



# Technical Bulletin #7

## COUNTERBATTEN SYSTEMS

July, 2001

Tile roofing has been around for thousands of years and continues to be the most common roofing material used throughout the world. Since tile installations predate the introduction of plywood by centuries, it is noteworthy that, except in America where tile is a relative newcomer, most tile roofs are installed on open spaced sheathing. Most commonly, the tiles are attached to 2"x 2" battens that are spaced in accordance with the size of the tile. In some cases a draped underlayment or sarking system may be installed over the rafters prior to batten installation but often times the tiles themselves are the stand-alone roof system.

This method of installation has worked well for hundreds of years due to the fact that the roofs are installed in such a manner that the water is prevented from entering through the tile assembly. By sealing all hips, ridges, and walls with proper flashing materials and directing water off the roof, tile roofs provide trouble free service for decades.

Since most of the roofs in America are installed over solid roof sheathing, tile installations have been modified to suit the culture. While tile roofs installed over solid decking can be made to work, this application creates a number of problems that do not occur with tile roofs over spaced sheathing. One method of tile application that works well over solid roof decks and provides the advantages of old world installations is the counterbatten system.

Counterbatten systems are created by installing wood strips in vertical direction up the roof on 16 or 24 inches on center and then fastening the horizontal or anchor battens directly through these vertical battens. The size of these batten strips will vary according to spacing and load factors but the minimum dimensions are typically 3/8 inch thick for the vertical strips and nominal 1 by 3 inch for the horizontals. Nominal 1 by 2 inch battens are usually avoided for these applications and should never be used if the vertical strips are spaced greater than 16 inches on center.

Counterbatten or strapping systems provide the most trouble-free, long lasting method of roof tile installation. Elevating the anchor battens and tiles above the roof surface optimizes most aspects of the tile roof installation. Any concern about wind-driven rain is diminished because any water beneath the tile can course off the roof without encountering resistance from battens or tile. By preventing water ponding, all components of the system can be expected to last longer and perform better. Nail penetrations are minimized and those nails that do penetrate the underlayment are less likely to ever be exposed to water since they only penetrate the vertical strips that run parallel to water flow.

This method has long been the standard for low slope installations and tile installations in regions subject to severe winter weather but provide significant advantage to tile installations universally.

The air space between the roof deck and the installed tile forms a highly effective thermal barrier that ventilates and cools in hot climates and helps prevent ice dams in cold regions. The strapping system optimizes this effect

in both cases. In recent thermal studies performed by the Florida Department of Energy, it was shown that a typical tile roof installation reduces ceiling level heat flux by 38% compared to the same roof with a black asphalt shingle. With the counterbatten system that figure jumps to 48% reduction.

In cold weather regions, a major cause of ice damming is the heat lost through the roof that melts snow on the surface that runs down and freezes when it reaches the eaves. With the counterbatten system under the tile roof, even if attic ventilation is ineffective, the air space beneath the tile is usually sufficient to dissipate the heat before it is able to melt the snow.

Attention should be paid to flashing and edge treatments since the thickness of the vertical batten must be considered to maintain an even plane and proper flow pattern. Additional nailer boards and edge metals will usually be required at rake edges. For full details on counterbatten installations, please refer to the WSRCA/NTRMA Design Criteria Manual for Cold and Snow Regions.

### Counterbatten Facts:

- The number of nails that penetrate the underlayment is greatly reduced by using the counterbatten system.
- Code requires that battens be fastened at 24" o.c. with 8d nails or at 12" o.c. with 1 1/2" staples.
- Typically there are nine courses of tile per square (100 sq. ft) using 90 linear feet of battens.
- The number of underlayment penetrations when battens are fastened with staples:
  - 5 staples per four foot batten = 10 holes (225 holes per square)
  - If all tiles are nailed - four tiles = 4 holes
  - Total holes per square = 315      With alternate courses nailed = 270 holes
- The number of underlayment penetrations when battens are fastened with nails:
  - 3 nails per four foot batten = 3 holes (68 holes per square)
  - If all tiles are nailed - four tiles = 4 holes
  - Total holes per square = 158      With alternate courses nailed = 113
- The number of underlayment penetrations when counterbattens are used:
  - Vertical strips at 16" o.c. = 63 holes
- Nails or screws used to fasten tile to the batten should not penetrate the underlayment. Fastener lengths for tile profiles are:
  - Flat tile - 1 3/4"
  - Espana - 1 3/4" at pan, 3" at top
  - Villa - 2 1/2" at center hole
  - Cedarlite - 1 1/2"