



2018 Carolinas Mid-winter Roofing Expo
Charlotte, NC – January 16-18, 2018

Technical issue update

presented by

Mark S. Graham
Vice President, Technical Services
National Roofing Contractors Association



Topics

- Code update:
 - North Carolina
 - South Carolina
 - ICC 2018
- Concrete roof deck moisture
- Roof drainage
- Metal stud-framed parapet walls
- Questions/other topics

Code update

New NC Building Code 2018, Transition Period (Overlap) and Plan Approval for State Construction Office

Update on 2018 NC Building Code
The 2018 NC Building Code as presented on the NC DOI website, has been adopted by the Building Code Council at the June 2017 quarterly meeting. It is presently pending Rules Review. The review may not be completed until September, so we cannot promise there will not be some minor changes, but to date there are no anticipated issues with the timeline discussed in the previous Engineering Newsletter.

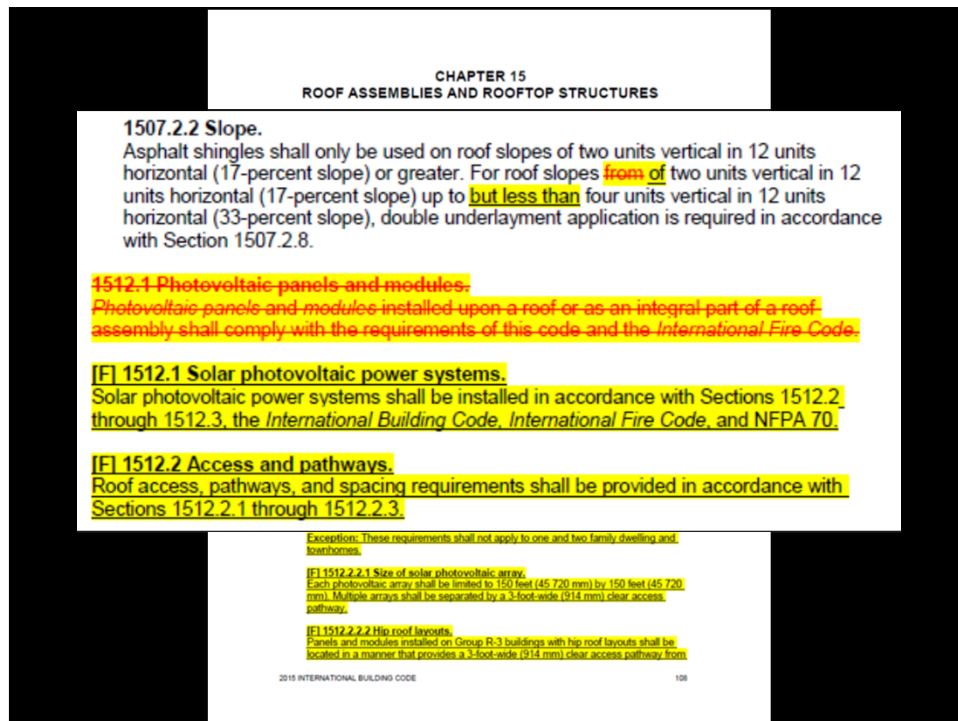
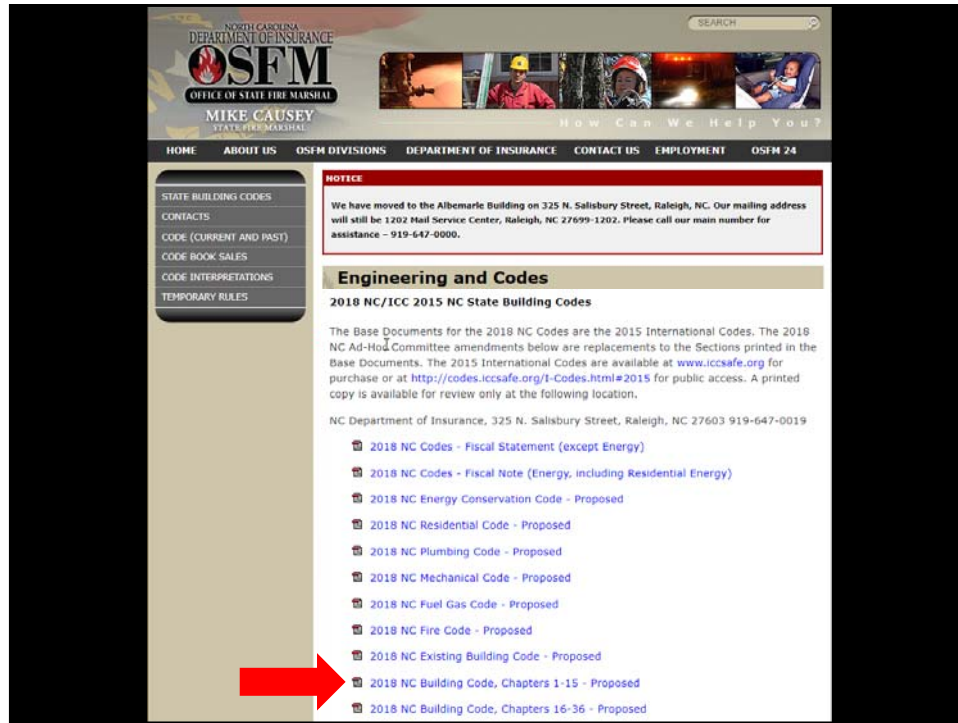
The 2018 NC Code (Except Electrical) will become adopted no later than July 1, 2018, and then we enter into a (minimum) six month overlap timeframe where either the 2012 NC code or the 2018 is acceptable. Then, on January 1, 2019 the 2018 NC code is effective, and the 2018 NC Code is the requirement. This time frame of overlap may be extended, but that cannot be predicted at this time. The 2018 Electrical Code will become effective April 1, 2018.

Remember, the newly adopted 2018 NC Building Code, once it clears Rules Review, is like any other code amendment and can be used as an alternate method prior to the effective date if requested by the user. Reference NC Administrative Code Section 102.5.

The following represents a time line that may aid in planning when to budget for new code training and materials.

FIGURE 1: TENTATIVE ADOPTION AND EFFECTIVE DATES*

- * Dates of overlap and earliest adoption date (July 1, 2018) are subject to variation due to the public adoption process and the direction of the Building Code Council



The screenshot shows the website for the North Carolina Department of Insurance, Office of State Fire Marshal (OSFM). The page features a navigation menu with links for HOME, ABOUT US, OSFM DIVISIONS, DEPARTMENT OF INSURANCE, CONTACT US, EMPLOYMENT, and OSFM 24. A sidebar on the left contains links for STATE BUILDING CODES, CONTACTS, CODE (CURRENT AND PAST), CODE BOOK SALES, CODE INTERPRETATIONS, and TEMPORARY RULES. A red arrow points to the '2018 NC Energy Conservation Code - Proposed' item in a list of 2018 NC Codes. The list includes:

- 2018 NC Codes - Fiscal Statement (except Energy)
- 2018 NC Codes - Fiscal Note (Energy, including Residential Energy)
- 2018 NC Energy Conservation Code - Proposed
- 2018 NC Residential Code - Proposed
- 2018 NC Plumbing Code - Proposed
- 2018 NC Mechanical Code - Proposed
- 2018 NC Fuel Gas Code - Proposed
- 2018 NC Fire Code - Proposed
- 2018 NC Existing Building Code - Proposed
- 2018 NC Building Code, Chapters 1-15 - Proposed
- 2018 NC Building Code, Chapters 16-36 - Proposed

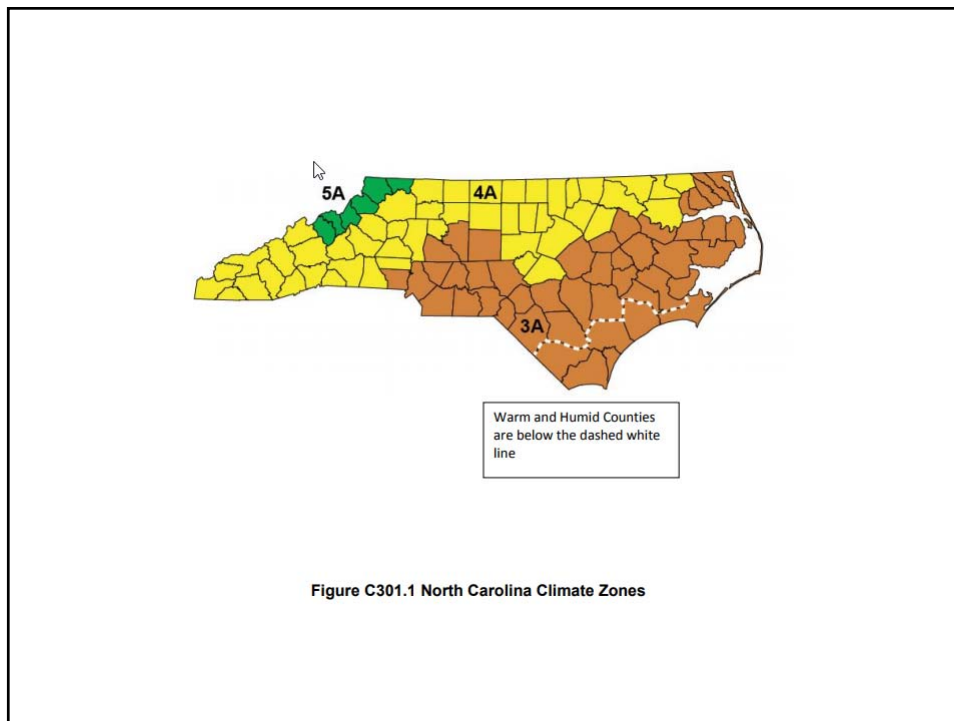


TABLE C402.1.3

**OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS,
R-VALUE METHOD^f**

Climate Zone	3		4		5	
	All Other	Group R	All Other	Group R	All Other	Group R
	Roofs					
Insulation entirely above deck	R - 25 ci	R-25 ci	R - 30 ci	R-30 ci	R - 30 ci	R-30 ci
Metal buildings ^{a,b}	R-10 + R-19 FC	R-10 + R-19 FC	R-19 + R-11 Ls; R-25 + R-8 Ls	R-19 + R-11 Ls; R-25 + R-8 Ls	R-19 + R-11 Ls; R-25 + R-8 Ls	R-19 + R-11 Ls; R-25 + R-8 Ls
Attic and other - wood framing ^e	R-38	R-38	R-42	R-42	R-42	R-42
Attic and other - steel framing ^e	R-38	R-38	R-49	R-49	R-49	R-49

C402.3 Roof solar reflectance and thermal emittance.

Low-sloped roofs directly above cooled conditioned spaces in Climate Zones 1, 2 and 3 shall comply with one or more of the options in Table C402.3.

Exceptions: The following roofs and portions of roofs are exempt from the requirements of Table C402.3:

1. Portions of the roof that include or are covered by the following:
 - 1.1. Photovoltaic systems or components.
 - 1.2. Solar air or water-heating systems or components.
 - 1.3. Roof gardens or landscaped roofs.
 - 1.4. Above-roof decks or walkways.
 - 1.5. Skylights.
 - 1.6. HVAC systems and components, and other opaque objects mounted above the roof.
2. Portions of the roof shaded during the peak sun angle on the summer solstice by permanent features of the building or by permanent features of adjacent buildings.
3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot [74 kg/m²] or 23 psf [117 kg/m²] pavers.
4. Roofs where not less than 75 percent of the roof area complies with one or more of the exceptions to this section.
5. Metal building roofs.

**TABLE C402.3
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS^a**

Three-year aged solar reflectance ^b of 0.55 and 3-year aged thermal emittance ^c of 0.75
Three-year-aged solar reflectance index ^d of 64

LLR SC.GOV
Making South Carolina a Safe Place to Work and Live

Home | License Lookup | Inside LLR

Follow @scdlr

South Carolina Department of Labor, Licensing and Regulation

Inside LLR | Professional Licensing Boards | Labor Programs/OSHA | Fire and Life Safety | Online Services | Media/FOIA/Governmental Affairs

Today's Date: Monday, January 15, 2018

License Status Changes

South Carolina Building Codes Council

Building Code Information

- View Adopted Building Codes
- View Wind / Seismic Maps for South Carolina
- Buildings Codes In Effect for South Carolina (PDF Format)
- SC Modifications to International Codes
- Local Modifications to the Building Codes
- Section 6-9-50 <http://www.scstatehouse.gov/code/t06c009.php>
- Accessibility Act <http://www.scstatehouse.gov/code/t10c005.php>
- Fair Housing Law <http://www.scstatehouse.gov/code/t31c021.php>
- Energy Efficiency Standards Act <http://www.scstatehouse.gov/code/t06c010.php>

Board Meetings

- Calendar
- Agendas
- Minutes
- Board Members

Licensure

- Licensee Lookup
- Licensure with the Board
- Applications and Forms
- Fees
- Education
- FAQ
- Renew Your License
- Change Your Address
- Application status
- Print copy of your license

Information

- Laws and Policies
- Publications / News
- FOIA Requests
- Related Links
- License Status Changes

Complaints / Board Orders

- File a Complaint
- Board Orders
- What can I expect when a complaint is filed against me?

Contact Us

- Board Email: Contact.BCC@llr.sc.gov
- Board Phone: (803) 896-4668
- Administrator: Roger K. Lowe
- Board Staff: Teresa Martin
- Board Staff: Jennie Meade
- Advice Counsel: Georgla Lewis **
- Directions: 110 Centerville Dr, Columbia SC

ICC INTERNATIONAL CODE COUNCIL

Help | Sign In

Welcome to ICC's Online Digital Library

Unlock the power of the codes with a live demonstration of premiumACCESS beginning January 17 at noon CST.

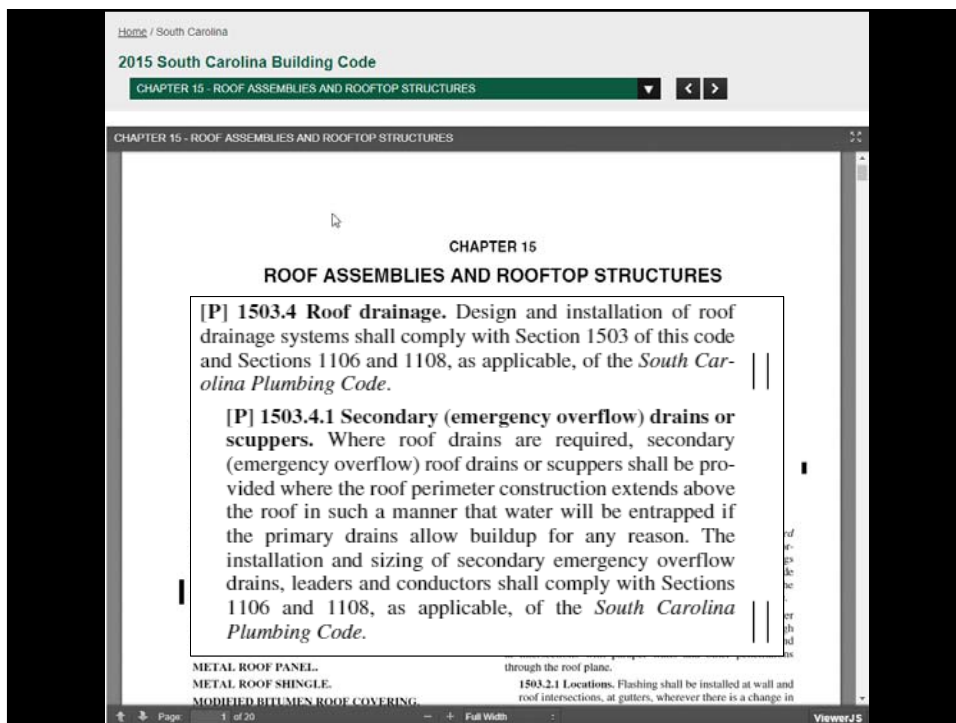
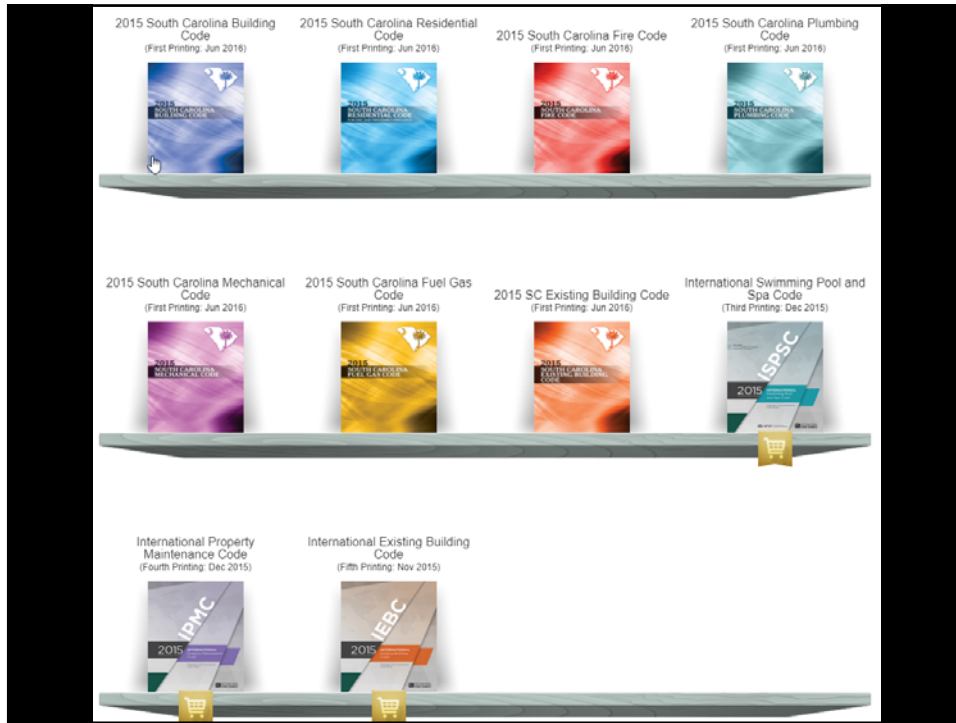
Stay current on all the latest product and feature releases including the upcoming 2018 I-Codes with premiumACCESS newsletter.

premiumACCESS Overview

premiumACCESS Feature Overview

[HTTP://CODES.ICCSAFE.ORG](http://codes.iccsafe.org)

	premiumACCESS Subscription Service	publicACCESS Free Viewing
Complete Code Text Learn more >	✓	✓
ES Report Tagging Learn more >	✓	✓
Highlight & Annotate Learn more >	✓	
Tag Content Learn more >	✓	
Bookmark Learn more >	✓	
Collaborate	✓	



Building Energy Codes Program

DOE • EERE • BTO • BECC • Adoption • Status of State Energy Code Adoption

South Carolina

Commercial Residential Code Change

Current Codes: 2009 IECC

Approved Compliance Tools: Can use COMcheck

Approximate Energy Efficiency: Equivalent to 2009 IECC

Effective Date: Jan. 01, 2013

Adoption Date: Apr. 02, 2012

Code Enforcement: Mandatory

DOE Determination: ASHRAE 90.1-2007: Yes
ASHRAE 90.1-2010: No
ASHRAE 90.1-2013: No

Energy cost savings for South Carolina resulting from the state updating its commercial and residential building energy codes in accordance with federal law are significant, estimated to be on the order of nearly \$250 million annually by 2030.
[South Carolina DOE Determination Letter, May 31, 2013](#)

Popular Links

Status of State Energy Codes

Select a state

State Related Resources

Program and Incentives

State Contacts

Primary Contact for State Adoption
Roger Lowe
South Carolina Building Codes Council
110 Centerville Drive
Columbia, South Carolina 29210
roger.lowe@llr.sc.gov
(803) 699-4688

Secondary Contact for State Adoption
Ashlie Lancaster
Director
South Carolina Energy Office
1200 Senate Street
408 Wade Hampton Building
Columbia, South Carolina 29201
(803) 737-9622
alancaster@seeealliance.org

Building Codes Assistance Project

SUNSHOT INITIATIVE TOOLS NEWS CODE STATUS ABOUT CONTACT US

State Code Status: South Carolina

Current Commercial Code
South Carolina Energy Standard
The commercial provisions of the South Carolina Energy Standard reference the 2009 IECC, including that code's reference to ASHRAE 90.1-2007 as an alternative compliance path
passed 4/2/2012, effective 1/1/2013
✓ Can use COMcheck to show compliance.

Current Residential Code
South Carolina Energy Standard
The residential provisions of the South Carolina Energy Standard reference the 2009 IECC
passed 4/2/2012, effective 1/1/2013
✓ Can use REScheck to show compliance.

Both the residential and commercial code are mandatory statewide. All new and renovated buildings and additions constructed within the state must comply with this standard. Local jurisdictions may adopt more stringent codes.

Climate Zone: 3A

View another state

Contacts
Trish Jerman
Manager, Energy Programs
South Carolina Energy Office
Contact: Staff Directory

Roger K. Lowe
Administrator
South Carolina Building Codes Council
Email: roger.lowe@llr.sc.gov

Sareena Nagpal
Energy Codes Manager
Southeast Energy Efficiency Alliance (SEEA)
Email: snagpal@seeealliance.org

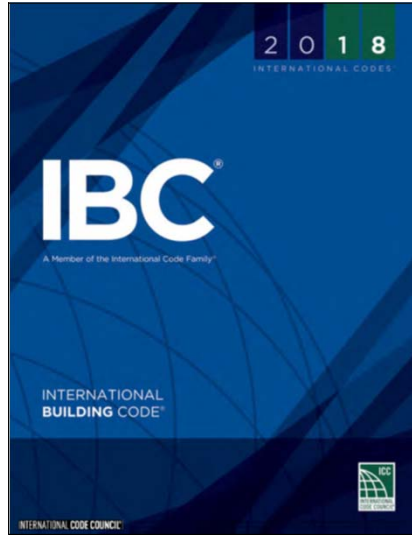
History

July 1, 2016 The 2015 I-codes with state-specific modifications become effective statewide. The energy code has not been updated and still references the 2009 IECC.

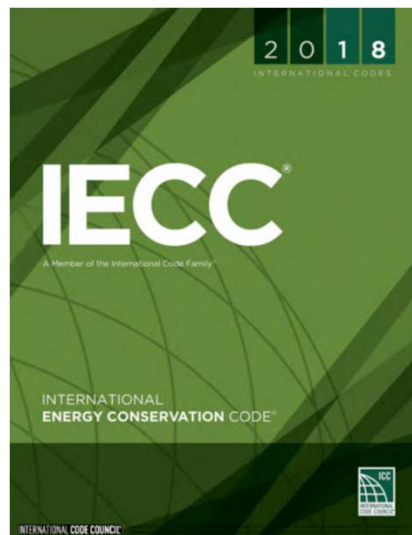
Spring 2012 The House approves HB 4639 on February 23rd, and the Senate concurs on March 21st. Gov. Nikki Haley signs the bill into law as Act 143 on April 2, 2012. This act amends Section 6-10-30 of the state's code of laws as to adopt the 2009 IECC as the statewide energy standard. The effective date of this legislation will be January 1, 2013.
The residential provisions of the South Carolina Energy Standard (2013) will reference the 2009 IECC. The commercial provisions of this standard will reference the 2009 IECC, including that code's reference to ASHRAE Standard 90.1-2007 as an alternative compliance path.

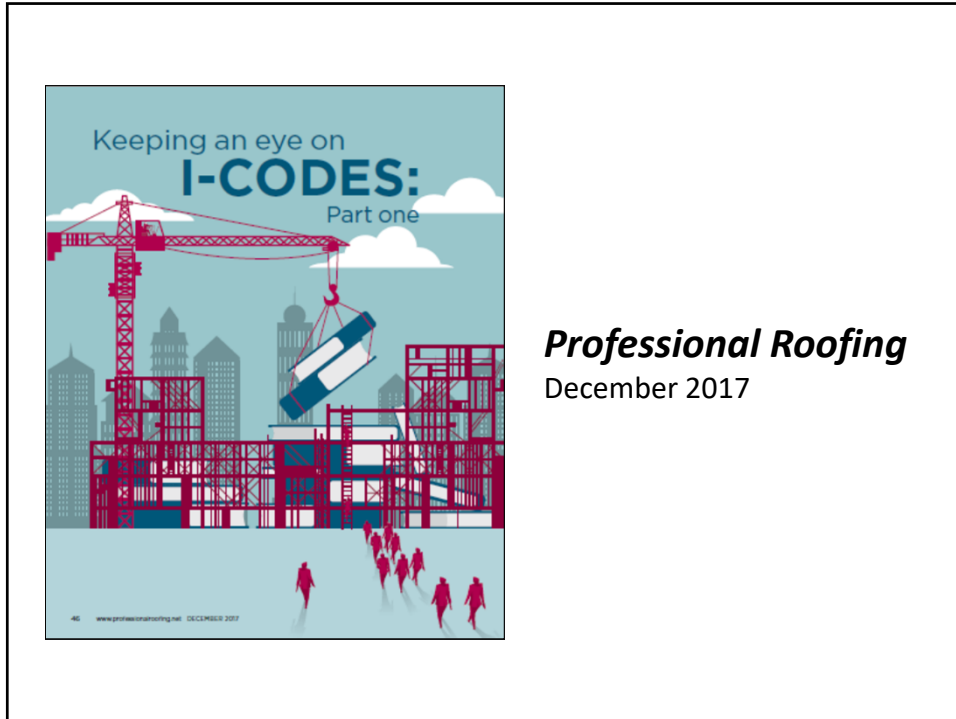
Energy Efficiency in Appalachia: How Much More is Available, At What Cost, And By When? May 2009
Energy Efficiency Policies and Incentives in SC Energy Standard Act
RECA 2009 IECC Compliance Guide for SC
RECA 2012 IECC Compliance Guide for SC
Report: Energy Efficiency in the South April 2010
Residential Cost Comparison of the 2012 IECC vs the 2006 IECC for South Carolina
SC Residential Energy and Cost Savings: 2012 IECC vs 2009 IECC
SEEA Commercial Code Review: South Carolina

***International Building Code,
2018 Edition (IBC 2018)***



***International Energy Conservation Code,
2018 Edition (IECC 2018)***





Concrete roof deck moisture

When is it OK to roof?

Historical guidelines

- After 28 days
- Application of hot bitumen
- Plastic film test
 - ASTM D4263, “Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method”

These are not appropriate for current generations of concrete mixes

Concrete Floors and Moisture, 2nd Edition


Howard M. Kanare, CTL Group

75% internal RH can be achieved:

- Normal weight structural concrete
 - Less than 90 days
- Lightweight structural concrete
 - Almost 6 months

These values are based upon “protected” concrete, without re-wetting

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 is 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, but has a density in the range of 80 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.

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 strength to the concrete, accelerate concrete's setting, retain concrete's 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 aggregate 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—in other words, it must be pre-moistened. 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 form 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 joists.

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.
- **Adhesive del.** The presence of moisture can result in deterioration of moisture-sensitive roofing materials and adhesive bond loss between adhered material layers.
- **Adhesive mass and non-Arald and low-melting organic compound.** Excessive moisture can affect adhesive curing and drying rates. Also, moisture can result in adhesive "bleeding," resulting in bond strength loss.
- **Metal fastener corrosion.** Excessive moisture can contribute to and accelerate metal component corrosion, including fastener corrosion.
- **Insulation R-value del.** 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

Moisture on concrete roof decks

RESEARCH+TECH



Moisture in concrete roof decks
Normal-weight and lightweight structural concrete cause some concern
by Mark S. Givens

NRCA continues to receive a significant number of requests of members related problems associated with concrete roof decks. Following is an ongoing investigation and NRCA's latest recommendations for addressing the issue.

Issue Reported
The issue of moisture in concrete roof decks is the issue (Issue 2006), NRCA has received numerous reports of moisture-related problems with roof systems installed on concrete roof decks. Such aggregates are used and normal weight structural concrete. Reported problems include roof system deterioration, adhesive loss, adhesive bond with water based and low-melting organic compound adhesives, metal and fastener corrosion, moisture in slope-to-drain and structural joints.

Issue No. 2006 publication of the NRCA's *Insulation Technology Manual*, 2006 Edition, NRCA no longer considers the plastic sheet use method as a viable approach to distribute a concrete roof deck dry, moisture and organic application. Also, due to the close relationship between concrete on dry curing method and the "dryness"

20 www.professionalroofing.net SEPTEMBER 2017

Professional Roofing,
Sept. 2017

Roof drainage concerns

Roof drainage

**SECTION 1502
ROOF DRAINAGE**

[P] 1502.1 General. Design and installation of roof drainage systems shall comply with Section 1502 of this code and Sections 1106 and 1108, as applicable, of the *International Plumbing Code*.

[P] 1502.2 Secondary (emergency overflow) drains or scuppers. Where roof drains are required, secondary (emergency overflow) roof drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow buildup for any reason. The installation and sizing of secondary emergency overflow drains, leaders and conductors shall comply with Sections 1106 and 1108, as applicable, of the *International Plumbing Code*.

1502.3 Scuppers. Where scuppers are used for secondary (emergency overflow) roof drainage, the quantity, size, location and inlet elevation of the scuppers shall be sized to prevent the depth of ponding water from exceeding that for which the roof was designed as determined by Section 1611.1. Scuppers shall not have an opening dimension of less than 4 inches (102 mm). The flow through the primary system shall not be considered when locating and sizing scuppers.

1502.4 Gutters. Gutters and leaders placed on the outside of buildings, other than Group R-3, private garages and buildings of Type V construction, shall be of noncombustible material or not less than Schedule 40 plastic pipe.

**CHAPTER 11
STORM DRAINAGE**

Where scuppers are used, buildings shall be designed to a location that can accommodate storm water. Chapter 11 specifies the design method used for the geographic area and provides sizing methods for piping and gutter systems to convey the storm water away from the building. Included in this chapter are regulations for piping materials and related drainage systems.

**SECTION 1105
ROOF DRAINS**

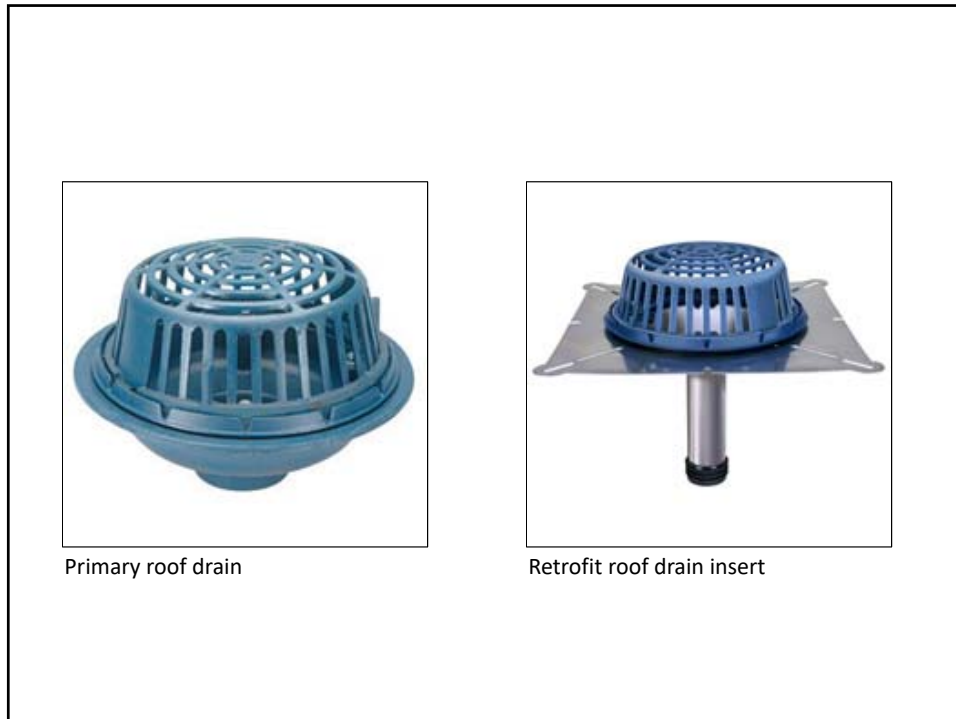
1105.1 General. Roof drains shall be installed in accordance with the manufacturer's instructions. The inside opening for the roof drain shall not be obstructed by the roofing membrane material.

1105.2 Roof drain flow rate. The published roof drain flow rate, based on the head of water above the roof drain, shall be used to size the storm drainage system in accordance with Section 1106. The flow rate used for sizing the storm drainage piping shall be based on the maximum anticipated ponding at the roof drain.

**SECTION 1106
SIZE OF CONDUCTORS, LEADERS
AND STORM DRAINS**

1106.1 General. The size of the vertical conductors and leaders, building *storm drains*, building storm *sewers* and any horizontal branches of such drains or *sewers* shall be based on the 100-year hourly rainfall rate indicated in Figure 1106.1 or on other rainfall rates determined from *approved* local weather data.

INTERNATIONAL ROOFING COUNCIL

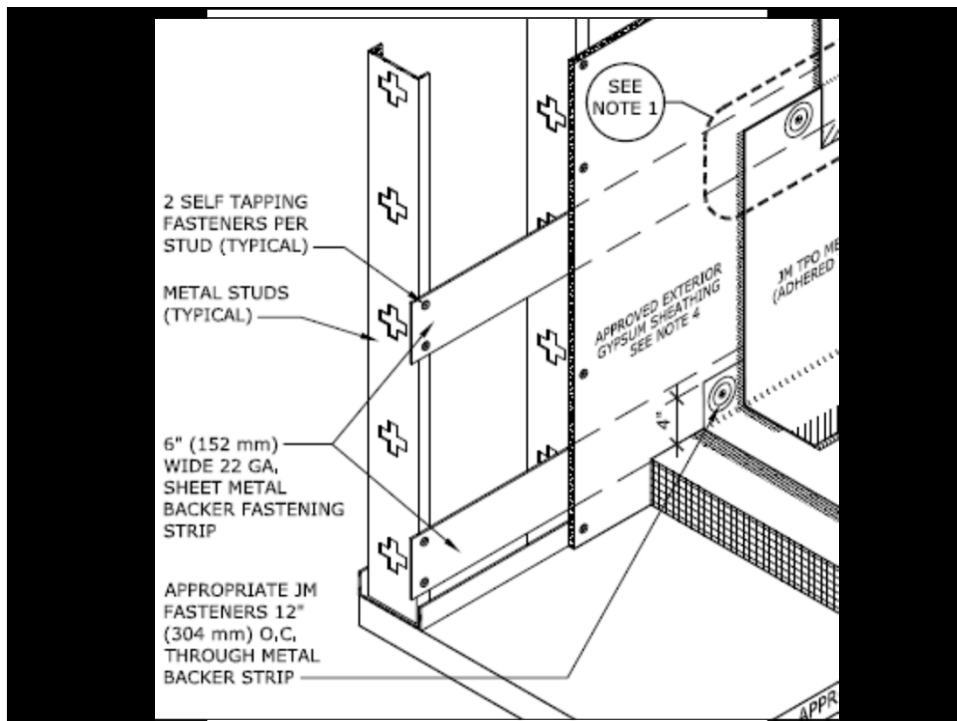


NRCA's interim recommendations

Roof drainage concerns

- Be cautious of roof drain issues, particularly in reroofing situations
 - IBC 2009 adds secondary drainage
 - IBC 2015 provides exception
 - IPC 2015 and IPC 2018 changes
- Assure membrane opening is larger than drain outlet/piping opening
- Be cautious of retrofit drain inserts
- Consider proposal/contract language

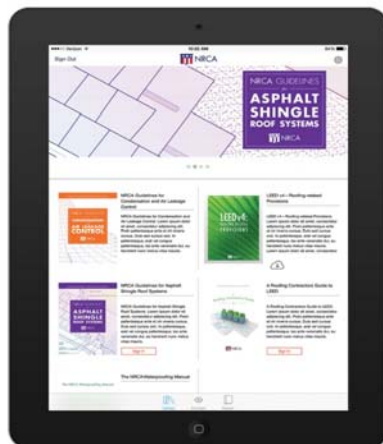
Metal stud-framed parapet walls



The NRCA Roofing Manual - 2018



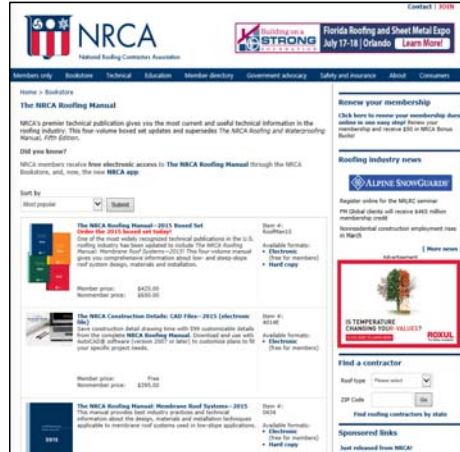
NRCA App



- 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

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

Questions... and other topics



Mark S. Graham

Vice President, Technical Services
National Roofing Contractors Association
10255 West Higgins Road, 600
Rosemont, Illinois 60018-5607

(847) 299-9070
mgraham@nrca.net
www.nrca.net

Twitter: @MarkGrahamNRCA
Personal website: www.MarkGrahamNRCA.com