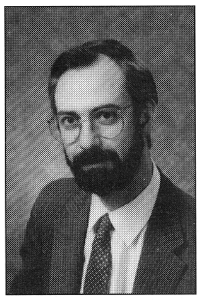
Designing for long-lasting tile roof systems

by **Thomas L. Smith, AIA, CRC**

You have been called to look at a 40-year-old tile roof that is leaking. The tiles appear to be in great shape—maybe they could last another 40 years or more. But when investigating the problem, you find that the battens have rotted, and many of the fasteners have corroded.



Last week, you looked at a beautiful tile roof that was only four years old; it was leaking because of poorly designed or constructed flashings. In both jobs, the great longevity that quality tiles enjoy was compromised by other components of the roof system.

When promoting tile systems to building owners, in addition to discussing the great aesthetic attributes that tiles can offer, it is appropriate to discuss the inherent long life of quality tiles. But, for a roof system to perform for an extended period of time, care in the selection of components such as underlayments, battens, fasteners and flashing details is very important. Long-life components will result in some increased initial cost, but some relatively minor expenditures can easily result in a significant increase in the life of the roof.

In a paper written in the *Proceedings of the 10th Conference on Roofing Technology* (see the June "Tech Transfer"), the lack of roofing industry guidelines concerning longevity of components of a tile roof system was identified. The *NRCA Steep Roofing Manual* does give some recommendations regarding underlayments, fasteners and metal flashings, but these recommendations are *non-conservative* for many areas of the United States. Until more conservative industry recommendations are developed, the following interim recommendations are suggested.

Underlayments

When specifying underlayments, it should be realized that water can find its way to the underlayment. Therefore, to avoid water leakage into the building, an effective water-shedding material is needed. Besides the ability to resist deterioration, the underlayment needs to be quite tough—otherwise, it can be damaged during the rigorous tile application period.

There are several different material options. Selection will, in part, be based upon availability in a given area. Options for 4-in-12 slopes and greater are:

- A single layer of organic, smooth-surfaced roll roofing, meeting ASTM D 224 Type I or II (Type II is preferable).
- Two layers of coated organic base sheet, meeting ASTM D 2626 (unperforated).
- Two layers of organic felt, meeting ASTM D 226 Type II (#30), provided the slope is 7-in-12 or greater.
- One layer of self-adhering modified bitumen, meeting ASTM D 1970, over one layer of ASTM D 226 Type I (#15) felt. The #15 felt facilitates future removal of the self-adhering underlayment and minimizes the chance of deterioration of the deck because of moisture accumulation from below.
- One layer of self-adhering modified bitumen underlayment meeting ASTM D 1970, under one layer of ASTM D 226 Type II (#30) felt.
- Certain types of SBS-modified bitumen, heavyweight sheets can also be very good underlayments; however, until ASTM standards are developed, specifying these products is difficult.

Special provisions are needed when the slope is less than 4-in-12 (see the *NRCA Steep Roofing Manual*, coupled with the aforementioned options).

Battens

Except in areas that are typically hot and dry (e.g., the desert Southwest), preservative-treated battens are recommended. Treated wood is also recommended for ridge and hip nailers, and for strips into which the tiles are fastened. Treatment should comply with AWPA standards C2 and P5, or AWPB LP-2.

NRCA recommends that battens be 4 feet (1200 mm) long, with a space about ½ inch (13 mm) between the end of each batten. This provides a drainage path for water that finds its way to the underlayment. But, a more effective approach is to provide kerfs (cuts) about ¼ inch (6 mm) wide at about 2 inches (50 mm) on center.

Or, spacers (shims) can be placed between the batten and the underlayment. A common technique is to cut 2-inch (50-mm) squares from asphalt shingles, or use pieces of preservative-treated wood lath. To avoid batten deflection problems, the spacers should be about 12 inches (300 mm) on center. Another option is to use a counter-batten system.

Fasteners

For fastening battens and tiles, copper, brass or stainless-steel nails, clips or tie-wire fasteners are recommended. However, in areas that are typically hot and dry, corrosion protection need not be as conservative. In these areas, galvanized steel is a less expensive option that can provide a long service life.

When using galvanized materials, the thickness of the zinc coating is important. When using nails, the galvanizing requirements of ASTM A 641 Class 2 are recommended.

When fastening tile directly into plywood or OSB, ring or screw shank nails are recommended. PR

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