NRCA's steep-slope manual is thoroughly revised for 2013

by Maciek Rupar


**Best-practice manual**

Users of *The NRCA Roofing Manual* not yet familiar with NRCA’s approach to manual development should understand the information provided in the manual represents time-tested, best-practice guidelines for roof system installation throughout the U.S. based on the consensus judgment of knowledgeable, practicing roofing contractors.

Generally, NRCA guidelines provide for higher levels of construction durability and quality than building code provisions, which prescribe the minimum legal requirements for construction. NRCA guidelines tend to be consistent with or more conservative than manufacturers’ recommendations, which are intended to provide a level of quality construction necessary to obtain a manufacturer’s warranty.

The manual does not purport to include all practices, designs and applications. The best practice, design or application for a specific job may vary according to climatic conditions and geographic location. Exclusion of certain practices from the manual does not mean such practices are unsatisfactory or inappropriate, and some geographic areas may employ area practices not included in the manual that are better or more appropriate than those included in the manual. Accordingly, the manual should only be used as a guideline and should not replace personal knowledge or experience.

NRCA’s 2011-12 Manual Update Committee was responsible for preparing the current volume. They used the previous version during the deliberations and made specific recommendations for improving the revised manual’s substance and format. NRCA’s Technical Operations Committee periodically reviewed the volume’s progress and made additional recommendations. Also, a number of 2012 I-Code® provisions influenced recommendations made in this volume. As a result, there are significant revisions for 2013.

**Updated content organization**

Five roof covering type-specific sections and appendixes comprise the new steep-slope manual. Each of the five sections is organized into six chapters. For 2013, each section has been expanded by adding two new chapters. Chapters 1 through 5 address roof deck sheathing materials and design, underlayment materials and applications, and roof covering materials and applications, respectively.

A new Chapter 4—Roof System Configurations has been added for each roof covering type. The chapter provides generic roof system specifications that contain inventories of available roof system components and accompanying figures. Chapter 4 is intended as a guide for designers specifying steep-slope roof systems when developing their own drawings and specifications for projects.


A new Chapter 5—Roof Re-covering has been added within the asphalt shingle and metal shingle roof system sections and addresses NRCA-recommended re-covering applications. It discusses design considerations specific to re-covering steep-slope roof systems as well as generic re-covering roof system specifications and is formatted in a manner similar to the presentation used in Chapter 4.

Roof re-covering previously addressed in the reroofing section of *The NRCA Roofing Manual: Architectural Metal Flashing, Condensation Control and Reroofing—2010*, which was the fourth volume in the first four-year update cycle of *The NRCA Roofing Manual*. At the start of the second four-year update cycle of *The NRCA Roofing Manual*, NRCA’s Manual Update Committee recommended the inclusion of roof re-covering information as part of each subsequent volume so it would be available alongside related information primarily intended for new construction applications.
Chapter 6—Construction Details provides technical information concerning the design and installation of construction details for quality steep-slope roof systems. The appendixes include a discussion of roof system accessories, such as prefabricated flashings and skylights; contact information for organizations referenced in the manual; explanation of unit abbreviations used in the manual; unit conversion tables; and a sheet metal gauge, thickness and weight table.

Because the volumes typically are used for reference, contents are organized in a fashion intended to make it straightforward to locate sought-after information. References to contents of companion volumes and other NRCA publications are located throughout each volume to assist with quickly locating related information.

Minimum slope

NRCA’s updated steep-slope roof system application recommendations are intended for roof systems installed on substrates having a 4:12 (18-degree) slope or greater. This applies to new construction and reroofing situations for all roof system types addressed in the new manual. NRCA makes this recommendation in recognition of the fact that rapid and complete drainage is essential for water-shedding roof systems.

The manual recognizes some building codes and manufacturers allow for the application of water-shedding roof systems on slopes as low as 2:12 (9.5 degrees).

When asphalt shingle roof systems are applied on substrates with less than a 4:12 (18-degree) slope, NRCA currently recommends the installation of a single layer of ASTM D1970-compliant self-adhering polymer-modified bitumen sheet underlayment, as well as taking specific additional steps during the roof system design process. ASTM D1970, “Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection,” addresses self-adhering polymer-modified bitumen sheet underlayment thickness, tear resistance, adhesion to wood substrates, sealing around nails, low-temperature flexibility, thermal stability and other physical properties.

Underlayerment recommendations

Users of the manual’s previous edition will notice significant changes in the revised chapters addressing underlayments.

For example, asphalt felt materials currently are recommended as underlayment only in asphalt shingle roof systems and wood shake and wood shingle roof systems installed over continuous or closely spaced sheathing.

As a minimum underlayment for asphalt shingle roof systems, NRCA recommends a single layer of ASTM D4869 Type II, III or IV asphalt felt or ASTM D6757 asphalt felt applied horizontally in shingle fashion.

ASTM D4869, “Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing,” addresses material characteristics and physical property requirements of organic mat-based steep-slope asphalt felt underlayments. ASTM D4869, Type II asphalt felt is considered equivalent to ASTM D226, Type I (15-pound) asphalt felt, and ASTM D4869, Type IV asphalt felt is considered equivalent to ASTM D226, Type II (30-pound) asphalt felt.


NRCA recommends a single layer of ASTM D4869 Type III or Type IV asphalt felt applied horizontally in shingle fashion as a minimum underlayment for wood shake and wood shingle roof systems installed over continuous or closely spaced sheathing.

NRCA recommends underlayments other than asphalt felts for use in clay and concrete tile, metal shingle and slate roof systems because roofing contractors’ field experiences have shown current-generation asphalt felt materials’ service lives often fall short of primary roof covering materials’ service lives.

Also, the double-layer mechanically attached asphalt felt underlayment configuration was removed from the new volume. This configuration was recommended in the 2009 edition for asphalt shingle roof systems installed on roofs with slopes less than 4:12 (18 degrees) as well as tile and slate roof systems. The configuration was removed.
from the 2013 edition in part because the increased durability benefits it used to provide can more easily be achieved using other underlayment materials and partly because the new recommendations are limited to roof systems installed over substrates at 4:12 (18-degree) slopes or greater. Many building codes prescribe double-layer asphalt felt applications as a minimum underlayment for water-shedding roof systems installed on roofs at less than 4:12 (18-degree) slopes.


### Water and ice-dam protection membranes

As in the 2009 edition, the current volume considers underlayments and water and ice-dam protection membranes separate and distinct roof system components. Separate eave details are provided for roof systems incorporating water and ice-dam protection membranes. Roof system configurations provided in Chapter 4—Roof System Configurations and Chapter 5—Roof Re-covering list water and ice-dam protection separately from underlayments. NRCA recommends ASTM D1970-compliant self-adhering polymer-modified bitumen sheets be used for water and ice-dam protection membranes.

The current volume provides a new recommendation for water and ice-dam membrane installations in cold regions. As an option for clay and concrete tile and slate roof systems, underlayment from the field of the roof can be extended to eaves to cover the water and ice-dam protection membrane. By making this recommendation, NRCA’s Manual Update Committee is addressing concerns about unknown service lives of self-adhering sheets used for water and ice-dam protection membrane applications. Clay and concrete tile materials and slate materials in particular historically have been found to possess service lives exceeding typical service lives of other steep-slope roof covering materials.

### Asphalt shingles


IBC 2012 and IRC 2012 contain different provisions for determining the minimum asphalt shingle wind-resistance classification requirements. The primary difference between the methods used is each code references different design wind-speed maps to determine the required classification. If you specify, design or install asphalt shingle roof systems, it is important you understand the differences between the applicable requirements provided by the two model codes.

Also, 2012 I-Code provisions for determining asphalt shingle wind-resistance classification requirements have inherent limitations. The new volume addresses the limitations of the codes’ methods.

### Clay and concrete tile

Minimum clay and concrete tile roof system underlayment recommendations have been revised.

For mechanically attached tile roof systems, NRCA currently recommends a minimum single layer of ASTM D1970-compliant self-adhering polymer-modified bitumen sheet or a single layer of mechanically attached polymer-modified bitumen sheet be specified as underlayment.

For adhesive-set tile roof systems, NRCA currently recommends two layers of polymer-modified bitumen sheets adhered together to form a continuous weather-proof underlayment layer. Depending on substrate type, the bottom layer is mechanically fastened or adhered in an appropriate adhesive.

Updated Chapter 3—Clay and Concrete Tile explains the differences between the roof tile classifications established in ASTM International standards for clay and concrete roof tile materials. The two standards classify tile according to tile profile, but the classification criteria for clay tile are not the same as the classification criteria for concrete tile.

### Metal shingles

This section has been significantly expanded in the current volume. Treatment of metal shingle roof systems has been developed to be on par with other steep-slope roof system types addressed in the 2013 volume.

Text from *The NRCA Roofing Manual: Metal Panel*
and SPF Roof Systems—2012 addressing sheet metal properties, protective coatings for metal roof coverings and dissimilar metal contact has been adapted for use in the new volume. New text and figures were developed to address recommendations for system design, underlayment application and metal shingle installation. A new complete set of metal shingle construction details has been added to the current edition; the 2009 edition provided no construction details for metal shingle roof systems.

As a minimum underlayment for metal shingle roof systems, the current volume recommends a single layer of synthetic sheet be applied horizontally in shingle fashion. If adhered underlayment is preferred, a single layer of ASTM D1970-compliant self-adhering polymer-modified bitumen sheet can be applied horizontally in shingle fashion.

Metal roof shingles are available in a variety of designs, profiles, sizes and finish types. Many metal shingle designs imitate the appearance of other steep-slope roof coverings, typically at a fraction of the weight. Other metal shingle designs seek to be clearly identifiable as metal. Because of the diversity of metal roof shingle designs, application recommendations vary and often are product-specific. The updated metal shingle section references manufacturers’ recommendations for product-specific fastening, flashing details, etc.

Instead of attempting to address a large number of product designs, the updated volume uses a single common metal shingle design for text illustrations and construction details. NRCA recommends metal shingle roof systems be fastened with concealed fasteners; a metal shingle designed for attachment with concealed fasteners is used for illustrations and construction details. To help you prepare submittal materials, figures separately show three metal shingle designs in Chapter 4—Roof System Configurations.

**Slate**

NRCA’s revised recommendations for wood panel roof sheathing for slate roof systems call for minimum ¾-inch-thick plywood over rafters spaced at 16 inches on center and a minimum ¾-inch-thick plywood over rafters spaced at 24 inches on center. These minimum thicknesses are intended to provide adequate support for a slate roof system and adequate pull-out resistance for fasteners used to attach slate.

Because of the longevity of slate roof systems and concerns about the long-term performance of oriented strand board (OSB) panels, NRCA’s revised recommendations for slate roof substrates do not include OSB panels.

Slate roof system underlayment recommendations are similar to clay and concrete tile roof system underlayment recommendations. As a minimum underlayment application, a single layer of ASTM D1970-compliant self-adhering polymer-modified bitumen sheet or a single layer of mechanically attached polymer-modified bitumen sheet is recommended.

Double-layer mechanically attached polymer-modified bitumen sheet underlayment also can be specified. In this configuration, the polymer-modified bitumen sheets are lapped a minimum of half the sheet width plus 1 inch—the same way asphalt felt sheets would be lapped in a double-layer configuration.

Two layers of underlayment consisting of two single-layer underlayment applications also may be used with slate. For example, the first underlayment layer is used to “dry-in” a building temporarily, or two different underlayment materials are used. In a two-layer configuration, the first layer is mechanically attached and the second layer may be mechanically attached or adhered to the first layer depending on the specification.

In Chapter 6—Construction Details, a venting ridge construction detail was added (see Figure 1).

**Wood shake and wood shingles**

During the early review stages of the existing steep-slope text, NRCA’s Manual Update Committee seriously considered removing the wood roofing section from the 2013 volume. Insignificant market share of wood roofing primarily was cited as justification for discontinuing support for wood shake and wood shingle roof systems.

Fortunately for wood roofing, its supporters on NRCA’s Technical Operations Committee prevailed. Recommendations from roofing contractors who continue to install and service wood shake and wood shingle roofs, as well as information published by the Cedar Shake and Shingle Bureau, were considered when preparing the updated section.
A single-layer self-adhering underlayment configuration has been added as an alternative to mechanically attached asphalt felt underlayment for wood roof systems installed over continuous or closely spaced sheathing. IBC 2012 and IRC 2012 prescribe this underlayment configuration as an alternative to underlayment mechanically attached with cap nails for wood shake and wood shingle roof systems installed in high-wind areas.

Chapter 3—Wood Shake and Wood Shingle Roof Systems contains new language applicable to valley construction in wood roof assemblies using spaced sheathing. The new volume points out if valley underlayment and/or valley lining is used in wood roof assemblies, continuous or closely spaced sheathing should be installed in valley areas to support valley flashing materials.

Construction details

A steep-slope guide for clearances between penetrations, walls and valleys is included in the revised introduction to construction details. The minimum recommended distances are diagramed in a new figure in a manner similar to the illustration provided in the construction details chapter of The NRCA Roofing Manual: Membrane Roof Systems—2011.

Four eave construction details found in the 2009 edition were eliminated.

In the 2009 volume, the third option (the “B” detail) for detailing an eave with water and ice-dam protection membrane showed the membrane material applied directly to the deck with the drip edge metal fastened on top. This detail conflicted with a provision introduced in IRC 2012 (Section R905.2.8.5), which prescribes underlayment installed over the drip edge along eaves for asphalt shingle roof systems; therefore, this detail was removed. Corresponding details in other sections of the volume also were removed.

As in the 2009 edition, the preferred construction detail for this condition shows the membrane material applied directly to the deck, the drip edge metal fastened on top and a stripping ply of the membrane material on top of the drip edge metal deck flange.

The kicking-out, or diverter, flashing details for eave-to-wall intersections were removed. These constructions are instead addressed in text and figures within each section of the new volume.

In response to numerous telephone requests to NRCA’s Technical Services Section, steep-slope expansion joint details for each roof covering type are included in the new volume.

Final notes

The new volume complements and is best used in conjunction with earlier volumes of The NRCA Roofing Manual, which are intended to be updated every four years. The 2011-12 Manual Update Committee responsible for the new manual was composed of practicing roofing contractors who have used the 2009 volume in their operations. I encourage you to use the 2013 volume for NRCA’s most up-to-date guidelines applicable to steep-slope roof systems.

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