2017 RCMA Annual Meeting
Las Vegas, Nevada
February 28, 2017

NRCA technical update

presented by

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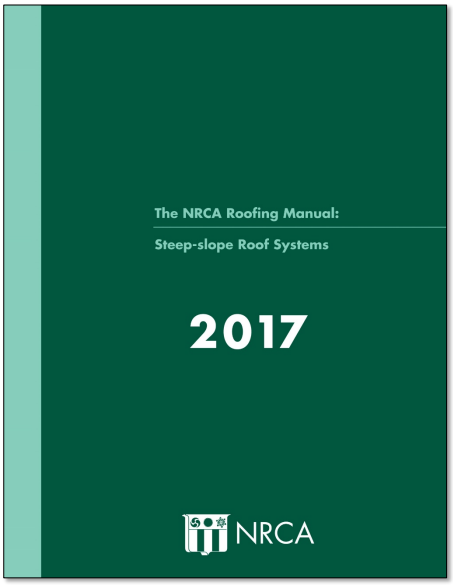
Topics

- Publications
- NRCA issues
- Questions

NRCA publications

NRCA Guidelines for Roof Coatings

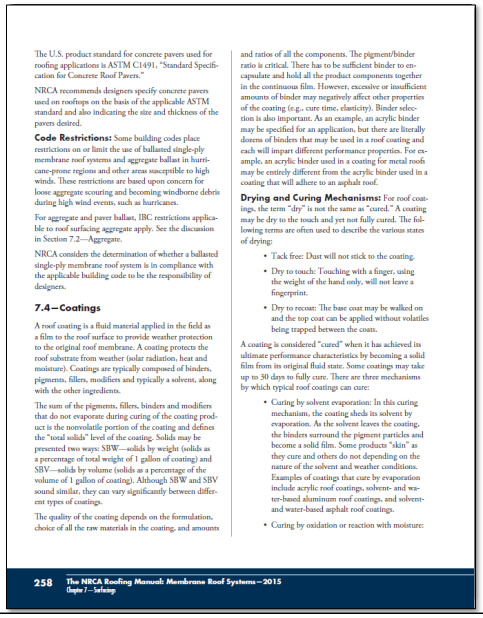


The NRCA Roofing Manual: Steep-slope Roof Systems-2017

The NRCA Roofing Manual - 2017

The NRCA Roofing Manual: Membrane Roof Systems-2015

July 2016 Update



The U.S. product standard for concrete pavers used for roofing applications is ASTM C1491, "Standard Specification for Concrete Roof Pavers."

NRCA recommends designers specify concrete pavers used on rooftops on the basis of the applicable ASTM standard and also indicating the size and thickness of the pavers desired.

Code Restrictions: Some building codes place restrictions on or limit the use of ballasted single-ply membrane roof systems and aggregate ballast in hurricane-prone regions and other areas susceptible to high winds. These restrictions are based upon concern for loose aggregate scouring and becoming windborne debris during high wind events, such as hurricanes.

For aggregate and paver ballast, IBC restrictions applicable to roof surfacing aggregate apply. See the discussion in Section 7.2—Aggregate.

NRCA considers the determination of whether a ballasted single-ply membrane roof system is in compliance with the applicable building code to be the responsibility of designers.

7.4—Coatings

A roof coating is a fluid material applied in the field as a film to the roof surface to provide weather protection to the original roof membrane. A coating protects the roof substrate from weather (solar radiation, heat and moisture). Coatings are typically composed of binders, pigments, fillers, modifiers and typically a solvent, along with the other ingredients.

The sum of the pigments, fillers, binders and modifiers that do not evaporate during curing of the coating product is the nonvolatile portion of the coating and defines the "total solids" level of the coating. Solids may be presented two ways: SBW—solids by weight (solids as a percentage of total weight of 1 gallon of coating) and SBV—solids by volume (solids as a percentage of the volume of 1 gallon of coating). Although SBW and SBV sound similar, they can vary significantly between different types of coatings.

The quality of the coating depends on the formulation, choice of all the raw materials in the coating, and amounts and ratios of all the components. The pigment/binder ratio is critical. There has to be sufficient binder to encapsulate and hold all the product components together in the continuous film. However, excessive or insufficient amounts of binder may negatively affect other properties of the coating (e.g., cure time, elasticity). Binder selection is also important. As an example, an acrylic binder may be specified for an application, but there are literally dozens of binders that may be used in a roof coating and each will impart different performance properties. For example, an acrylic binder used in a coating for metal roofs may be entirely different from the acrylic binder used in a coating that will adhere to an asphalt roof.

Drying and Curing Mechanisms: For roof coatings, the term "dry" is not the same as "cured." A coating may be dry to the touch and yet not fully cured. The following terms are often used to describe the various states of drying:

- Tack free: Dust will not stick to the coating.
- Dry to touch: Touching with a finger, using the weight of the hand only, will not leave a fingerprint.
- Dry to recoat: The base coat may be walked on and the top coat can be applied without volatiles being trapped between the coats.

A coating is considered "cured" when it has achieved its ultimate performance characteristics by becoming a solid film from its original fluid state. Some coatings may take up to 30 days to fully cure. There are three mechanisms by which typical roof coatings can cure:

- Curing by solvent evaporation: In this curing mechanism, the coating sheds its solvent by evaporation. As the solvent leaves the coating, the binders surround the pigment particles and become a solid film. Some products "skin" as they cure and others do not depending on the nature of the solvent and weather conditions. Examples of coatings that cure by evaporation include acrylic roof coatings, solvent- and water-based aluminum roof coatings, and solvent- and water-based asphalt roof coatings.
- Curing by oxidation or reaction with moisture:

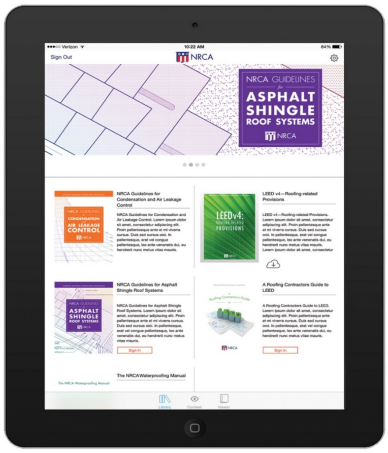
258 The NRCA Roofing Manual: Membrane Roof Systems—2015
Chapter 7—Surfacing

Manual online

www.nrca.net

- Available to all NRCA member registered users (multiple users per member company)
- "Members only" section, click on "My account", the "Electronic file"
- View, download and print

NRCA App



- NRCA App available on the Apple Store and Google Play Store for tablets
- iPhone App also available
- Register within App as being an NRCA member
- The NRCA Roofing Manual is viewable to NRCA members
- Favorite and send pages features

Others' publications…

International Building Code, 2015 Edition

TABLE 1507.10.2
BUILT-UP ROOFING MATERIAL STANDARDS

MATERIAL STANDARD	STANDARD
Acrylic coatings used in roofing	ASTM D 6083
Aggregate surfacing	ASTM D 1863
Asphalt adhesive used in roofing	ASTM D 3747
Asphalt cements used in roofing	ASTM D 3019; D 2822; D 4586
Asphalt-coated glass fiber base sheet	ASTM D 4601
Asphalt coatings used in roofing	ASTM D 1227; D 2823; D 2824; D 4479
Asphalt glass felt	ASTM D 2178
Mineral-surfaced inorganic cap sheet	ASTM D 3909
Thermoplastic fabrics used in roofing	ASTM D 5665, D 5726

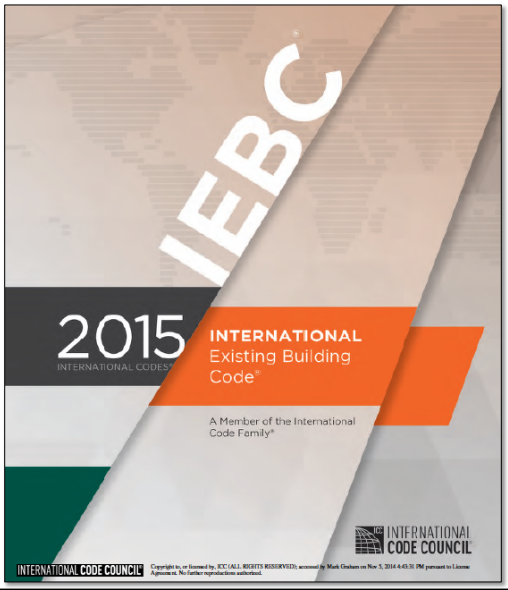
1507.14.3 Application. Foamed-in-place roof insulation shall be installed in accordance with the manufacturer's

4. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear off of existing roof coverings.

TABLE 1507.14.3
PROTECTIVE COATING MATERIAL STANDARDS

MATERIAL	STANDARD
Acrylic coating	ASTM D 6083
Silicone coating	ASTM D 6694
Moisture-cured polyurethane coating	ASTM D 6947

International Existing Building Code, 2015 Edition



Roof coating service life

How long will a roof coating continue to provide a fire classification?

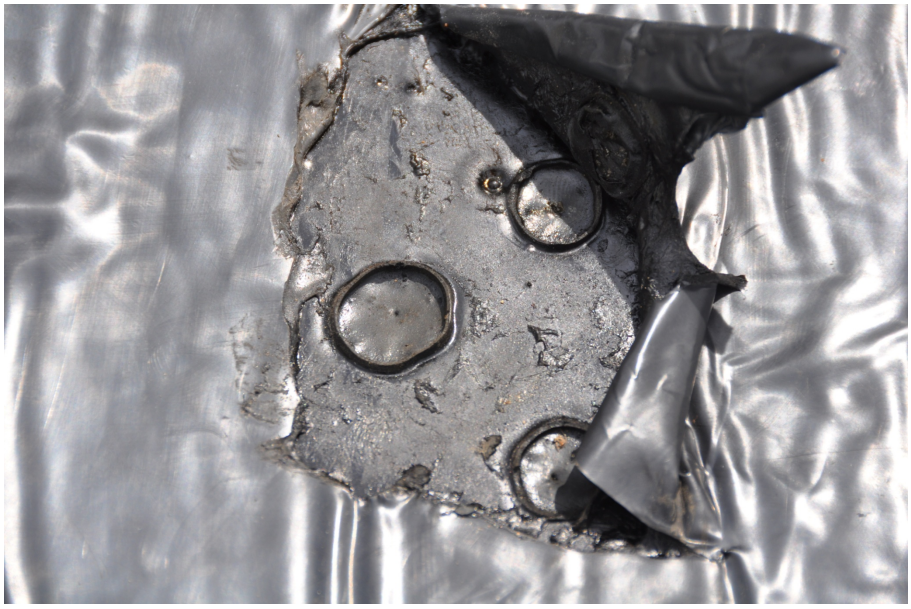
Roof coating-related ASTM standards

- ASTM D6847-Urethane (D08.06)
- ASTM D1227-Emulsion (D08.09)
- ASTM D4479-Asphalt (D08.05)
- ASTM D6694-Silicone (D08.06)
- ASTM D2824-Aluminum (D08.05)
- ASTM D3468-Neoprene/CSPE (D08.18)
- ASTM D6083-Acrylic (D08.18)

Give consideration to asking ASTM to establish a roof coatings subcommittee within Committee D08… and move these standards into that subcommittee.

Issues

Moisture in concrete roof decks

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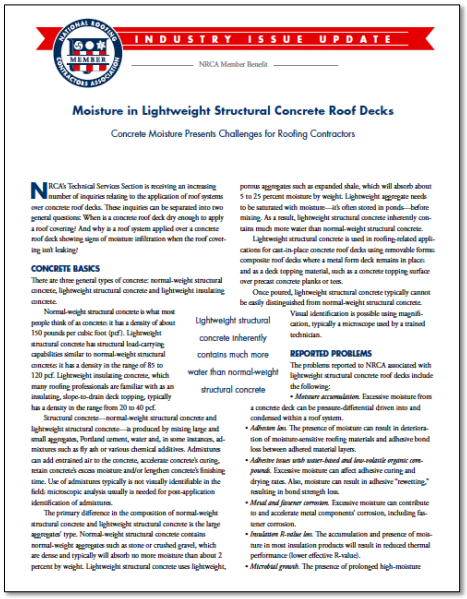
NRCA Industry Issue Update, August 2013



INDUSTRY ISSUE UPDATE

NRCA Member Benefit

Moisture in Lightweight Structural Concrete Roof Decks

Concrete Moisture Presents Challenges for Roofing Contractors

NRCA's Technical Services Section is receiving an increasing number of inquiries relating to the application of roof systems over concrete roof decks. These inquiries can be separated into two general questions: When is a concrete roof deck dry enough to apply a roof covering? And why is a roof system applied over a concrete roof deck showing signs of moisture infiltration when the roof covering isn't leaking?

CONCRETE BASICS

There are three general types of concrete: normal-weight structural concrete, lightweight structural concrete and lightweight insulating concrete.

Normal-weight structural concrete is what most people think of as concrete: it has a density of about 150 pounds per cubic foot (pcf). Lightweight structural concrete has structural load-carrying capabilities similar to normal-weight structural concrete: it has a density in the range of 85 to 120 pcf. Lightweight insulating concrete, which many roofing professionals are familiar with as an insulating, slope-to-drain deck topping, typically has a density in the range from 20 to 40 pcf.

Lightweight structural concrete inherently contains much more water than normal-weight structural concrete

Structural concrete—normal-weight structural concrete and lightweight structural concrete—is produced by mixing large and small aggregates, Portland cement, water and, in some instances, admixtures such as fly ash or various chemical additives. Admixtures can add entrained air to the concrete, accelerate concrete's curing, retain concrete's excess moisture and/or lengthen concrete's finishing time. Use of admixtures typically is not visually identifiable in the field; microscopic analysis usually is needed for post-application identification of admixtures.

The primary difference in the composition of normal-weight structural concrete and lightweight structural concrete is the large aggregates' type. Normal-weight structural concrete contains normal-weight aggregates such as stone or crushed gravel, which are dense and typically will absorb no more moisture than about 2 percent by weight. Lightweight structural concrete uses lightweight, porous aggregates such as expanded shale, which will absorb about 5 to 25 percent moisture by weight. Lightweight aggregate needs to be saturated with moisture—it's often stored in ponds—before mixing. As a result, lightweight structural concrete inherently contains much more water than normal-weight structural concrete.

Lightweight structural concrete is used in roofing-related applications for cast-in-place concrete roof decks using removable forms; composite roof decks where a metal form deck remains in place; and as a deck topping material, such as a concrete topping surface over precast concrete planks or tees.

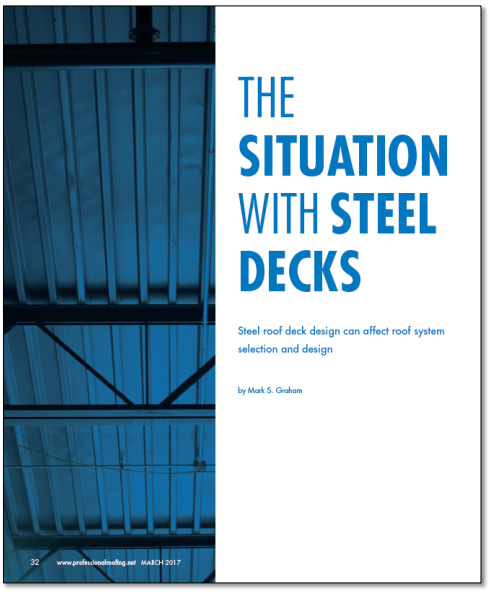
Once poured, lightweight structural concrete typically cannot be easily distinguished from normal-weight structural concrete. Visual identification is possible using magnification, typically a microscope used by a trained technician.

REPORTED PROBLEMS

The problems reported to NRCA associated with lightweight structural concrete roof decks include the following:

- *Moisture accumulation.* Excessive moisture from a concrete deck can be pressure-differential driven into and condensed within a roof system.
- *Adhesion loss.* The presence of moisture can result in deterioration of moisture-sensitive roofing materials and adhesive bond loss between adhered material layers.
- *Adhesive issues with water-based and low-volatile organic compounds.* Excessive moisture can affect adhesive curing and drying rates. Also, moisture can result in adhesive "rewetting," resulting in bond strength loss.
- *Metal and fastener corrosion.* Excessive moisture can contribute to and accelerate metal components' corrosion, including fastener corrosion.
- *Insulation R-value loss.* The accumulation and presence of moisture in most insulation products will result in reduced thermal performance (lower effective R-value).
- *Microbial growth.* The presence of prolonged high-moisture

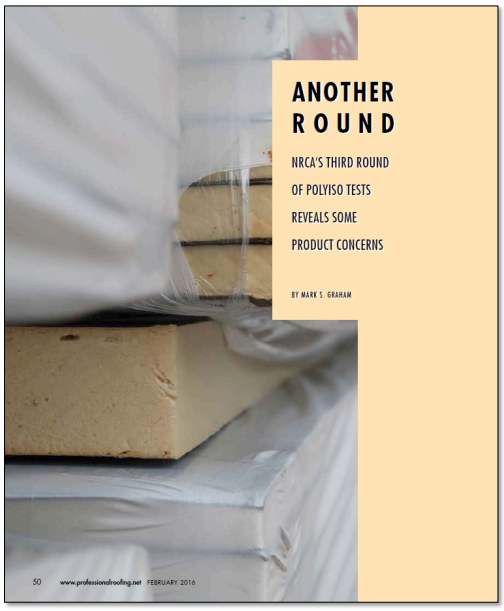
An interim report of NRCA's latest concrete/ moisture research will be provided at the TOC: Programs and Issues educational session (TH10) on Thursday at 9:30 a.m.



Professional Roofing
March 2017
www.ProfessionalRoofing.net

Polyisocyanurate insulation

Knit line, thickness and dimensional stability concerns



Professional Roofing,
February 2016
www.ProfessionalRoofing.net

Knit lines

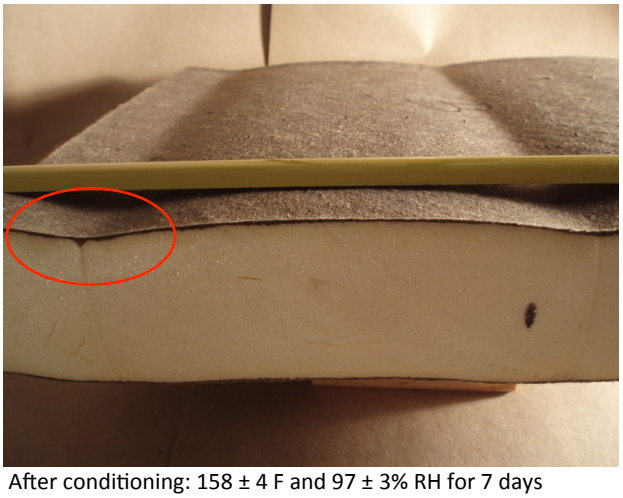
Knit lines -- continued

Photo from manufacturer's product literature

Thickness and knit lines

As delivered by manufacturer.

Knit lines -- continued



After conditioning: 158 ± 4 F and 97 ± 3% RH for 7 days

Knit lines -- continued

Knit line and V-groove close-up (after conditioning)

"NRCA recommends the use of a suitable cover board layer over polyisocyanurate insulation before the installation of roof membrane."

-The NRCA Roofing Manual: Membrane Roof Systems-2015

Additional interim recommendations

Polyiso. knit line, thickness and dimensional stability concerns

- Measure polyiso. thickness upon delivery
- Look for knit lines and board unevenness
- Contact manufacturer and NRCA if you see any issues

Questions… and other topics

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