous Recommendations** – Instructions shall be given to all parties involved cautioning against traffic of any kind on finished roof. Damage to roof tiles and/or sub-roof may result.