

Avoiding ponding water by achieving positive drainage

by James R. Kirby, AIA

Q: My new low-slope roof system was just completed, and after the first rain, there were a number of puddles on the roof for a while. All parties involved (the architect, contractor and manufacturer) are calling this "ponding water." There seem to be many definitions of ponding water—What is NRCA's definition? Also, what are the ramifications



of ponding water, is it acceptable, and how can it be avoided?

A: The NRCA Roofing and Waterproofing Manual, Fourth Edition, defines ponding water as "the excessive accumulation of water at low-lying areas on a roof." To avoid ponding water, NRCA recommends that all roof systems be designed and built to ensure positive drainage.

The manual defines positive drainage as "the condition in which consideration has been made during design 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 during ambient drying conditions."

Low-slope roof systems contain membranes intended to be water-impermeable coverings. A waterproofing system, on the other hand, is designed to withstand hydrostatic pressure resulting from standing or ponding water. Roof systems generally are not designed as or intended to serve as waterproofing systems.

To ensure positive drainage, a roof system designer should not simply select a nominal slope (either $\frac{1}{8}$ or $\frac{1}{4}$ -in-12 [1 or 2 percent]). He should consider the following: structural framing; deck type; typical construction tolerances; expected deck deflection; drain locations; overlayment

material (e.g., gypsum board, insulating concrete and insulation); membrane type; penetrations; potential blockage (due to equipment curbs); and overall building/roof layout. Assessing these factors will help him determine the method(s) for achieving positive drainage—whether a new or replacement roof system is being designed.

Ponding water can be detrimental to most roof membranes.

It is NRCA's experience that ponding water can be detrimental to most roof membranes and, potentially, an entire roof assembly. NRCA's *Handbook of Accepted Roofing Knowledge (HARK)* identifies the effects it can have: deterioration of a roof's surface and membrane; debris accumulation, vegetation, fungal growth and resulting membrane damage; deck deflections (sometimes resulting in structural problems and other complications); ice formation and resulting membrane degradation or damage; tensile splitting of water-weakened organic or asbestos felts; repair difficulties if leaks occur; water entry into a building if the roof membrane is punctured or fails in a ponding area; and voiding of manufacturers' warranties.

Ponding water may not be defined in a manufacturer's warranty. Some warranties simply state that damages resulting from ponding water (or inadequate drainage) are not covered. Any time or size limits describing the condition should be noted in the warranty. Problems that arise from ponding water may be excluded or not covered by the manufacturer, and, subsequently, the building owner may look to the installer and/or designer for a solution.

NRCA suggests that no standing water remain on a roof membrane longer than 48 hours. This will allow for the migration of residual water and evaporation of small

"birdbaths." (Some manufacturers set a 24-hour time limit.)

Building codes typically list minimum slope requirements but do not mention ponding water or positive drainage. For new construction, *The BOCA* [Building Officials & Code Administrators International] *National Building Code*, 1996, *Standard Building Code*, 1994, and *Uniform Building Code*, 1994, (BOCA, SBC and UBC, respectively) require all roof systems to have minimum design slopes of $\frac{1}{4}$ -in-12 (2 percent).

The exceptions: BOCA permits coal tar built-up roof systems to have minimum design slopes of $\frac{1}{8}$ -in-12 (1 percent); SBC allows water-retaining roof materials; and UBC allows the design for water accumulation in lieu of meeting the slope requirements. **Note:** The manual does not recommend a minimum slope to ensure positive drainage.

Each code has specific rules for reroofing work. BOCA states that if more than 25 percent of a job is reroofing, work must comply with new roof system installation requirements. SBC states that reroofing does not have to meet slope requirements, provided there is positive drainage. But with UBC, compliance with the slope requirements is mandated; corrective measures, such as relocating drains, are to be taken.

For new construction work, positive drainage can be achieved by designing adequate slope into the structure and/or specifying sufficient amounts of tapered insulation, crickets and drains. When reroofing, positive drainage can be achieved by adding tapered insulation or additional roof drains in low spots. The best way to avoid the question, "What is ponding water?" is to design and install roof systems with positive drainage. **PR**

Each month in this column, one of NRCA's technical services staff members will answer readers' technical questions. If you have a specific question you would like answered in this column, send it to Professional Roofing magazine, 10255 W. Higgins Road, Suite 600, Rosemont, Ill. 60018-5607.