

# Metal slope requirements

by Joan P. Crowe, AIA

Structural metal panel roof systems have become a common choice for low-slope roofing applications. These systems are an appealing alternative to using low-slope roof membrane systems for several reasons. For example, structural metal panels have the strength and capability to span structural members, therefore eliminating the need for a roof deck. In addition, structural metal panel roof systems can be attractive and provide long-lasting, cost-effective service lives.

However, roof system designers who specify structural metal panel roof systems need to be aware of varying recommendations for minimum roof slope by different sectors of the construction industry.

## Recommendations

*The NRCA Roofing and Waterproofing Manual, Fifth Edition*, states the minimum slope for structural metal panel roof systems should be ½-in-12 (2.4 degrees). This recommendation conflicts with some manufacturers who list ¼-in-12 (1.2 degrees) as an acceptable minimum slope.

The 1999 *BOCA National Building Code* and 1999 *Standard Building Code* list the minimum slope for metal panel systems as ¼-in-12 (1.2 degrees). The 2000 *International Building Code* divides metal roof systems into three categories: lapped, nonsoldered seams without applied sealant; lapped, nonsoldered seams with applied sealant; and standing seam. The required minimum slopes for these systems are 3-in-12 (14 degrees), ½-in-12 (2.4 degrees) and ¼-in-12 (1.2 degrees), respectively. The 1997 *Uniform Building Code* (UBC) doesn't offer any provisions about minimum slope for metal roof systems.

*The Metal Building Systems Manual*, a design manual published by the Metal Building Manufacturers Association (MBMA), also includes guidelines for metal roof systems. MBMA classifies metal roof systems into two types, through-fastener metal roof systems and standing-seam metal roof systems. MBMA recommends a minimum slope of ½-in-12 (2.4 degrees) for through-fastener metal roof systems and ¼-in-12 (1.2 degrees) for standing-seam metal roof systems. The association also stresses deflection of purlins and rafters under dead and live loads be checked to ensure positive drainage.

## What to do?

Roof systems must meet a governing building code's requirements. However, roof system designers should keep in mind that building codes primarily are concerned with life-safety issues, not serviceability. Prescribed requirements are minimums, and they may not be adequate for achieving watertight roof systems.

NRCA's ½-in-12 (2.4-degree) minimum slope recommendation for metal roof systems is prescriptive, whereas NRCA recommendations for low-slope membrane roof systems are performance-based.

For example, NRCA recommends designers should not only specify that a low-slope membrane roof system be a certain slope but also include provisions in the overall roof design for complete positive drainage. NRCA defines positive drainage as the drainage

condition in which consideration has been made during the design for all loading deflections of a deck and additional roof slope has been provided to ensure drainage of a roof area within 48 hours following rainfall under conditions conducive to drying.

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## Designers who specify structural metal panel roof systems need to be aware of recommendations for minimum roof slope

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NRCA's prescriptive ½-in-12 (2.4-degree) slope recommendation for metal roof systems is more conservative than manufacturers' recommendations of ¼-in-12 (1.2 degrees) because NRCA attempts to account for those factors that affect drainage and slope, such as deflection and supporting structural members' allowable erection tolerances.

In addition, designers can achieve localized positive drainage for their roof system designs by including crickets and/or diverters at some curbs and penetrations. NRCA recommends crickets be installed at roof penetrations that are more than 24 inches (610 mm) wide.

For more information about structural metal panel roof systems, refer to the Architectural Sheet Metal and Metal Roofing section of *The NRCA Roofing and Waterproofing Manual, Fifth Edition*; contact NRCA at (847) 299-9070; fax (847) 299-1183; or access NRCA's Web site, [www.nrca.net](http://www.nrca.net).

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