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09/10/2012

True Sustainability Starts with the Roof

Look past green claims to find the most sustainable roofing system for your facility

By Richard L. Fricklas

Look past green claims to find the most sustainable roofing system for your facility.

For steep-sloped roofing systems, aesthetics plays a major role in roofing decisions such as whether to use tile, slate, painted metal, asphalt, or wood shingles or shakes. However, for commercial low-slope roofing, aesthetics is much less important than these more critical issues:

- Keeping water out of the building
- Prolonging roof life
- Protecting roof warranties
- Meeting building codes for fire, R-value, wind and drainage
- Serving as a platform for rooftop equipment

In recent years, additional criteria such as reflectivity (albedo), emissivity, revised energy codes, and recyclability have gained more importance.

Roughly two-thirds of commercial roof activity today consists of re-covering or re-roofing existing buildings. While periodic inspection and routine maintenance are the best investment a building owner can make, far too often the roof is out of sight, out of mind (until it leaks, of course).

Below, learn how to reduce leak potential and prolong roof life through routine inspections and maintenance. Important resources on this subject include Corps of Engineers publications on its computerized ROOFER program and RoofPoint, the roofing rating system by the Center for Environmental Innovation in Roofing.

Forthcoming columns will look at roof coatings and liquid membranes as important parts of sustainability and address what, where, and when coatings should be used as part of an overall roof management program.

Keeping the Building Dry

Early in the life of a low-slope roof system, leakage is often a consequence of poor workmanship, damage by other trades, or poor detailing. Address this by engaging a roof consultant to provide and review specifications and details. Later on during the construction phase, use a full-time roof observer to provide quality assurance.

A relatively new document, *Standard Practice for Quality Assurance Observation of Roof Construction and Repair* (ASTM D7186), can go a long way towards a successful roof launch. Also look into seminars by RCI that lead to certification as a Registered Roof Consultant (RRC) or Registered Roof Observer (RRO). Both programs will help you get a roof project off to a good start. For your reference, you may also want to order a copy of the newly released *NRCA Construction Details*, a supplement to AutoCAD software that contains 573 customizable details from past NRCA roofing manuals.

Poor detailing, especially of roof flashings and counterflashings, is a major source of early leakage. Often new equipment is installed after the roof has been put in service. This lapse can also void a roof warranty if the installation is not approved by the warranty supplier.**PageBreak**

Prolonging Roof Life

Weathering of roofing materials includes UV degradation, the high energy ultraviolet rays that attack chemical double bonds and result in embrittlement. For bituminous roofs, including asphalt and coal tar pitch (both considered BUR) and polymer modified bituminous systems, UV protection is provided by surfacing with roof aggregate or roofing granules because they are opaque to UV light.

For smooth-surfaced bituminous systems, solvent-based asphalt-aluminum and fibrated asphalt-aluminum roof coatings were once popular, with the flakes of aluminum pigment providing the UV screen.

Water-based acrylic coatings can be applied to weathered asphalt surfaces, and a number of low-VOC products are offered as well. At least one modified bituminous manufacturer applies a white coating to granulated sheets during production, which adds UV screening and a more reflective surface than is possible with granulated sheets only.

For single-ply systems, UV is screened by reinforcing the polymer with fine carbon black particles (such as black EPDM) or titanium dioxide pigment in light-colored EPDM, PVC, or TPO membranes.

Chemicals that help absorb ozone also prolong roof life. One single-ply manufacturer has just added factory-applied liquid Kynar, a fluoropolymer coating that has long been the coating of choice for standing seam metal roof panels. Several acrylic coatings are now available to surface many types of membranes. The newer acrylic

materials are more elastic and have better adhesion to properly prepared substrates than the first generation materials.

Protecting Roof Warranties

The typical length of roof warranties has grown to 30 years or more. Perhaps this was done since the projected life of rooftop solar panels is 30 years or more and it's extremely difficult to access the roof membrane under solar panels. Most membrane manufacturers strongly recommend against installing panels on aged roofs to avoid the huge expense of removing and replacing the solar panels when the old roof must be replaced.

Typical warranty requirements/recommendations include:

1. Upgrade the roof membranes. For BUR, this might be to install 4-ply membranes instead of 3-ply. For MB systems, the use of thicker base and cap sheets may be appropriate. Single-ply may require 90-mil (0.090-inch) membranes instead of thinner ones. Sprayed-in-place polyurethane foam with a density of 2.3 psf or greater offers higher compressive strength.
2. Upgrade the thermal insulation to greater than R-20, depending on the climate.
3. Face the thermal insulation by using a coverboard such as gypsum to increase the indention and impact resistance from traffic and hail.
4. Manufacturers recommend that warranted roofs be inspected twice a year, when the ducks fly north and when they fly south. Then, whenever the membrane is exposed to severe storms or when new equipment is installed on the roof, conduct a special inspection. All manufacturers warn that abuse is excluded from the warranty and strongly recommend that repairs should be completed by certified contractors, either the original roof installer or another who is approved to make repairs.**PageBreak**

Meeting or Exceeding Building Codes

Building codes evolve over time and with experience. Fire requirements address both exterior and interior exposure. Especially since a number of severe hurricanes hit the U.S. every decade, wind requirements have become more stringent. Increased thermal resistance in order to meet *ASHRAE 90.1* or LEED certification requirements (or both), along with providing more highly reflective roof systems, are also part of the energy equation.

Local building codes depend upon which version of the building or plumbing code is followed. All of these parameters are the responsibility of the roof designer, but in re-roofing or re-covering there may not be a licensed professional on the team.

Serving as a Platform for Rooftop Equipment

Virtually every low-slope roof system has equipment on the roof, from HVAC to other mechanical units that require periodic servicing. Recommendations include:

- Control roof access. Implement daily sign in sheets for any rooftop activity by anyone. Remember, the key to roof performance is the key that locks the roof hatch.
- Install rooftop walkways recommended by the roof manufacturer for protection.
- Address areas that don't shed water properly. If you notice ponding, consider tapered insulation at the time of re-cover or adding more roof drains.

Resources
Virtually all materials manufacturers offer technical assistance when asked. Literature in the roofing file should be specific to the membrane actually in place, as well as copies of the roof warranties. What, no file? No better time to start one than right now!

Richard (Dick) L. Fricklas *was technical director emeritus of the Roofing Industry Educational Institute prior to his retirement. He is co-author of* The Manual of Low Slope Roofing Systems *and continues to participate in seminars for the University of Wisconsin and RCI Inc., the Institute of Roofing, Waterproofing, and Building Envelope Professionals. His honors include the William C. Cullen Award and Walter C. Voss Award from ASTM, the J. A. Piper Award from NRCA, the William C. Correll award from RCI, and the James Q. McCawley Award from the MRCA. Dick holds honorary memberships in both ASTM and RCI Inc.*

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