



2016 Carolinas Mid-winter Roofing Expo
Columbia, SC -- January 19-21, 2016

Building code update

presented by

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



International Codes-Adoption by State (January 2016)																
ICC makes every effort to provide current, accurate code adoption information. Not all jurisdictions notify ICC of code adoptions. To obtain more detailed information on amendments and changes to adopted codes, please contact the jurisdiction. To submit code adoption information: www.iccsafe.org/adoption																
X = Effective Statewide A = Adopted, but may not yet be effective L = Adopted by Local Governments S = Statewide adoptions with limitations AL = Adopted by the State for Local Adoption																
12x 2012 Edition 09 = 2009 Edition 06 = 2006 Edition 04 = 2004 Edition 03 = 2003 Edition 01 = 2000 Edition																
* The title of the 2000 and 2003 IAWIC Code was changed to IWUC in the 2006 version.																
Jurisdiction	IBC	IRC	IFC	IMC	IPC	IPSC	IFGC	ISCC	IECC	IFMC	IEBC	IFSPC	ICCPIC	IWUC	IZC	ICC 700
Alabama	S09, L	XL	S09, L	S09, L	S09, L		S09, L	XL	L	L	L	L	L	L	L	L
Alaska	X09	L06, L08	X09	X09	X09		X09	L06, X12 SFR								
Arizona	S12, L	S09, L	S12, L	S12, L	S12, L	S12, L	S12, L	S09, L	L	L	L	L	L	L	L	L
Arkansas	X12	X12	X12	X09	X08	L	X06	X09								
California	X12	X12	X12													
Colorado	S15, L	S12, L	S15, L	S15, L	X12, L	L	X12, L	L	S12, L	L	X12	L	X12	L	X12, L	L
Connecticut	X03	X09	X03	X03	X03			X09	L	X03						
Delaware	L12	L12	L12	S15	S12		S15	S12	L	L						
District of Columbia	X12	X12	X12	X12	X12		X12	X12	X12	X12			X12			
Florida	X12	X12		X12	X12		X12	X	X12	L12	X12					
Georgia	X12	X12	X12	X12	X12		X12	X	X09	XL12	XL12	XL12		XL12		XL08
Hawaii	X08	X08, L08							X08, L08							
Hawaii	X12	X12	X12	X12			X12	L12	X12, L12		X12					
Illinois	S09, L	L	S09, L	S09, L	L	L	S09, L	X15		S09, L	S09, L	L12	L	L	L	L
Indiana	X12	X03	X12	X12	X08		X12		X12	L	S06, L					
Iowa	S09, L	S09, L	X09	S09, L	L	L	L		X12	L	S06, L					
Kansas	L	L	S06, L	L	L	L	L		S09, L	L						
Kentucky	X12	X12	X12	X12			X12	X09, X12	L							
Louisiana	X12	X12	L	X12	X12		X12	X09, L	L	X12						
Maine	X09	X09						X09	L	X09						
Maine	X15	X15		X15	L15	L	L	X12	X15	X15	X15					
Massachusetts	X09	X09		X09				X12	X09							
Michigan	X12	X15	L	X12	X12	L	X12	X09	L	X12						
Minnesota	X12	X12	X06	X12			X12	X12	L	X12	L					
Mississippi	S12, L	S12, L	S12, L	S12, L	S12, L	L	S12, L	L	L	S12, L	L					
Missouri	S12, L	S09, L	L	S12, L	S12, L	L	S09	S12	L					L	L	L
Montana	X12	X12	L	X12			X12	X12		X12						
Nevada	S12, L	S12, L	L	L	L	L	L	S12, L	L	S12, L	L			L	L	L
Nevada	S12, L	S12, L	S12, L	L	L	L	L	S12, L	L	S12, L	L			L	L	L
New Hampshire	X09	X09		X09	X09		L	X09	L	X09						
New Jersey	X15	X15	X15	X15			X15	X15	L	X15			X15			
New Mexico	X09	X09	X03	L			L	X09	L	X09				L	L	
New York	X06	X06	X06	X06	X06			X06	X09, X12C	X06	X06					
North Carolina	X09	X09	X09	X09	X09		X09	X	X09				X12			
North Dakota	S12, L	S12, L	L	S12, L			S12, L	L	L	S12, L	L					
Ohio	X09	A09	X09	X09	X09		X09	X09		X09						
Oklahoma	X15	S09, X	X15	X15	X15	L	X15	S03, L	S06, L	X15			S06, L	L	L	L
Oregon	X12	X09	X12	X12			X12	X	X12							
Pennsylvania - 16 2015, Amendment to affect 12/31 plus accessibility provisions.																
Pennsylvania	X09	X09	X09	X09	X09		X09	X09	L	X09			X09	X09		
Rhode Island	X12	X12	X12	X12	X12		X12	X12		X12						
South Carolina	X12	X12	X12	X12	X12		X12	XL12	XL12	XL12	XL12	XL12	XL12			
South Dakota	S15, L	L	S09, L	S09, L	L	L	L	L	L12	S15, L	L			L	L	L
Tennessee	S06, L	X09	S06, L	L	L	L	L12	X06	L	L	L	L	L	L	L	L
Texas	X09	X09						X09	L							
Utah	X12	X12	X12	X12	X12		X12	X12		X12					X06	
Vermont								X15								
Virginia	X12	X12	X12	X12	X12		X12	X12	X12	X12	X12	X12				
Washington	X12	X12	X12	L12	L12	L15	X12, L	L	X12, L12	L	X12, L	X12		L	L	L12
West Virginia	X12	X09		X12	X12		X12	X09	X12	X12						
Wisconsin	X09		L	X09	X09		X09	X09		X09						
Wyoming	X15, L	L15	X15, L	X15, L	L15	L12	X15, L	L15	S12	X15, L	L12	L12	L12	L12	L12	L12

South Carolina

Codes Adopted	Adoption Date	Implementation Date
2012 International Residential Code	August 29, 2012	July 1, 2013
2012 International Building Code	August 29, 2012	July 1, 2013
2012 International Fire Code	August 29, 2012	July 1, 2013
2012 International Plumbing Code	August 29, 2012	July 1, 2013
2012 International Mechanical Code	August 29, 2012	July 1, 2013
2012 International Fuel Gas Code	August 29, 2012	July 1, 2013
2009 International Energy Conservation Code ¹	April 2, 2012	January 1, 2013
2011 National Electrical Code ²	August 29, 2012	July 1, 2013


3




[Home | License Lookup | Inside LLR](#)

[Follow @scdlir](#)

South Carolina Department of Labor, Licensing and Regulation

[Inside LLR](#) | [Professional Licensing Boards](#) | [Labor Programs/OSHA](#) | [Fire and Life Safety](#) | [Online Services](#) | [Media/FOIA Center](#)

Today's Date: Monday, January 18, 2016

South Carolina Building Codes Council

2015 Adoption is proceeding smoothly

The list of modifications to the 2015 editions of the International Code Series has been placed in the legislative process as required by law. The projected date for implementation is still July 1, 2016. Any projects that have permit approval prior to July 1, 2016 may be completed using the 2012 series. Please check back to this website for any updates.

[Click here to view the modifications to the 2015 Codes](#)

- 2012 Code Modifications
- Special Inspection Manual (pdf)
- Programs
- Building Code Information
- General Information
- Code Enforcement Officer and Special Inspector Registration Application

Disclaimer of Liability

With respect to any information found on this website, neither the Department of Labor, Licensing and Regulation or any of its employees, makes any warranty, express or implied, including the warranties of merchantability and fitness for a particular purpose, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.

License Information

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

Publications

- Publications
- Related Links

Complaint/Board Order Information

- Board Orders
- File a Complaint
- What Can I Expect When a Complaint is Filed Against Me?

Board Information/Laws and Policies

- Laws/Policies
- FOIA Requests
- Minutes
- Board Members
- Agendas
- Board Meeting Calendar

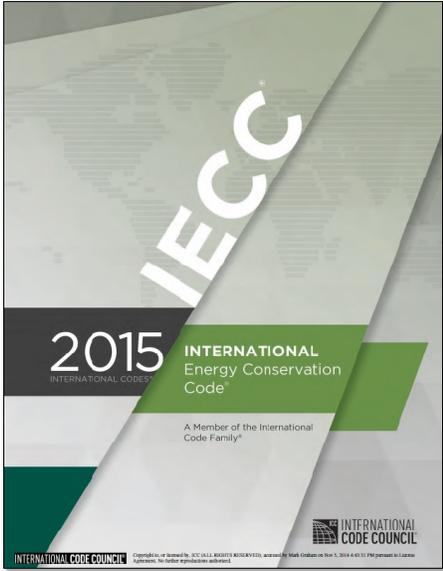
Contact Us

Telephone: (803) 896-4688
Email: contactllr@llr.sc.gov


4

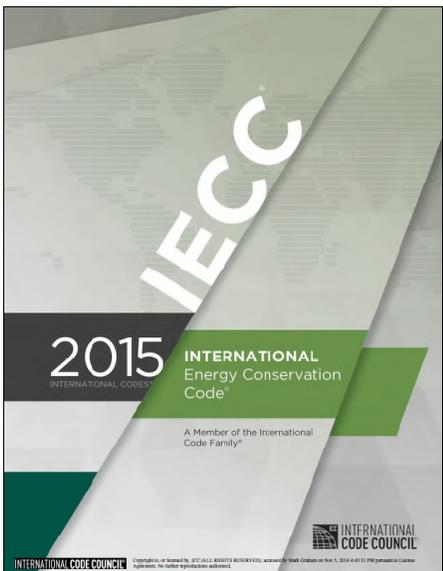

The screenshot shows the website for the North Carolina Department of Insurance, Office of State Fire Marshal. The page is titled "Engineering and Codes" and is part of the "STATE BUILDING CODES" section. It includes a navigation menu with options like HOME, ABOUT US, OSFM DIVISIONS, DEPARTMENT OF INSURANCE, CONTACT US, and EMPLOYMENT. The main content area features a "State Building Codes" section with a welcome message and a list of "2002 Codes" that were effective from January 1, 2002, through December 31, 2007. The codes listed are: 2002 Administrative, 2002 Building, 2002 Energy Conservation, 2002 Fire Prevention, 2002 Fuel Gas, 2002 Mechanical, and 2002 Plumbing. A "RESOURCES" sidebar on the right lists links for 2012 NC Codes, 2006 NC Codes, 2002 NC Codes, 2011 NEC, and an Accumulative Supplement to the 2012 NC Building Code. The page number "5" is visible at the bottom center.

The image shows the cover page of a document titled "2012-2016 NC State Building Codes Amendments - 2012 - 2016". The document is published by the NC Building Code Council and NC DOI - Staff. At the bottom, there is a section titled "[NC State Building Codes Amendments - Effective 1/1/2016]" which states: "The following pages represent a summary of the Building Code Council adopted amendments that have been approved by the Rules Review Commission for the time period of 2012 - June 2015." The page number "6" is visible at the bottom center.



Roof requirements:

- R-value
- Roof reflectivity
- Air retarder



IECC 2015:

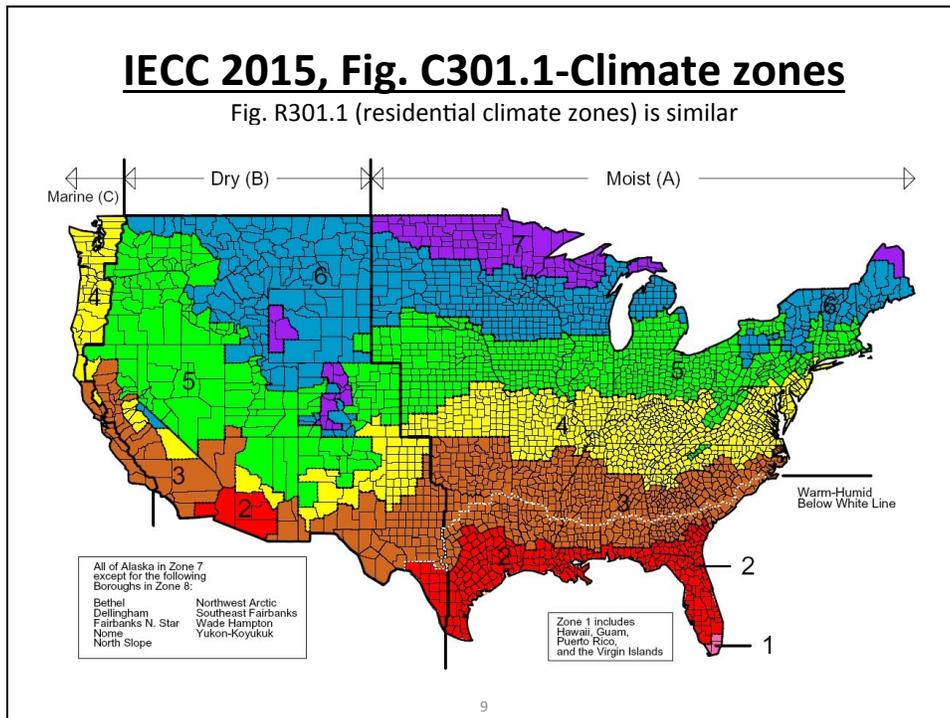
Commercial buildings:

- All except “Residential Buildings”

Residential buildings:

- One- and two-family dwellings, multiple single-family dwellings and Group R-2, R-3 and R-4 buildings three stories or less





Minimum R-value

IECC 2015: Commercial Buildings (Insulation component R-value-based method)

Climate zone	Assembly description		
	Insulation entirely above deck	Metal buildings	Attic and other
1	R-20ci (all other) R-25ci (Group R)	R-19 + R-11 LS	R-38
2	R-25ci		
3			
4	R-30ci		R-38 (except Marine 4)
5		R-38 (all other) R-49 (Group R, Marine 4)	
6			
7	R-35ci	R-25 + R-11 LS	R-49
8		R-30 + R-11 LS	

ci = Continuous insulation; LS = Liner system

10

Comparison of IECC's various editions

Commercial Buildings (Insulation component R-value-based method)

Climate Zone	IECC 2006	IECC 2009	IECC 2012*	IECC 2015*
1	R-15 ci	R-15 ci	R-20 ci	R-20 ci
2		R-20ci		R-20 ci
3			R-25 ci	
4				R-25 ci
5	R-20 ci		R-25 ci	R-30 ci
6				
7	R-25 ci	R-25 ci	R-30 ci	R-35 ci
8				

* Applies to roof replacement projects
ci = continuous insulation




Reflectivity

International Energy Conservation Code, 2015 Edition (Commercial)

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: [Refer to earlier “Cool and Green Roofs” presentation]

TABLE C402.3
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS

Three-year solar reflectance of 0.55 and 3-year aged thermal emittance of 0.75
Three-year-aged solar reflectance index of 64

[Footnotes omitted for clarity]




Air barrier

International Energy Conservation Code, 2015 Edition (Commercial), Sec. C402.5

“A continuous building envelope air barrier shall be provided throughout the building envelope...” (Except 2B)

Test methods:

- Whole building: Not greater than 0.40 cfm/ft³
- Assembly: Not greater than 0.04 cfm/ft³
- Material: Not greater than 0.004 cfm/ft³
 - Deemed to comply: BUR, MB, adhered single ply and SPF

Air barrier not required in reroofing projects unless also recladding (IECC 2015 only: Sec. C502.4)



13

Code compliance is becoming increasingly challenging and presents significant liability risks



14



Proper wind design

- Determine wind loads
 - IBC Ch. 16-Structural Design
 - ASCE 7-10, “Minimum Design Loads for Buildings and Other Structures”
- Design for resistance
 - FM 4474
 - UL 580 or UL 1897

IBC requires (Sec. 1603) design wind loads to be shown in the Contract Documents



*Specifying a wind warrantee,
in itself, is not proper wind design*



Design wind load determination

www.roofwinddesigner.com

The screenshot shows the website's header with the URL 'www.roofwinddesigner.com' and a navigation bar containing 'Home | Contact Us | FAQ | Login'. Below the header is a large blue banner with the text 'Roof Wind Designer is intended to provide users with an easy-to-use means for determining roof systems' design wind loads for many commonly encountered building types that are subject to building code compliance.' The main content area contains several paragraphs explaining the software's technical basis, including references to ASCE 7, NFPA 5000, and the Midwest Roofing Contractors Association (MRCA). At the bottom of the page, there are logos for the Midwest Roofing Contractors Association, NRCA, and NERCA, along with a copyright notice for 2015 National Roofing Contractors Association.



FM 1-28 has been updated

www.fmglobaldatasheets.com

FM Global
Property Loss Prevention Data Sheets **1-28**
October 2015
Page 1 of 100

NECESSITY OF FM GLOBAL SHOULD CONTACT THEIR LOCAL FM GLOBAL OFFICE BEFORE BEGINNING ANY ROOFING WORK.

Table of Contents

	Page
1.0 SCOPE	5
1.1 Changes	5
2.0 LOAD PRESENTATION RECOMMENDATIONS	6
2.1 Design Wind Pressure	6
2.2 Minimum Wind Rating for FM Approved Roof System	7
2.2.1 Design Pressure	7
2.2.2 Wind Challenge	7
2.2.3 Walls of Parimeter and Corner Zones	8
2.3 Exterior Walls	8
2.4 Opening Penetrations in Exterior Walls	9
2.4.1 Exterior Doors	9
2.4.2 Windows in Exterior Walls	11
2.4.3 Louvers in Exterior Walls and Siding	11
2.5 Wind Tunnel Tests	11
2.7 Use of ASCE 7-10	12
2.8 Use of the Eurocode	12
2.9 Emergency Power Systems	13
3.0 SUPPORT FOR RECOMMENDATIONS	13
3.1 General	13
3.1.1 Wind Challenge	14
3.1.2 Design Wind Speeds	14
3.1.3 Structural Design for Regions Prone to Tropical Storms Including Hurricanes, Typhoons and Cyclones	14
3.2 Wind Pressure Determination	16
3.2.1 Minimum Building Wind Zones	16
3.2.2 Determining Surface Roughness Exposure	16
3.2.3 Building Enclosure Classification	17
3.2.4 Tangible Factor (K _t)	18
3.2.5 Monthly Pressure Coefficient (K _c)	18
3.2.6 Exposure Factor	18
3.2.7 Design Pressure for Concrete Roof Decks	19
3.2.8 Wind Challenge	20
3.2.9 Examples of Design Pressure Determination For Proposed Roof Construction	24
3.3 Parimeter and Corner Walls	24
3.4 Wind Design Pressure for Low-Corner Roof Shapes	25
3.4.1 Sharp-Slope, Mono-Slope, and Shell Roofs	25
3.4.2 Sharp-Slope, Mono-Slope, and Shell Roofs	25
3.4.3 Arched Roofs	29
3.4.4 Dome Roofs	31
3.4.5 Dome Roofs with Semi-Circular Roofs	31
3.5 Determining Wind Design Pressure for Exterior Walls	34
3.5.1 Exterior Pressure: Embedded and Partially Embedded Buildings	34
3.5.2 Interior Wind Pressure: Embedded and Partially Embedded Buildings	34

©2015 Federal Mutual Insurance Company. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without written permission of Federal Mutual Insurance Company.

- October 2015 update
- Based upon ASCE 7-05 with enhancements
- Reformatted
- Be cautious of FM-insured projects
- NRCA will review and publish a summary of changes



ASCE 7-16 (public review draft)

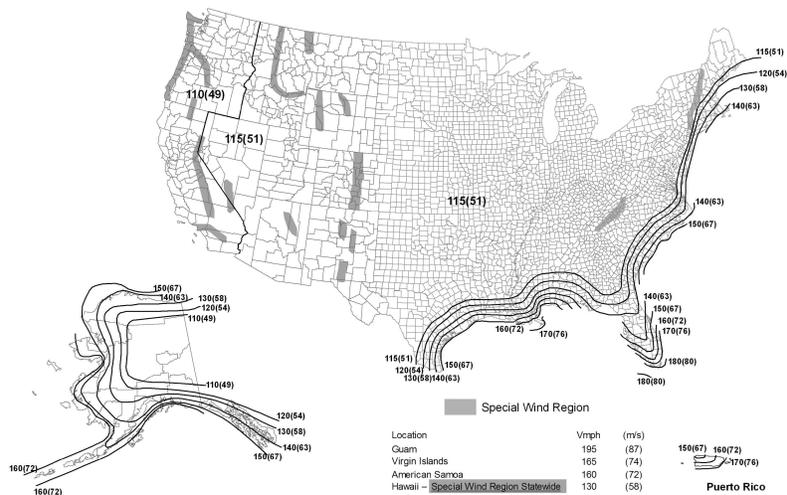
- Revised basic wind speed map
- Changes (and new) pressure coefficients
- Revised perimeter and corner zones

Expect higher field, perimeter and corner uplift pressures



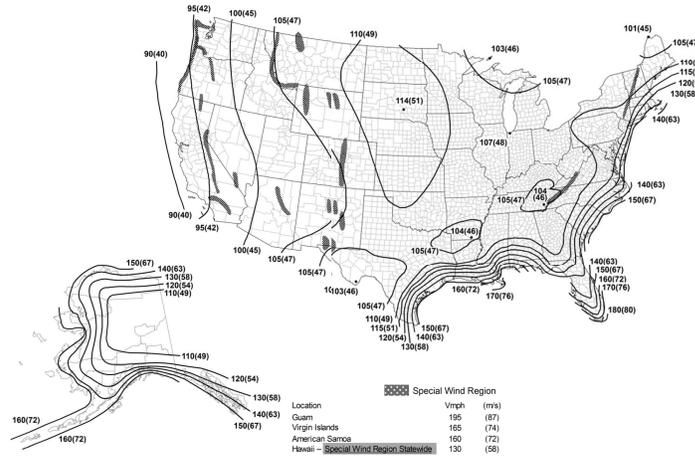
ASCE 7-10 basic wind speed map

Fig. 1607A-- V_{ult} for Risk Category II Buildings



ASCE 7-16 (draft) basic wind speed map

Risk Category II Buildings

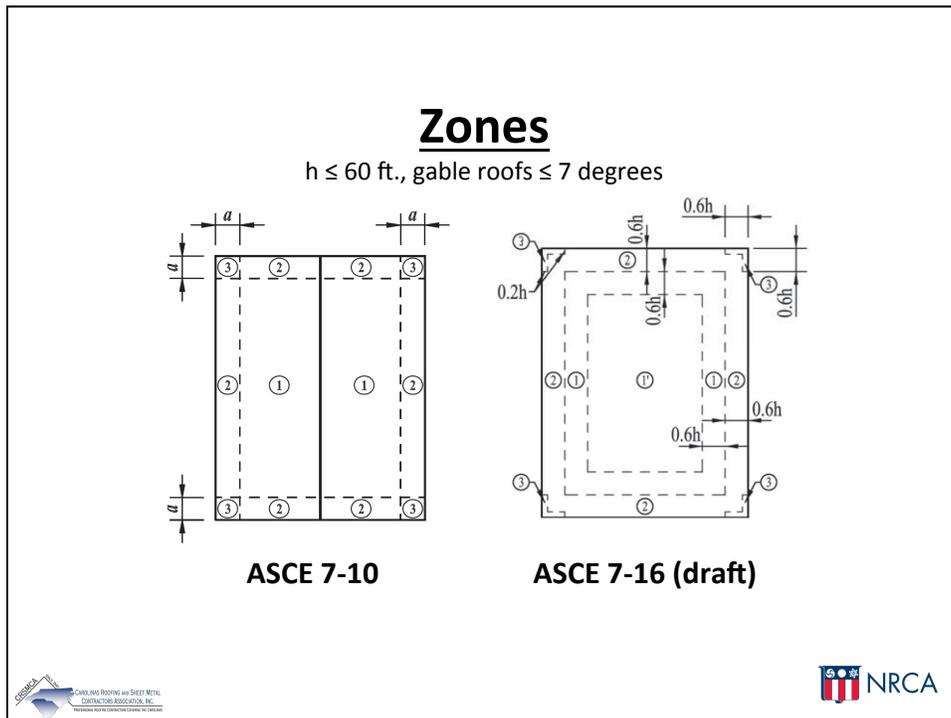


GC_p pressure coefficients

$h \leq 60$ ft., gable roofs ≤ 7 degrees

Zone	ASCE 7-10	ASCE 7-16 (draft)
1 (field)	-1.0	-1.7
1'	--	-0.9
2 (perimeter)	-1.8	-2.3
3 (corners)	-2.8	-3.2





*Proper wind design is oftentimes avoided...
and it is getting more complicated*

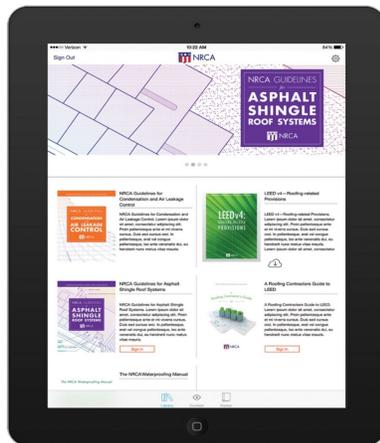
Carolinan Roofing & Sheet Metal Contractors Association, Inc. | CAROLINAS ROOFING & SHEET METAL CONTRACTORS ASSOCIATION, INC. | NATIONAL ROOFING CONTRACTORS COLLEGE OF LEADERSHIP

NRCA

The NRCA Roofing Manual



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



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