BLOCK THAT PARAPET

Many leaks associated with roofing occur at the base flashing where the roofing terminates at the parapet walls. Very often this is a result of base flashing failures from stresses produced by differential movement between the roof deck and the wall.

This condition occurs frequently in framed buildings especially where the wall is independent of the roof framing system. It is also commonly found on precast/prestressed concrete construction where concrete roof slabs bear on exterior masonry walls. Stresses are caused by the parapet moving at a different rate than the roof deck. This situation becomes more serious when the deck is heavily insulated. Differential movement is not solely due to the temperature changes. Moisture changes cause walls of brick and fired clay products to continuously expand, whereas those constructed of concrete masonry units show long term shrinkage. Cast and precast concrete expand and contract with both moisture and temperature changes.

To absorb these reversible and non-reversible movements, expansion and control joints are generally installed to absorb parapet movements and permit them to move without damage. Roof decks move both parallel and perpendicular to exterior walls. Temperature changes produce dimensional changes in steel framed decks. When this temperature change occurs, the frame will correspondingly change dimension, but this can occur as much as 2-12 hours after the peak temperature that produces it. On the other hand, curtain walls of metal and glass and light metal panels will react very quickly to ambient temperature changes. Therefore, the frame moves at a different cycle from the wall.Concrete decks change dimension from shrinkage and creep as well as temperature changes. With long span precast/prestressed decks, the cumulative movement occurs at the exterior wall. The type of framing, the parapet construction, the source of the forces, etc., all determine the magnitude of the change in length and all of this differential movement must be absorbed where the roofing system meets the parapet, at the base flashing.

Historically, base flashing was metal. The horizontal leg was built into the membrane, but the vertical leg was not connected to the wall. This permitted independent movement between the roofing assembly and the parapet, but it proved to be unsatisfactory because of the substantial differential movement between the built-up roofing and the metal. Since the metal responded to a greater degree and more quickly to temperature changes, cumulative movement was concentrated at the metal flashing joints where it often ruptured the membrane.

As a result, base flashing composed of materials similar to those used in the membrane have been substituted for the metal since they reacted to thermal and moisture changes in much the same way as the membrane. This advantage is offset by the fact that being viscoelastic (in contrast to the metal) they lack sufficient stiffness to remain in place where they were turned up against the wall. Consequently, they had to be mechanically and adhesively secured to the wall to resist slipping and pulling from tensile forces exerted by the membrane.

To these forces, there is added those produced by differential movement between the wall and the roof forces that often demand greater strength than mere fabric and bitumen can provide. The result is wrinkling, broken end joints and eventual rupture of the flashing. Patches and multiple coatings bear silent witness to the inability of built-up base flashing to withstand repeated stress reversals.

Other problems have arisen. Where walls contained expansion joints, these joints are not always extended through the base flashing. Moreover, it is common practice to run the base flashing continuously over precast concrete panel joints and masonry control joints. Stress concentrations at these points often split the flashing or disbond it from the wall.

It is time we recognized that built-up base flashing cannot be made strong enough or flexible enough to remain watertight when it must bridge between dissimilar surfaces that are moving at different rates.

Although the metal did not bond well to the BUR, and end laps were difficult to seal, it did provide divorcement between the roofing and the parapet. This was possible because of its stiff vertical leg, a feature that built-up base flashing lacks.

The attributes of these two can be combined by providing vertical blocking at the perimeter of the roof. Such blocking, set about 1" away from the parapet, and supported on the structural deck offers the requisite stiffness and effectively isolates the roofing from the wall.

Prefabricated elastomeric units, which are sometimes used to bridge between the wall and the top of the blocking, have not proved to be completely satisfactory. The forces produced by differential movement frequently caused the ends and corners to fail.

A more satisfactory and straightforward solution may be to return to the independent cap flashing concept and simply extend the cap flashing out over the top of the blocking as illustrated in the NRCA Detail for "Non-Wall Supported Flashings".

Although the initial cost of providing blocking may be slightly higher, the benefits to be derived more than offset it. In addition to providing a system that will function independently of the wall, it facilitates reroofing, provides for edge venting (if required), permits masonry to “breathe” and protects the roofing when the parapet leaks. Moreover, when job scheduling forces the roofing contractor to install the membrane before the parapet is erected, it allows the roofer to complete his work in a watertight manner.

[1] Construction detail plates are available from The National Roofing Contractors Association (NRCA), O'Hare International Center, 10255 W. Higgins Road, Suite 600, Rosemont, IL 60018-5607 • (708) 299-9070.