**UNIFIED FACILITIES GUIDE SPECIFICATIONS**

**References are in agreement with UMRL dated January 2021**
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**04/06**

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**USACE / NAVFAC / AFCEC / NASA** | **UFGS-07 32 14 (April 2006)**

**Preparing Activity: NAVFAC** | **Replacing without change UFGS-07321 (June 2005)**

**UNIFIED FACILITIES GUIDE SPECIFICATIONS**

**References are in agreement with UMRL dated January 2021**

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SECTION 07 32 14

CLAY TILE ROOFING REPLACEMENT OR REPAIR
**04/06**

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**NOTE: This guide specification covers the requirements for clay tile roofing on historic buildings which require replacement, reinstallation, or repair of clay tile roofs.**

**Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.**

**Remove information and requirements not required in respective project, whether or not brackets are present.**

**Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).**

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PART 1 GENERAL

1.1 REFERENCES

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**NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.**

**Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.**

**References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.**
**********

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

| | |
|---|---|
| ASTM B370 | (2012; R 2019) Standard Specification for Copper Sheet and Strip for Building Construction |
| ASTM C1167 | (2011; R 2017) Standard Specification for Clay Roof Tiles |
| ASTM C1184 | (2014) Standard Specification for Structural Silicone Sealants |
| ASTM D146/D146M | (2004; E 2012; R 2012) Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing |
| ASTM D226/D226M | (2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing |
| ASTM D412 | (2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension |
| ASTM D4586/D4586M | (2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free |

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

| | |
|---|---|
| NRCA RoofMan | (2020) The NRCA Roofing Manual |

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

| | |
|---|---|
| SMACNA 1793 | (2012) Architectural Sheet Metal Manual, 7th Edition |

## 1.2 SUBMITTALS

**********
**NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G". Generally, other**

**submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.**

**For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.**

**The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.**

**Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.**
**********

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Clay Tile Roofing Systems

Drawings showing clay tile installation and appearance details, flashing details, and fastening details for the tiles.

SD-03 Product Data

Clay Tile Roofing Systems

Manufacturer's catalog data and installation instructions.

Qualifications

Documentation showing qualifications of personnel proposed to perform the roofing work, and a listing identifying prior installations completed by the Contractor.

SD-04 Samples

Clay Roofing Tile

One representative tile of each type.

Sealant

237 mL 8 ounces of each type.

Underlayment Membrane

300 by 300 mm 1 by 1 foot section of each type.

Fasteners

Representative samples of each fastener with identifying tags.

SD-07 Certificates

Materials

Certificates of compliance attesting that the materials meet specification requirements.

## 1.3 QUALIFICATIONS

The Contractor shall provide qualified workers, trained and experienced in installing clay tile roofing systems of this configuration, and shall submit documentation of 5 consecutive years of work of this type. The Contractor shall be familiar with and shall perform work in accordance with [SMACNA 1793] [NRCA RoofMan]. A list of installations shall be provided which identifies when, where, and for whom the installations were made.

## 1.4 DELIVERY, STORAGE AND HANDLING

Materials shall be delivered in manufacturer's unopened bundles and containers with the manufacturer's brand and name marked clearly thereon. Tiles shall be stored in accordance with manufacturer's printed instructions. Roll goods shall be stored on end in an upright position. Immediately before laying, roofing felt shall be stored for 24 hours in an area maintained at a temperature not lower than 10 degrees C 50 degrees F.

## 1.5 PROJECT/SITE CONDITIONS

### 1.5.1 Environmental Requirements

Clay tile roofing work shall proceed when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer's recommendations and warranty requirements.

### 1.5.2 Material Storage

Materials shall not be stored on roof decks in such a manner as to overstress and/or damage the deck and supporting structure. Placing of loads at midspans of framing shall be avoided. Superimposed loads shall be well distributed.

### 1.5.3 Units of Work

Units of work shall be established, including removal of existing materials, preparation of existing surfaces and application of underlayment and nailers, and related temporary and/or permanent flashing

so that it can be completed prior to the end of each working day.

1.5.4 Temporary Protection Materials

Materials shall be provided and maintained on the site at all times for temporary roofing, flashing, and other protection when delays and/or changed weather conditions do not permit completion of each unit of work prior to the end of each working day. Materials which have been used for temporary roofing, flashing and other protection shall be removed and discarded.

1.6 WARRANTY

A material and labor warranty shall be furnished against defects in material and workmanship that affect the appearance, leak resistance, and attachment of clay tile roof assembly, including related metal flashing for a period of 10 years from date of final acceptance of the work. Warranty shall also cover the blow-off at wind gusts up to, and including, [_____] km/hour mph.

PART 2 PRODUCTS

2.1 MATERIALS

**********
**NOTE: Edit these paragraphs to meet project requirements.**
**********

2.1.1 Existing Clay Tile

Intact and serviceable existing clay tiles shall be salvaged and reused whenever possible. New clay tiles being incorporated into existing clay tile roofs shall match existing as closely as possible. Clay tiles from the same manufacturer as the original shall be used if possible.

2.1.2 Clay Roofing Tile

Clay roofing tile shall be minimum Grade 1 tile conforming to ASTM C1167. Tile shall be [one-piece barrel] [two-piece barrel] [flat shingle] [interlocking shingle] type in the following pattern: [_____]. Tile shall be [glazed] [unglazed].

2.1.2.1 Colors

Clay tile color shall be [in accordance with Section 09 06 00 SCHEDULES FOR FINISHES] [_____].

2.1.2.2 Fittings

Clay tile fittings shall be of the following types as required by manufacturer's instructions: eave - [eave closure] [under eave]; gable - [end band] [gable rake]; ridge - [ridge] [closed ridge end] [ridge/hip terminal]; hip - [cut hip] [hip roll] [hip starter] [ridge/hip terminal]; valley - [cut valley] [closed valley].

2.1.3 Underlayment Membrane

An underlayment membrane shall be furnished on surfaces to be covered with

tile. Membrane shall consist of [asphalt-saturated felt] [and] [high strength composite self-adhering membrane].

2.1.3.1 Roofing Felt

Roofing felt shall be asphalt-saturated rag felt, Type II, No. 30 asphalt felt in accordance with ASTM D226/D226M.

2.1.3.2 Elastomeric Membrane Underlayment

Elastomeric membrane shall be a cold applied composite self-adhering membrane, minimum 0.10 mm 0.004 inch thick, high strength polyethylene film with slip resistant embossing, coated on one side with a thick layer of adhesive-consistency rubberized asphalt, interwound with a disposable silicone coated release sheet. The tensile strength and elongation values shall be not less than 1724 kPa 250 psi when tested in accordance with ASTM D412 and pliability shall be unaffected when tested in accordance with ASTM D146/D146M.

2.1.3.3 Elastomeric Membrane Accessories

Two component urethane, mastic and primer shall be as approved by the membrane manufacturer. Flashing, expansion joint covers, temporary UV protection and corner fillets shall be as recommended by the membrane manufacturer.

2.1.4 Fasteners

2.1.4.1 Nails

Nails shall be solid copper, Number 11 gauge nails, minimum 8 mm 5/16 inch head. Nails shall be of sufficient length to adequately penetrate the roof sheathing.

2.1.4.2 Miscellaneous Fasteners

Miscellaneous fasteners may include but are not limited to: wind locks, hurricane clips, tile attachment brackets, tile nails, twisted wire (tile-tie), deck anchor systems, and flashing cleats. Fasteners shall be made of solid copper (wind locks and hurricane clips can be made of stainless steel).

2.1.5 Flashing

Flashing shall be 0.57 kg 20 ounce, light cold-rolled temper (H00) copper conforming to ASTM B370. Like metals shall be used on all components of fastening systems and flashing in order to avoid galvanic action. Flashing shall be in accordance with the requirements as specified in Section 07 60 00 FLASHING AND SHEET METAL.

2.1.6 Plastic Cement

Plastic cement for gable rakes, hip rolls, ridges, stringers and other conditions shall be non-running, heavy body plastic cement composed of ingredients complying with ASTM D4586/D4586M.

2.1.7 Sealant

Sealant, when used in lieu of plastic cement, shall be silicone in

accordance with ASTM C1184.

2.1.8 Mortar

Mortar for filling the openings of cut valley tiles shall consist of 1 part portland cement to 3 parts damp plaster sand, and shall be colored to the nearest possible match with the color of the tile.

2.1.9 Wood Strips

Wood strips for nailers, battens, cant strips, and eave strips shall be of foundation grade redwood or preservative treated Douglas fir. Sizes and lengths shall be provided per tile manufacturer's installation details.

2.1.10 Snow Guards

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**NOTE: Snow guards are necessary accessories for most tile roofs in sections of the country where masses of snow and ice accumulate on the roof that can slide from the roof onto lower roof surfaces and gutters. Snow guards are manufactured in various forms, and each type requires different methods of application. Edit to omit this paragraph if not necessary to meet project requirements.**

**********

Snow guards which are compatible with the roof tile shall be provided as indicated.

PART 3 EXECUTION

3.1 PROTECTION OF ROOF SURFACES

Equipment (such as padded ridge ladders) and techniques shall be used which prevent damage to roof as a result of foot or material traffic. Contractor shall be responsible for controlling breakage of new or existing tile beyond what is indicated. The progression of work shall be laid out and presented to the Contracting Officer to prevent other trades from working on or above completed roofing. Personnel who are working on the roof shall have proper shoes which will not further damage tiles and shoe soles shall be made of a material which will aid in preventing falls.

3.2 TILE REMOVAL

Where work involves partial replacement or repair of roof, Contractor shall verify each tile for tightness and continued use. Tiles which have been identified for replacement or re-installation shall be marked for approval within 30 days of Notice to Proceed. Tiles identified for removal shall be marked with a non-destructive color mark which can be easily removed. Tiles fastened with non-copper fasteners shall be re-fastened with proper copper fasteners.

3.3 PREPARATION OF SURFACES

Roof deck surfaces shall be smooth, clean, firm, dry, and free from loose boards, large cracks, and projecting ends that might damage the roofing. Foreign particles shall be cleaned from all interlocking areas to ensure proper seating and to prevent water damming. Prior to installation of

tile, vents and other projections through roofs shall be properly flashed and secured in position, and projecting nails shall be driven firmly home.

## 3.4 ROOFING FELT

### 3.4.1 Standard Application

Felt shall be laid in horizontal layers on deck areas to be covered with tile. Two layers of No. 30 felt shall be applied. Two layers shall be run down valley, ridges, and hips. Applications shall be doubled on rough surfaces and overlapped 300 mm 12 inches on hips, valleys, and ridges. Membranes lapping valley felts shall be set in mastic. Joints shall be lapped 63 mm 2-1/2 inches horizontally and 150 mm 6 inches vertically. Felt shall be carried 150 mm 6 inches up vertical surfaces and 100 mm 4 inches over gutters. Edges shall be fastened with corrosion-resistant, 12 gauge, 9.5 mm 3/8 inch head standard roofing nails on 150 mm 6 inch centers. Felt shall be preserved unbroken.

### 3.4.2 Special Applications

Low pitch roofs shall have two layers of felt installed and shall be solidly mopped between felt layers and on top of felt layers with 11.3 kg per 9.3 sq. meter 25 pounds per square of hot asphalt.

## 3.5 ELASTOMERIC MEMBRANE UNDERLAYMENT

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**NOTE: A composite self-adhering membrane will be used in areas where ice build-up (ice dams) and wind driven rains are potential problems. In such areas, underlayment installation will be detailed on the drawings. Edit these paragraphs to meet project requirements.**

**********

### 3.5.1 Surface Preparation

Dust, dirt, loose nails or other protrusions shall be removed. Priming is not required for wood or metal surfaces but is necessary on concrete or masonry surfaces.

### 3.5.2 Primer

Primer shall be applied at a coverage rate of 6-9 sq. meters/L 250-350 sq. ft./gal.. Primer shall be applied by spray or paint roller.

### 3.5.3 Temperature

Membrane shall be applied only in fair weather when air and surface temperatures are above 5 degrees C 40 degrees F.

### 3.5.4 Membrane Application

Membrane shall be applied according to manufacturer's instructions. Membrane shall be adhered directly to roof deck. Pine wood decks shall be covered with minimum 6 mm 1/4 inch plywood prior to receiving membrane coverage. Membrane shall be cut into 3 to 4.5 meter 10 to 15 foot lengths and shall be re-rolled. The release paper shall be peeled back 300 to 600 mm 1 to 2 feet and the membrane shall be aligned on the lower edge of the

roof and the first 300 to 600 mm 1 to 2 feet shall be placed. The release paper under the membrane shall be pulled and peeled from the membrane. The membrane shall be pressed in place. Lower edges shall be rolled firmly with a wallpaper or hand roller. For ice dam protection, membrane shall be applied to reach a point above the highest expected level of ice dams. Ends and edges shall be overlapped a minimum of 150 mm 6 inches. Membrane shall not be folded onto an exposed face of the roof edge.

### 3.5.5 Valley and Ridge Application

The membrane shall be cut into 1.2 to 1.8 meter 4 to 6 foot lengths. The release paper shall be peeled and the sheet centered over the valley or ridge, draped and pressed in place working from the center of the valley or ridge outward in each direction. For valleys, membrane shall be applied starting at the low point and working upwards. Sheets shall overlap a minimum of 150 mm 6 inches.

### 3.5.6 Vertical Membrane Flashings

Vertical wall installations shall receive primer prior to the application of membrane. Primer shall be applied at a coverage rate of 6-9 sq. meters/L 250-350 sq. ft./gal.. Membrane shall be turned up walls and dormers as indicated on the drawings. Vertical membrane terminations shall be mechanically fastened. Vertical terminations shall receive a troweling of mastic as approved by the membrane manufacturer. Membrane may be folded onto the fascia, provided it will be covered by a gutter metal edge or other material.

### 3.5.7 Protection

Elastomeric membrane underlayment shall not be left permanently exposed to sunlight. Membrane shall be covered with exposed roofing materials as soon as possible. Membrane damaged due to exposure to sunlight shall be patched prior to the application of final roof covering.

## 3.6 METAL FLASHING

Metal flashing shall be as shown at intersections of vertical or projecting surfaces through the roof or against which the roof abuts, such as walls, parapets, dormers, and sides of chimneys. Flashing installation shall be in accordance with Section 07 60 00 FLASHING AND SHEET METAL.

## 3.7 CLAY ROOFING TILE (GENERAL)

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**NOTE: To ensure a watertight roof system, strict observance of minimum pitch requirement is necessary. Minimum roof pitches for the different types of clay tile shall be: one-piece barrel: 4:12; two-piece barrel: 5:12; flat shingle: 5:12; interlocking shingle: 3:12.**

**********

### 3.7.1 Repair and Replacement

Existing reusable clay tiles removed from the repair area shall be intermingled with new clay tiles to provide a smooth visual transition between new and existing areas.

### 3.7.2 High or Low Slope Pitches

Tiles [on roof slopes of less than 3:12 shall be applied over indicated underlayment on solid decking.] [on extremely steep or vertical applications, shall have the butt of each tile set with mastic or sealant, and placed where it will not be seen. The mastic or sealant shall not stain the surface of the tile. Copper "hurricane clips" may be installed instead of using mastic or sealant.]

### 3.7.3 Roof Decks and Fasteners

Tile shall be fastened to roof deck materials as follows:

| DECK | FASTENER |
|---|---|
| Plywood | Slater's ring shank nail. Point shall just penetrate through underside of deck. |
| Plank board | Slater's plain shank nail, at least 25 m 1 inch or more in 37 mm 1-1/2 inch thickness shall not penetrate deck. |
| Gypsum plank or Nailable Concrete | Stainless steel or silicone bronze nails with spiral threads, 37 or 50 mm 1-1/2 or 2 inch long. Nail shall penetrate deck at least 1/2 thickness but no more than 3/4. Underside of deck shall not be penetrated. If deck material is old and excessively hard, smooth shank shall be used. |
| Metal | Sheet metal screw and mastic |
| Fibrous cement | Tile-tie system |
| Note: All fastening and flashing metals shall be of like material in order to avoid galvanic action. | |

### 3.7.4 Poured Concrete Deck

Poured concrete decks shall have embedded 25 by 50 mm 1 by 2 inch beveled wood strips, extending from eave to ridge, spaced 500 mm 20 inches on centers. Concrete shall be smooth and flush with strips. Felts weighing 23 kg per 9.3 sq. meters 50 lbs. per 100 square feet shall be fastened with lath nailed over embedded strips. Twenty five by 50 mm One by 2 inch wood strips, spaced to suit tile, shall be applied horizontally across lath. Tile shall then be laid as directed for a sheathed roof.

### 3.7.5 Chalk Lines

Horizontal and vertical guide lines shall be chalked on the membrane to assure proper appearance. The chalk lines shall be spaced by measuring the delivered tiles for average length and width exposures. An exposure length of 6 mm 1/4 inch beyond the average shall not be exceeded.

## 3.8 ONE-PIECE BARREL TILE APPLICATION

### 3.8.1 Wood Strips

Wood stringers, 25 mm 1 inch wide and of proper height, shall be applied on hips and ridges to carry hip roll and ridge. A 25 by 50 mm 1 by 2 inch strip shall be applied for end bands. A 25 by 50 mm 1 by 2 inch cant strip shall be applied at eaves if eave closures are not specified.

### 3.8.2 Tile Application

a. Eave closures shall be installed first.

b. Tiles shall be laid to straight lines parallel to ground level and shall be lapped 75 mm 3 inches vertically.

c. Each tile shall be fastened with the quantity of nails, wind locks and/or hurricane clips recommended by the manufacturer for the specified roof slope, building height, and wind velocity.

d. Nails on tiles overlapping sheet metalwork shall not puncture the sheet metal. Tiles overlapping sheet metal shall be fastened with copper wire and plastic cement.

e. Gable rakes shall be cemented to field tiles and fastened with nails.

f. Hip rolls shall be cemented in laps and fastened with 50 mm 2 inch copper nails.

g. Ridges shall be cemented and fastened with 63 mm 2-1/2 inchcopper nails in laps and where they rest on roof tiles.

h. Where tiles join hip stringers they shall be made waterproof with flashing cement.

i. When hip starter and closed ridge end fittings have not been specified, the voids at ends of hips and ridges shall be filled with mortar colored to nearest match of tile color.

j. Tile in contact with cement mortar shall be immersed in water for at least 2 minutes before laying.

k. When ridge angles and hip/ridge terminals are not otherwise specified, they shall be mitered on job, nailed or wired, and set in plastic cement.

l. When short course tiles are not otherwise specified for rafters which do not accommodate full courses, they shall be cut and drilled on job by roofer unless a plus or minus 25 mm 1 inch adjustment of regular tile overhang at eave is sufficient.

## 3.9 TWO-PIECE BARREL TILE APPLICATION

### 3.9.1 Wood Strips

Wood stringers, 25 mm 1 inch wide and of proper height, shall be applied on hips and ridges to carry hip roll and ridge. A 25 by 88 mm 1 by 3-1/2 inch strip shall be applied and spaced appropriately for covers. When covers are laid at random exposure, strips shall be 25 by 100 mm 1 by 4

inches. At first row of cover tile after gable roll, a regular nailing strip shall be applied with an adjacent 50 by 50 mm 2 by 2 inch nailing strip along rake side. A 25 by 50 mm 1 by 2 inch cant strip shall be applied at eaves if eave closures are not specified.

3.9.2 Tile Application

a. Eave closures shall be installed first.

b. Tiles shall be laid to straight lines parallel to ground level, and shall be lapped 75 mm 3 inches vertically.

c. Each tile shall be fastened with the quantity of nails, wind locks and/or hurricane clips recommended by the manufacturer for the specified roof slope, building height, and wind velocity.

d. Tiles overlapping sheet metalwork shall have the nails so placed as to avoid puncturing the sheet metal. Tiles overlapping sheet metal shall be fastened with copper wire and plastic cement.

e. When tile is applied tight method, short course covers shall be installed over regular pans at eave and regular covers over short course pans at ridge. Top edge of covers shall abut bottom edge of pans in the succeeding course throughout the roof.

f. When covers are laid at random exposure, 10 percent extra covers in the first three courses at eave shall be used to avoid horizontal and diagonal lines and maintain this effect throughout roof.

g. Gable rakes shall be cemented to field tiles and fastened with nails.

h. Hip rolls shall be cemented in laps and fastened with 50 mm 2 inch copper nails.

i. Ridges shall be cemented and fastened with 63 mm 2-1/2 inchcopper nails in laps and where they rest on roof tiles.

j. Where tiles join hip stringers they shall be made waterproof with flashing cement.

k. When hip starter and closed ridge end fittings have not been specified, the voids at ends of hips and ridges shall be filled with mortar colored to nearest match of tile color.

l. Tile in contact with cement mortar shall be immersed in water for at least 2 minutes before laying.

m. When ridge angles and hip/ridge terminals have not been specified, they shall be mitered on job, nailed or wired, and set in plastic cement.

n. When short course tiles are not otherwise specified for rafters which do not accommodate full courses, they shall be cut and drilled on job by roofer unless a plus or minus 25 mm 1 inch adjustment of regular tile overhang at eave is sufficient.

## 3.10 FLAT SHINGLE TILE APPLICATION

### 3.10.1 Wood Strips

Wood stringers, 25 mm 1 inch wide and of proper height, shall be applied on hips and ridges to carry hip roll and ridge. A 18 by 25 mm 3/4 by 1 inch cant strip shall be applied at eaves.

### 3.10.2 Tile Application

a. Tiles shall be laid to straight lines parallel to ground level, lapped 75 mm 3 inch vertically.

b. Each tile shall be fastened with the quantity of nails, wind locks and/or hurricane clips recommended by the manufacturer for the specified roof slope, building height, and wind velocity.

c. Nails on tiles overlapping sheet metalwork shall not puncture the sheet metal. Tiles overlapping sheet metal shall be fastened with copper wire and plastic cement.

d. Gable rakes shall be cemented to field tiles and fastened with nails.

e. Hip rolls shall be cemented in laps and fastened with 50 mm 2 inch copper nails.

f. Ridges shall be cemented and fastened with 63 mm 2-1/2 inchcopper nails in laps and where they rest on roof tiles.

g. Where tiles join hip stringers they shall be made waterproof with flashing cement.

h. Voids at ends of hips and ridges shall be filled with mortar colored to nearest match of tile color.

i. Tile in contact with cement mortar shall be immersed in water for at least 2 minutes before laying.

j. Ridge angles and hip/ridge terminals shall be mitered on job, nailed or wired, and set in plastic cement.

k. When short course tiles are not otherwise specified for rafters which do not accommodate full courses, they shall be cut and drilled on job by roofer unless a plus or minus 25 mm 1 inch adjustment of regular tile overhang at eave is sufficient.

## 3.11 INTERLOCKING SHINGLE TILE APPLICATION

### 3.11.1 Wood Strips

Wood stringers, 25 mm 1 inch wide and of proper height, shall be applied on hips and ridges to carry hip roll and ridge. A 22 by 25 mm 7/8 by 1 inch cant strip shall be applied at eaves.

### 3.11.2 Tile Application

a. Tiles shall be laid to straight lines parallel to ground level, lapped 75 mm 3 inches vertically.

b. Each tile shall be fastened with the quantity of nails, wind locks and/or hurricane clips recommended by the manufacturer for the specified roof slope, building height, and wind velocity.

c. Nails on tiles overlapping sheet metalwork shall not puncture the sheet metal. Tiles overlapping sheet metal shall be fastened with copper wire and plastic cement.

d. Gable rakes shall be cemented to field tiles and fastened with nails.

e. Hip rolls shall be cemented and fastened with 50 mm 2 inchcopper nails in laps.

f. Ridges shall be cemented and fastened with 63 mm 2-1/2 inchcopper nails in laps and where they rest on roof tiles.

g. Where tiles join hip stringers they shall be made waterproof with flashing cement.

h. Voids at ends of hips and ridges shall be filled with mortar colored to nearest match of tile color.

i. Tile in contact with cement mortar shall be immersed in water for at least 2 minutes before laying.

j. Ridge angles and hip/ridge terminals shall be mitered on job, nailed or wired, and set in plastic cement.

k. When short course tiles are not otherwise specified for rafters which do not accommodate full courses, they shall be cut and drilled on job by roofer unless a plus or minus 25 mm 1 inch adjustment of regular tile overhang at eave is sufficient.

-- End of Section --