Manufacturers differ on minimum roof slope

by **Mark S. Graham**

Q: *What is the minimum recommended roof slope for a low-slope membrane roof system?*

A: While most people initially think that there should be an industrywide agreement as to the minimum recommended slope for low-slope roof applications, research shows a lack of consensus on this issue.



Review of various roof membrane manufacturers' product literature and installation specifications reveals a notable inconsistency in manufacturers' recommendations for a minimum roof slope. A look at NRCA's *Commercial Low-Slope Roofing Materials Guide* indicates that many manufacturers provide specific numerical values for minimum roof slope. These values range from a minimum slope of 0 inches per foot (dead level) by some manufacturers, to a minimum slope of ½ of an inch per foot (4 percent) by other manufacturers of similar materials.

A number of other manufacturers do not offer numerical values, but provide more qualitative recommendations for minimum roof slope. These recommendations range from allowances for dead level applications to requirements for positive drainage. There is even some disagreement between manufacturers as to the definition of positive drainage. Some require complete drainage within 24 hours of rainfall, while others allow for 48 hours after rainfall.

The NRCA Roofing and Waterproofing Manual recommends that virtually all low-slope membrane roof systems be installed with, at a minimum, a roof slope adequate to provide for positive drainage of the roof surface. Positive drainage is defined in the manual's glossary as "the drainage condition in which consideration has been made for all loading deflections of the deck, and additional roof slope has been provided to ensure drainage of the roof area within 48 hours of rainfall."

NRCA has chosen not to offer a specific numerical value (e.g., ¼ of an inch per foot [2 percent]) for a minimum recommended slope for low-slope membrane roof applications because the slope of the roof membrane, in itself, is not the sole determining factor for roof drainage adequacy.

This point is easily verified by the fact that there are a number of roofs with slopes as little as ⅛ of an inch per foot (1 percent) that drain adequately, while some roofs with slopes of ¼ to ½ of an inch per foot (2 to 4 percent) or even greater exhibit some ponding water because of deck deflection.

The "Slope and Drainage" section in NRCA's *Handbook of Accepted Roofing Knowledge* provides a commentary on structural roof deck deflection and camber, roof drain placement and other factors that can impact roof drainage efficiency.

Q: *Why isn't a common roof edge drainage detail, such as a conventional gutter and downspout system, included within the "Construction Details" section of* The NRCA Roofing and Waterproofing Manual?

A: The "Construction Details" section of the manual was devised to provide general guidelines for the development of common roof details that have been proven through years of experience and are generally applicable throughout the United States.

The 74 details included in the section are not intended to represent every possible detail condition, nor do they necessarily represent specific regional detailing practices or techniques. NRCA readily acknowledges that some modification or adaptation of the details is often necessary for specific project conditions.

In the case of a roof edge gutter detail, NRCA has found that the extent of use of roof edge gutters and the manner in which they are fabricated and installed vary throughout the United States. While a K-style gutter with a separate gravel stop edge may be common in some areas, a one-piece gutter profile with an integral back edge stripping flange is preferred in some northern climates where there are concerns of snow and ice buildup. In other regions, roof edge gutters are seldom used.

Because all gutter details rely on a metal flange (stripping flange) to be continuously embedded within the roof membrane assembly along the length of the detail, differential thermal movement of the metal flange relative to the roof membrane is of notable concern.

It is not uncommon to see localized membrane splitting over the end joints in the stripping flange or along the back edge of the flange only a few years after initial installation. For this reason, frequent inspection and maintenance of gutters and any other embedded metal edge details are recommended to assure that they are watertight.

The foreword to the "Construction Details" section provides a brief commentary on embedded metal edge details and offers a recommendation for controlling differential thermal movement of embedded metal edges. PR

Each month in this column, Terrance R. Simmons, RRC, or Mark S. Graham, both NRCA deputy directors of technology and research, will answer readers' technical questions. If you have a specific question that you would like answered in this column, send it to Q & A, Professional Roofing, *10255 W. Higgins Road, Suite 600, Rosemont, Ill. 60018-5607; or fax (708) 299-1183.*