Durability

EPDM Durability Key to Green Decision

by Bill Tippins, Ph.D., EPDM Product Manager, Firestone Building Products

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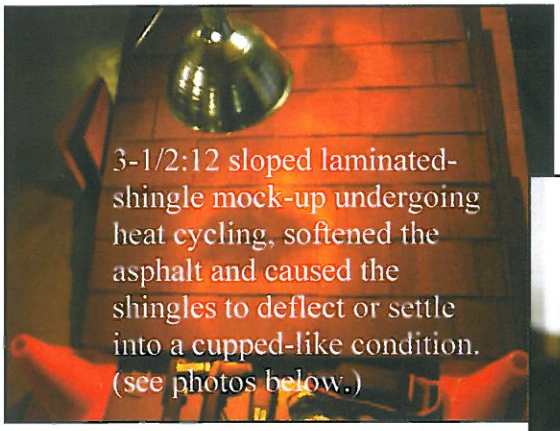
The green building movement has taught us a lot. Most notably, though, is that when it comes to the commercial roofing industry there are many "shades of green." Depending on who you talk to, where you are located, and your specific building needs, the green roofing discussion may involve reflective white membranes, vegetative roofs, solar panels, acrylic-coated membranes, increased insulation R-values, and more.

The greenness of a product, however, is not something that is easily determined. Too often, judgments and product recommendations are based on overly simplistic generalizations or factors such as solar reflectivity indexes, thermal ratings, and other attributes. For a roofing material to be deemed truly "green," it is imperative to look beyond the initial design stage and consider the system's full operational life. As such, long-term durability is a key factor that merits serious consideration in the green roofing discussion.

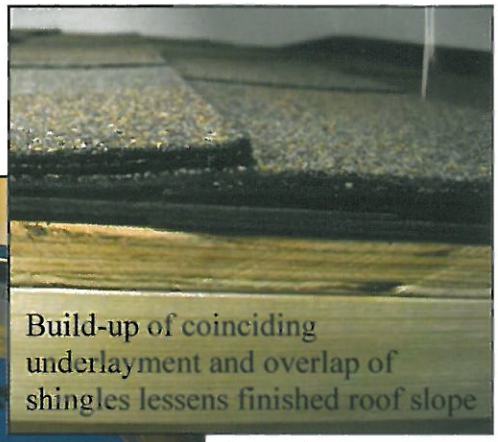
Role of Roof Durability

In a white paper titled Sustainable Buildings: *Addressing Long-Term Building Envelope Durability*, Dr. James Hoff, DBA, research director for the Center for Environmental Innovation in Roofing, noted that several industry researchers are concerned that today's green rating systems may not emphasize product durability enough. Specifically, Hoff cited Jamie McKay, a LEED Accredited Professional, who said, "The majority of green building assessment systems focus on the design to the constructed building, with little focus on the effect of the building system's life during operation. This tendency has resulted in a failure of many rating systems to properly consider durability, life-cycle cost and the effects of premature building envelope failures."

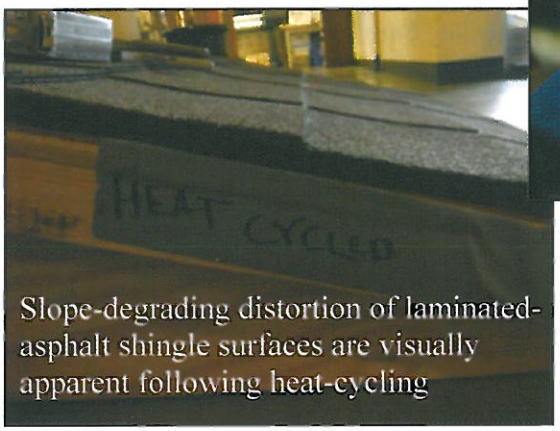
Likewise, when Hoff presented *Life-Cycle Assessment and the LEED Green Building Rating System* at the 2008 RCI convention, he explained that life-cycle assessment (LCA)



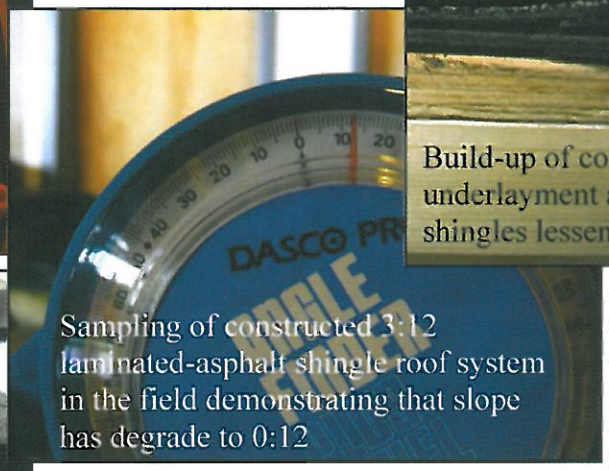
3-1/2:12 sloped laminated-shingle mock-up undergoing heat cycling, softened the asphalt and caused the shingles to deflect or settle into a cupped-like condition. (see photos below.)



Build-up of coinciding underlayment and overlap of shingles lessens finished roof slope



Slope-degrading distortion of laminated-asphalt shingle surfaces are visually apparent following heat-cycling



Sampling of constructed 3:12 laminated-asphalt shingle roof system in the field demonstrating that slope has degrade to 0:12

tect's design and ARMA *Residential Roofing Manual* and shingle manufacturer's recommendations. As a result, WSRCA honors NRCA's 5th edition *Steep-Slope Roofing Manual* and furthermore suggests that the build-up of multi-layers of underlayment combined with heavy-weight laminate shingles only be considered on steeper-sloped roofs - after contemplation of climate, roof dimensions, the roof's downslope eave-to-ridge dimension(s), etc. At a minimum, WSRCA recommends that laminated-asphalt shingles not be specified for roof slopes less than 4:12. If valley lengths are excessive (e.g., over 15') and/or eave-to-ridge dimensions exceed 18', carefully, well thought-out designs, respective of climate (e.g., exposure to wind-driven rain and/or snow and icing conditions) may indicate 4:12 or greater slopes are prudent for all water-shedding roof systems.

Construction Stats

November Construction Falls 9% Nationwide

by McGraw-Hill

At a seasonally adjusted annual rate of $405.0 billion, new construction starts in November dropped 9% from the previous month, according to McGraw-Hill Construction, a division of The McGraw-Hill Companies.

Non-residential building retreated after October's elevated activity, and non-building construction (public works and electric utilities) also settled back. Meanwhile, residential building in November held steady with its October pace. Through the first 11 months of 2009, total construction on an unadjusted basis came in at $381.0 billion, down 28% from the same period a year ago. The November statistics lowered the Dodge Index to 86 (2000=100), after the 95 reported for October, which was the highest reading for the Index so far in 2009.

"During the spring, the construction start statistics made the transition from steady decline to more of an up-and-down pattern, and November's pullback following the strong gain in October is a continuation of that pattern," stated Robert A. Murray, vice president of economic affairs for McGraw-Hill Construction. "Accordingly, even with the November decline, the evidence of recent months suggests that overall construction activity has at least stabilized at a low level. Single-family housing is no longer exerting a downward pull, and the federal stimulus act to this point has supported greater construction of highways, bridges, river/harbor development, and courthouses. At the same time, the negatives of weak employment, tight bank lending, and diminished state fiscal health continue to depress most of the non-residential building structure types as well as multi-family housing."

> *"The construction start statistics made the transition from steady decline to more of an up-and-down pattern..."*

Non-residential building in November fell 18% to $146.1 billion (annual rate). The manufacturing plant category in November plunged 85% from its exceptional volume in October, which reflected the start of a $1.1 billion oil refinery expansion in Illinois. The commercial sector in November revealed further weakness for these structure types – stores, down 17%; warehouses, down 22%; and hotels, down 34%. The office category in November was able to register a 3% gain, lifted by the $747 million renovation of the United Nations Secretariat Building in New York, New York. Without this very large project, the office category in McGraw-Hill Construction November would have fallen 44% from its October amount, which featured groundbreaking for three office projects valued each in excess of $100 million.

The institutional sector in November was dampened by reduced activity for healthcare facilities, down 20%; dormitories, down 41%; and amusement-related projects, down 57%. While losing momentum, the healthcare facilities category in November did include the start of these large projects – a $150 million medical center expansion in Winchester, Virginia; the $132 million clinic portion of a

is a better measure of a roofing material's cradle-to-cradle impact and more accurately reflects its long-term economic and environmental value compared to traditional life-cycle cost (LCC) analysis.

Roofing system durability, therefore, is a critically important factor in green roofing decisions. This is particularly true for applications where long-term building ownership is concerned, such as school districts and healthcare facilities.

Yet, despite the heightened awareness of green building practices, most low-slope roofing material purchases are based on cost rather than environmental performance. The green considerations for roofing are often taken into account only when dictated by an owner or when a subsidy exists.

EPDM: Black, White & Green

As roof designers place more emphasis on LCA and cradle-to-cradle concepts, EPDM's combination of low installation cost and lifetime economic value, durability, installation ease, design flexibility, and recyclability make it an economic and sustainable choice.

After nearly five decades and more than 20 billion-sq.ft. of proven field performance, some roofing manufacturers today warrant premium EPDM systems for up to 30 years. With a proactive maintenance program and periodic tune-ups, EPDM systems may last well past their expected service life. In fact, the SKZ Group in Germany conducted a study on EPDM and found that its expected life is between 50 and 75 years. Furthermore, recent field testing and laboratory analysis have helped identify the many green benefits of EPDM:

Cool Ballast: An extensive analysis of roofing system energy performance by the Single Ply Roofing Industry and Oak Ridge National Laboratory indicated ballasted and paver EPDM roofing systems can save as much energy as a reflective or "cool" roof in southern climates. In the study, ballasted EPDM profiles delayed the temperature rise for up to three hours, effectively moving about 20% of the cooling load into off-peak hours when energy costs are lowest. As such, ballasted EPDM membranes qualify as a "cool roof" option in the 2009 Title 24 standards.

Bright White: White EPDM (white-on-black bi-laminate) membranes possess the same physical traits as their black counterparts, while providing a highly reflective alternative to thermoplastics and coated membranes.

Less Waste: With the support of several industry partners, the EPDM Roofing Association's recycling program has been quickly transformed from a promising idea to a viable option. In just three years, nearly five million square feet of EPDM membrane has been recycled rather than dumped into landfills. Today, EPDM roof recycling extends throughout the United States and into Canada.

As the "shades of green" continue to evolve, overall roofing system durability and life-cycle assessment are increasingly important factors for selecting the best option. Designing a green roofing system today requires a long-term view to ensure it delivers environmentally and economically for decades to come.