

**NFRC CERTIFICATION
PROGRAM FOR
RESIDENTIAL AND
COMMERCIAL
FENESTRATION ENERGY-
RELATED PERFORMANCE
RATINGS**

Ray McGowan March 22, 2012

Charleston, SC

LEARNING OBJECTIVES

1. Understand the 2009 IECC and ASHRAE 90.1-2007 fenestration energy requirements for commercial construction.
2. Understand the role of NFRC related to providing high-performance fenestration for energy-efficient commercial construction.
3. Understand the NFRC 100 and NFRC 200 documents, the NFRC commercial fenestration certification program (CMA), and how CMA enables energy codes compliance.
4. Understand how the NFRC Component Modeling Approach (CMA) Program and associated software (CMAST) are used as design and compliance tools for developing valid specifications for fenestration energy-related performance requirements.

AIA CES INFORMATION

“The National Fenestration Rating Council” is a Registered Provider with The American Institute of Architects Continuing Education Systems. Credit earned on completion of this program will be reported to CES Records for AIA members. Certificates of Completion for non-AIA members are available on request.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



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National Fenestration
Rating Council

WHO IS NFRC ?

- An independent, non-profit, 501(c)3, organization; whose purpose is to serve the public good through education and research.
- We are a community of stakeholders with an interest in the energy performance of fenestration products.
- The indisputable authority for providing information people need to make the best decision about purchasing energy efficient windows, doors, and skylights.
- The NFRC label, indicating performance ratings, is found on all Energy Star® qualified windows, doors, and skylights.
- Consensus-driven organization – inclusive group decision-making process.

 National Fenestration Rating Council® CERTIFIED	World's Best Window Co. Millennium 2000+ Vinyl-Clad Wood Frame Double Glazing • Argon Fill • Low E Product Type: Vertical Slider
ENERGY PERFORMANCE RATINGS	
U-Factor (U.S./I-P) 0.30	Solar Heat Gain Coefficient 0.30
ADDITIONAL PERFORMANCE RATINGS	
Visible Transmittance 0.51	Air Leakage (U.S./I-P) 0.2
<small>Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. www.nfrc.org</small>	

NFRC Membership



- Voice and Vote
 - *You* help decide how NFRC ratings are developed
 - Member ideas are voted into action and *you* vote on the ideas
- Industry News
 - Latest fenestration information on energy code references, technical interpretations, research and technology, regulatory and legislative news, and more
 - News to help you anticipate change and stay competitive
 - NFRC News Now (our blog), Facebook, LinkedIn, and Twitter
 - News You Can Use What's New for Windows, Doors, Skylights, latest Energy Code references, and more

WHY RATE FENESTRATION PRODUCTS?

- Provides means for a fair comparison
- Help consumer to make informed decisions
- Help meet the code requirements
- Provides a base line for developments and product improvement
- Promotes energy efficiency
- National / International harmonization



NFRC Background

- Created by industry/government assistance in 1989
- Created to provide standardized methods for rating *fenestration energy performance*
- Unique, **501 (c)(3)** [educational non-profit public/private organization] representing:
 - Industry, codes officials, Design Professionals, Consumer Organizations
 - 700 Manufacturers participating
 - 250 Voting Members
 - \$4 million/yr operating budget
 - 17 staff members, 3 supporting contractors, LBNL partnership
 - Three International Licensees (India, South Africa, Australia)



NFRC—Introduction & Overview

Mission:

NFRC develops and administers comparative energy and related rating programs that serve the public and satisfy the needs of its private sector partners by providing fair, accurate and credible, user-friendly information on fenestration product performance.

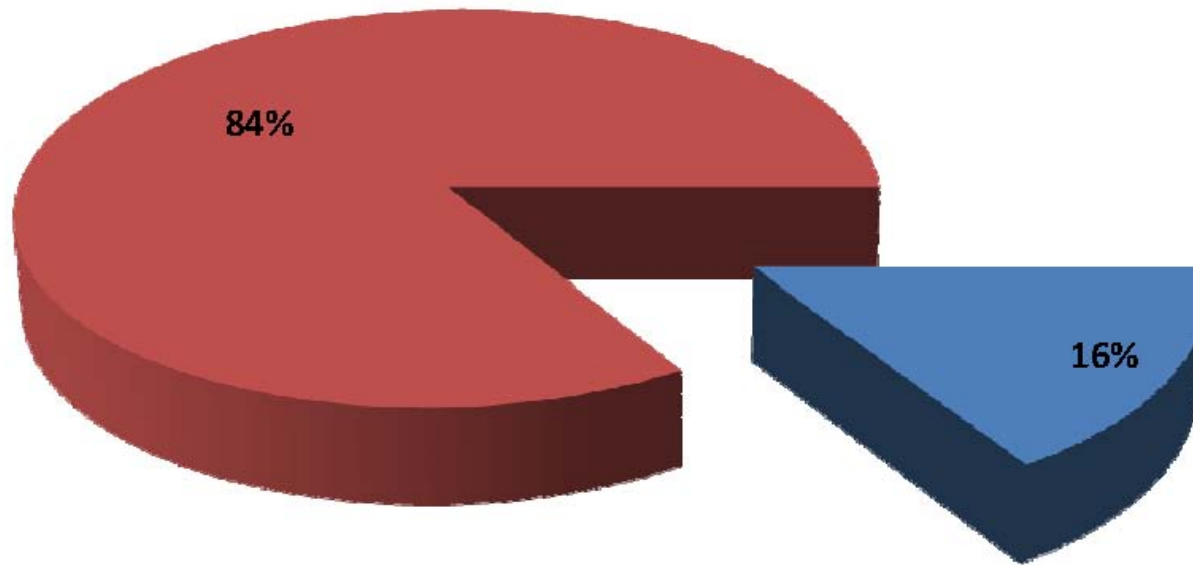
NFRC Rating Determination



- Computer simulation is the basis of all ratings
 - *3 million records in CPD, 1% go to production*
- Simulation performed at standardized sizes & environmental conditions
- Simulation generates a **whole-product rating**
- Simulated U-factors validated by physical testing
 - 4000 tests/year

Aggregate Building Loads

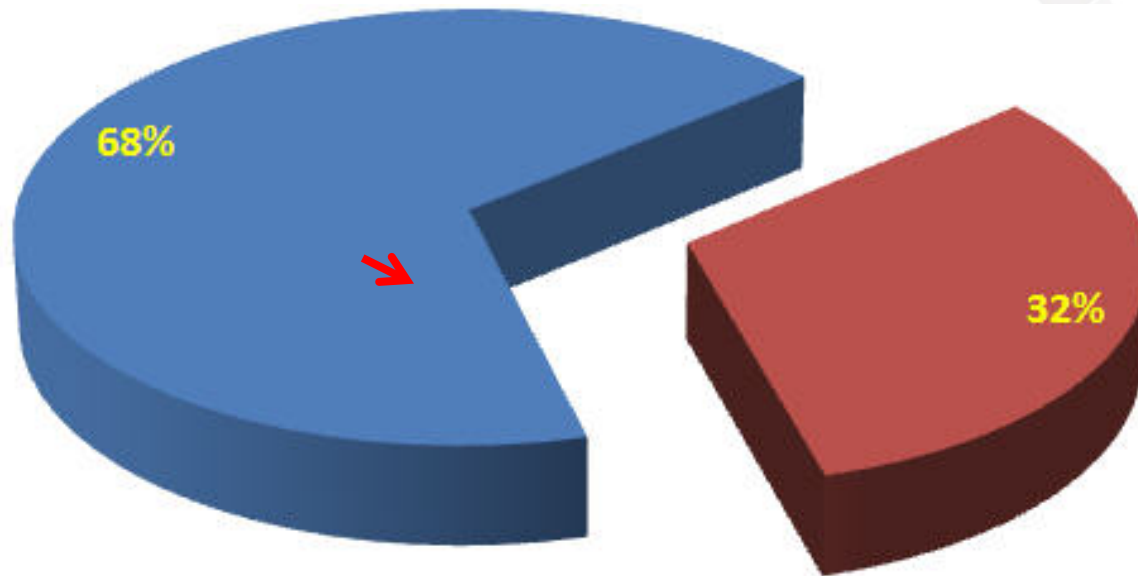
Non-residential buildings consume ~15.5 quadrillion BTU of primary energy - **16% of all energy used in U.S.**



- Energy used in commercial construction
- All other uses

Aggregate Building Loads

Fenestration consumes 32% of that primary energy :



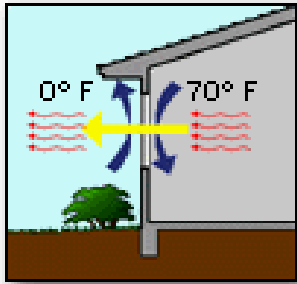
■ All Other Uses

■ Related to Fenestration

WHAT DOES NFRC RATE ?

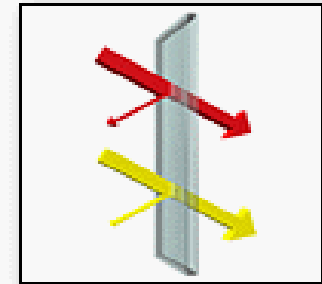
- Energy performance ratings:
 - Required Ratings
 - U Factor
 - Solar Heat Gain Coefficient
 - Visible Transmittance
 - Voluntary Ratings
 - Air Leakage
 - Condensation
-
-

NFRC Ratings



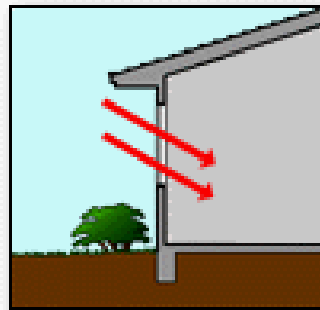
U-factor (thermal transmission)

NFRC 100



VT (Visible Transmittance)

NFRC 200



SHGC (Solar Heat Gain)
NFRC 200

Mandatory Ratings

A. Basics of NFRC Ratings; **in southern areas,**

- Heat loss rating (*U-factor*) **lower always better**
- Solar Heat Gain rating (*SHGC*) **lower always better**
- Visible Transmittance rating (*VT*) **higher generally better**

NFRC Energy Performance Ratings

The NFRC “Rating Process”



Simulation Laboratory

Testing Laboratory

Inspection Agency (IA)


NFRC Label or Label Certificate

Market Place



NFRC—Introduction & Overview

*Our
familiar
residential
temporary
label*

 National Fenestration Rating Council® CERTIFIED	World's Best Window Co. Millennium 2000+ Vinyl-Clad Wood Frame Double Glazing • Argon Fill • Low E Product Type: Vertical Slider
ENERGY PERFORMANCE RATINGS	
U-Factor (U.S./I-P) 0.30	Solar Heat Gain Coefficient 0.30
ADDITIONAL PERFORMANCE RATINGS	
Visible Transmittance 0.51	Air Leakage (U.S./I-P) 0.2
Condensation Resistance 51	—
<small>Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. www.nfrc.org</small>	



NFRC Ratings

Future Ratings

- Attachment products ratings
- Ventilation ratings
- Daylighting ratings

Skylights



Courtesy of Ghar-Expert

NFRC—References

NFRC *is* referenced by:

- The International Model Building Codes
- ASHRAE
- ***ENERGY STAR***®
- USGBC (LEED), etc.
- Florida Building Code-Chapter 13



Market Opportunity

Facts:

On average, **Only ~30%** of all nonresidential buildings (*somewhat higher % in residential*) use high performance windows;



Energy Codes and Fenestration

South Carolina Energy Code

- **International Residential Code-IRC 09 effective January 1, 2011**
 - Similar to the IECC 09
- **IECC 09 shown for comparison**

IRC 09-N1101.5

N1101.5 Fenestration product rating. *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and *labeled* and certified by the manufacturer. Products lacking such a *labeled U*-factor shall be assigned a default *U*-factor from Tables N1101.5(1) and N1101.5(2). The solar heat gain coefficient (SHGC) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and *labeled* and certified by the manufacturer. Products lacking such a *labeled* SHGC shall be assigned a default SHGC from Table N1101.5(3).

Code Compliance

No label,
Use defaults!

**TABLE N1101.5(3)
DEFAULT GLAZED FENESTRATION SHGC**

SINGLE GLAZED		DOUBLE GLAZED		GLAZED BLOCK
Clear	Tinted	Clear	Tinted	
0.8	0.7	0.7	0.6	0.6

**TABLE N1101.5(1)
DEFAULT GLAZED FENESTRATION U-FACTORS**

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKYLIGHT	
			Single	Double
Metal	1.2	0.8	2	1.3
Metal with thermal break	1.1	0.65	1.9	1.1
Nonmetal or metal clad	0.95	0.55	1.75	1.05
Glazed block	0.6			

SC Building Code-Residential and Commercial Requirement

- All Climate Zones:
 - U-Factor < 0.50
 - SHGC < 0.35

Use NFRC Label to Confirm Compliance

 <p>National Fenestration Rating Council® CERTIFIED</p>	<p>World's Best Window Co.</p> <p>Millennium 2000+ Vinyl-Clad Wood Frame Double Glazing • Argon Fill • Low E Product Type: Vertical Slider</p>		
<p>ENERGY PERFORMANCE RATINGS</p>			
<p>U-Factor (U.S./I-P)</p>	<p>Solar Heat Gain Coefficient</p>	<p>0.35</p>	<p>0.32</p>
<p>ADDITIONAL PERFORMANCE RATINGS</p>			
<p>Visible Transmittance</p>	<p>Air Leakage (U.S./I-P)</p>	<p>0.51</p>	<p>0.2</p>
<p>Condensation Resistance</p>	<p>—</p>	<p>51</p>	
<p>Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. www.nfrc.org</p>			

Use NFRC online database to confirm (www.nfrc.org)



Directory Search

Back

New Search

Exit Directory Search

Product Type

Window	Find ratings for window products.
Door	Find ratings for door products.
Skylight	Find ratings for skylight products.
Applied Film	Find ratings for film-attachment products.

Alternate Search Methods

CPD Number	Find a product by CPD Number.
Label Verification	Verify the ratings of an NFRC-certified product.

Helpful NFRC Links

Fenestration Facts	What is Fenestration?
FAQ	FAQ about Certification and Commercial/Site Built Programs.
Helpful Links	Helpful Links for Consumers and Technical Organizations.

Search Instructions

The NFRC Directory search offers two options for retrieving rating data:

1. **Product Type**
 - Select the type of product for which you wish to search.
2. **Alternate**
 - Select the method you wish to use for searching.

Notice to Consumers and Other Interested Stakeholders Regarding IG Certification

NFRC recently implemented a new requirement (NFRC 706) under its Product Certification Program requiring insulating glass units (IGUs) used in NFRC certified and labeled products to be certified as meeting certain performance requirements by an independent IG certification program ("IGC Program(s)") listed by NFRC. This requirement went into effect on July 1, 2010.

Some NFRC participants have requested extensions of time to comply with specific NFRC program requirements for reasons identified by those participants. Under strict guidance following NFRC policy, some requests have been granted allowing those program participants to extend the period of time to comply with the IG certification requirement under NFRC 706. Those extensions expire no later than July 1, 2011. Therefore, currently there are products listed in the NFRC Certified Products Directory that have been granted compliance extensions that have not yet received the independent IG certification mandated under NFRC 706.

If you have a question as to whether an NFRC certified and labeled product currently complies with this IG certification requirement, please contact the manufacturer of that product.

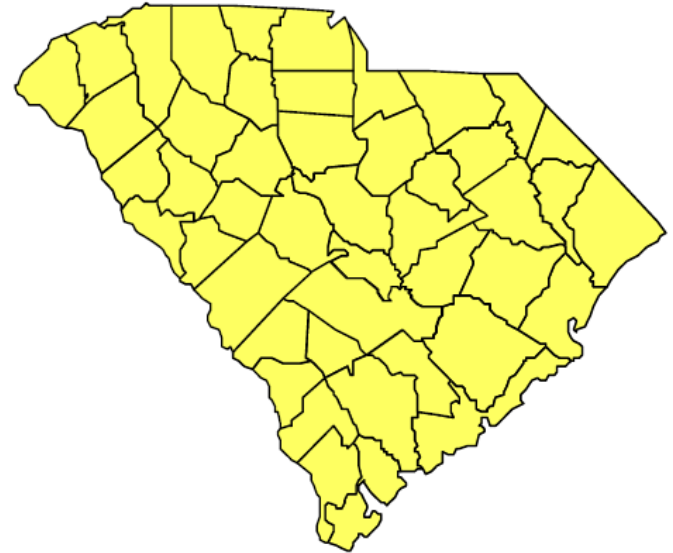
NFRC and Compliance

IECC 09 requirement

303.1.3 Fenestration product rating. *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled *U*-factor shall be assigned a default *U*-factor from Table 303.1.3(1) or 303.1.3(2). The solar heat gain coefficient (SHGC) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC shall be assigned a default SHGC from Table 303.1.3(3).

Residential Code Compliance

IECC 2009 Requirements



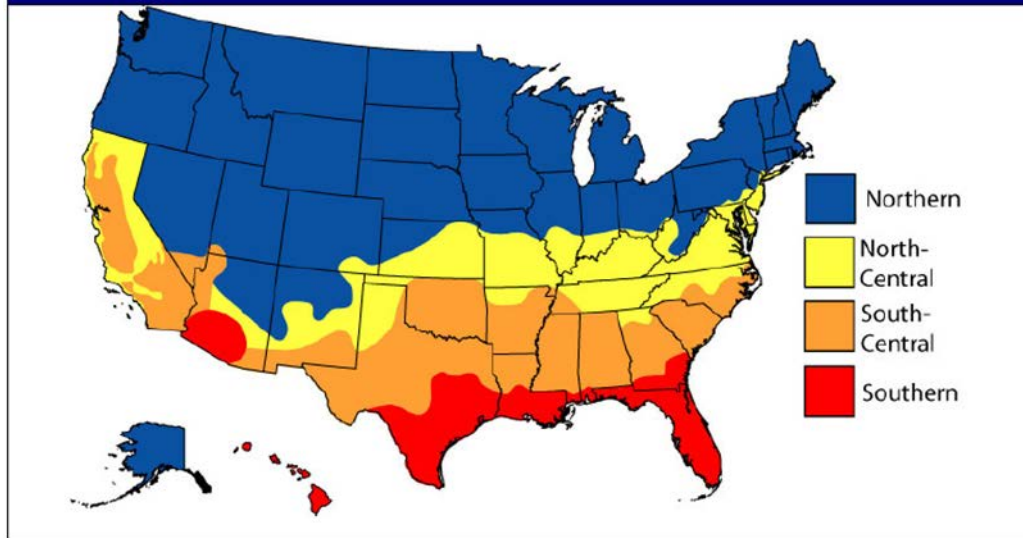
	Windows		
	Fenestration U-Factor	Skylight U-Factor	Glazed Fenestration SHGC
Zone 3	0.50	0.65	0.30

SHGC is lower



ENERGY STAR Criteria

Figure 1: Revised Draft ENERGY STAR Climate Zone Map



Climate Zone	U-factor	SHGC
Northern	≤ 0.30	NR
	$= 0.31$	≥ 0.35
	$= 0.32$	≥ 0.40
North-Central	< 0.32	< 0.40
South Central	≤ 0.35	≤ 0.30
Southern	≤ 0.60	≤ 0.27

2014 ENERGY STAR Criteria Being Developed

Preliminary Criteria Ranges



Windows		Air Leakage ≤ 0.3 cfm/ft ²		
Climate Zone	U-Factor Current	U-Factor Proposed	SHGC Current	SHGC Proposed
Northern	≤ 0.30	$\leq 0.25-0.27$	Any	Any
North-Central	≤ 0.32	$\leq 0.28-0.30$	≤ 0.40	$\leq 0.35-0.40$
South-Central	≤ 0.35	$\leq 0.30-0.32$	≤ 0.30	≤ 0.25
Southern	≤ 0.60	≤ 0.40	≤ 0.27	$\leq 0.20-0.25$

Doors		Air Leakage ≤ 0.3 cfm/ft ² for sliding doors <small>§EPA</small> Air Leakage ≤ 0.5 cfm/ft ² for swinging doors		
Glazing Level	U-Factor Current	U-Factor Proposed	SHGC Current	SHGC Proposed
Opaque	≤ 0.21	$\leq 0.15-0.19$	No Rating	No Rating
$\leq 1/2$ -Lite	≤ 0.27	$\leq 0.22-0.25$	≤ 0.30	≤ 0.25
$> 1/2$ -Lite	≤ 0.32	$\leq 0.27-0.30$	≤ 0.30	≤ 0.25

Skylights (including TDDs)		Air Leakage ≤ 0.3		
Climate Zone	U-Factor Current	U-Factor Proposed	SHGC Current	SHGC Proposed
Northern	≤ 0.55	$\leq 0.43-0.45$	Any	$\leq 0.25-0.35$
North-Central	≤ 0.55	$\leq 0.45-0.47$	≤ 0.40	$\leq 0.25-0.30$
South-Central	≤ 0.57	$\leq 0.48-0.50$	≤ 0.30	≤ 0.25
Southern	≤ 0.70	$\leq 0.55-0.60$	≤ 0.30	≤ 0.25

Commercial Rating-CMA Program and CMAST

B. Overview of the *Component Modeling Approach* ('CMA') Program

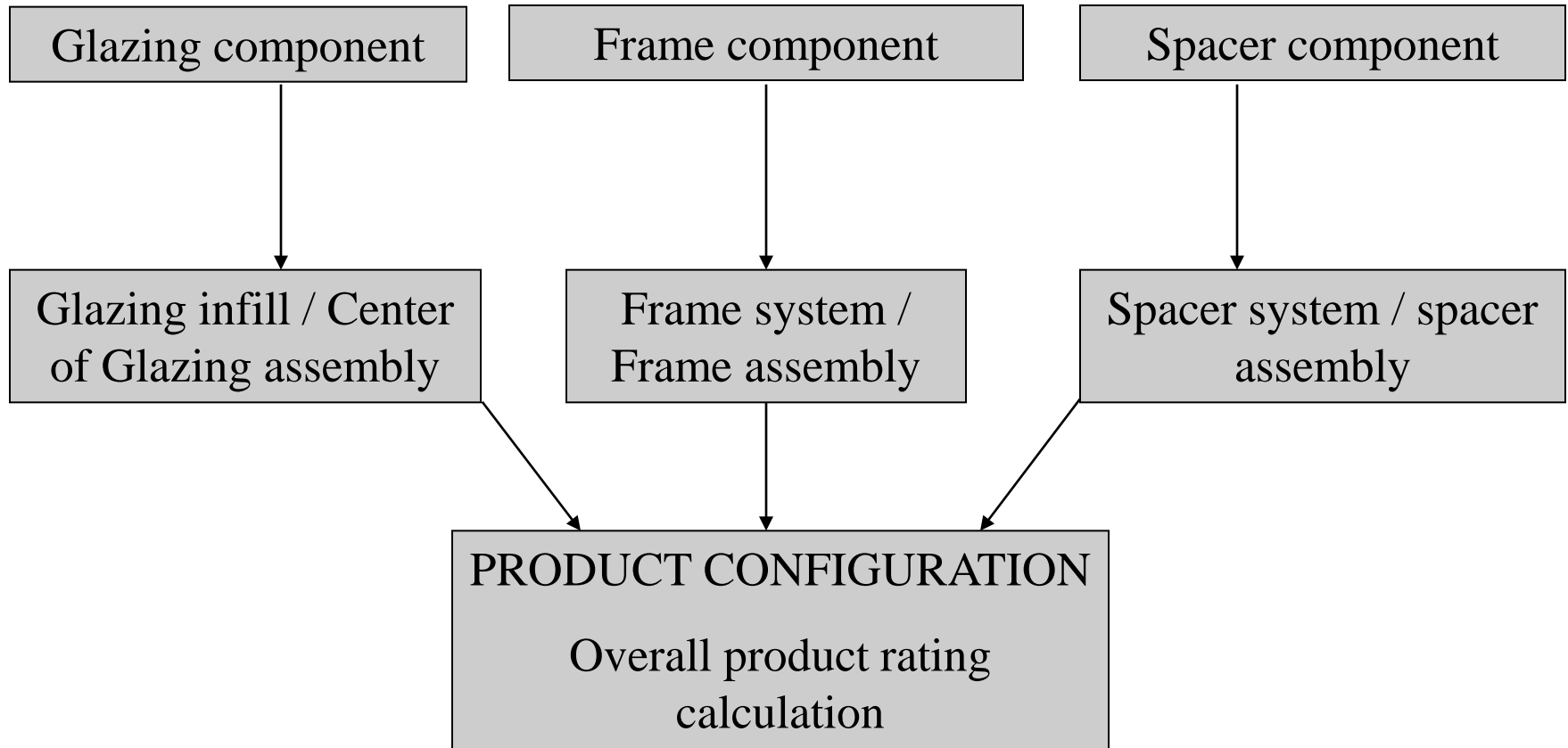


Overview, CMA Program, CMAST

The CMA process: **A New Approach** ~

New concept: “build” virtual products & projects using predefined and certified components from online CMA database to issue project-specific label certificates

Overview, CMA Program, CMAST



CMAST Screenshot

The screenshot displays the 'Product' window in CMAST software. The window is divided into several sections:

- Product Information:** Includes fields for Server ID, Client ID (9), Product Name (HED), Manufacturer (Frames Inc), Description, and Notes.
- Frame Assembly:** Shows 'FA-ACE-A' and 'Product Type: Glazed Wall/Sloped Glazing'.
- Dimensions:** Width: 78.74 in., Height: 78.74 in., Status: Design.
- Component Selection for Individual Product:**
 - Framing:** Frame Member: (empty)
 - Insulated Glazing Unit:** Center Of Glazing: Clr-6 Krypton85 LoE270-6, Spacer Edge Seal Assembly: TPS 12.7 mm, Dividers: (unchecked)
- Visibility:** Myself Only (selected), Additional Persons & Companies.
- Configuration:** A grid-based area showing a window configuration with a central vertical divider. An 'Edit Dims' checkbox is present.

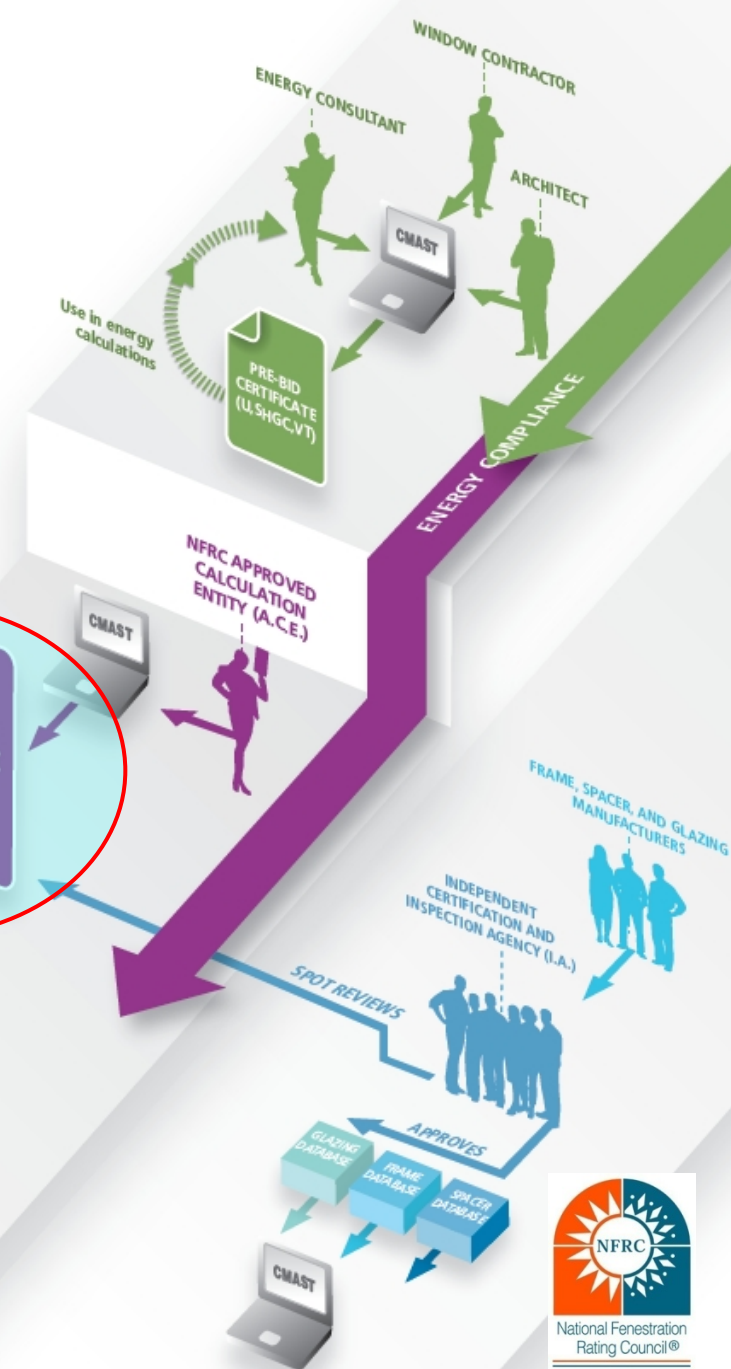
A red box highlights the 'NFRC Size' and 'Actual Size' fields, which both show 78.74 x 78.74 in. Below this, the U factor, SHGC, and VT values are displayed for both sizes.

Property	NFRC Size	Actual Size
Size	78.74 x 78.74 in.	78.74 x 78.74 in.
U factor	0.401	0.401 btu/h·ft ² ·F
SHGC	0.407	0.407
VT	0.608	0.608

At the bottom of the window, there are buttons for 'History', 'Calculate', 'EnergyPlus Report', 'OK', and 'Cancel'.

CMA Process

- FIELD INSPECTION PHASE
 - Finally, the CMA Label Certificate is posted on-site for field inspection



**HESCHONG
MAHONE
GROUP**



NFRC CMA Label Certificate *(cover page):*



NATIONAL FENESTRATION RATING COUNCIL LABEL CERTIFICATE PROJECT INFORMATION

LABEL CERTIFICATE ID: XYZ-001

Issuance Date: mm/dd/yyyy

This is to be completed by an NFRC Approved Calculation Entity (ACE), based on information provided by the Specifying Authority and calculated in accordance with NFRC procedures.

PROJECT LOCATION:

Address: _____
City: _____, State: _____, Zip code: _____
Contact person: _____, Title: _____
Phone: _____, Facsimile: _____, Email: _____
Project name (optional): _____, Designer (optional): _____

IDENTIFICATION OF SPECIFYING AUTHORITY:

Company name: _____, ID: _____
Address: _____
City: _____, State: _____, Zip code: _____
Contact person: _____, Title: _____
Phone: _____, Facsimile: _____, Email: _____

FRAMING SUPPLIER:

Company name: _____, ID: _____
Address: _____
City: _____, State: _____, Zip code: _____
Contact person: _____, Title: _____
Phone: _____, Facsimile: _____, Email: _____

GLAZING SUPPLIER:

Company name: _____, ID: _____
Address: _____
City: _____, State: _____, Zip code: _____
Contact person: _____, Title: _____
Phone: _____, Facsimile: _____, Email: _____

IDENTIFICATION NAME OF APPROVED CALCULATION ENTITY (ACE):

_____, ID: _____

IDENTIFICATION NAME OF INSPECTION AGENCY (IA):

_____, ID: _____

Number of individual products listed on this label certificate: **5**



NFRC CMA Label Certificate (page 2):



NATIONAL FENESTRATION RATING COUNCIL LABEL CERTIFICATE

PRODUCT LISTING

FOR CODE COMPLIANCE

LABEL CERTIFICATE ID: XYZ-001

Issuance Date: mm/dd/yyyy

NFRC CERTIFIED PRODUCT RATING INFORMATION:*

The NFRC Certified Product Rating Information listed here is to be used to verify that the ratings meet applicable energy code requirements.

PRODUCT LISTING:

CPD ID	Total Area ft ²	Name	Framing Ref	Glazing Ref	Spacer Ref	CERTIFIED Performance Rating at NFRC Standard Size		
						U-factor** Btu/ hr-ft ² -F	SHGC**	VT**
P-PL-010	88.89	PL-2200 / PL-2210	FA-PL2210	GA-TT-001	SA-AM-001	0.53	0.58	0.66
P-PL-005	182.67	PL-3400 / PL-3401	FA-PL3401	GA-TT-001	SA-AM-002	0.56	0.57	0.65
P-PL-012	382.22	PL-5700 / PL-5720	FA-PL5720	GA-TO-002	SA-AM-001	0.52	0.21	0.30
P-PL-002	60.00	PL-1100 / PL-1152	FA-PL1152	GA-TT-001	SA-AM-001	0.42	0.51	0.62
P-PL-022	525.00	PL-9900 / PL-9915	FA-PL9915	GA-TO-003	SA-AM-002	0.45	0.15	0.19

FRAME, GLAZING and SPACER ASSEMBLIES:

FRAMING LISTING:

FRAMING REF	SUPPLIER ID	DESCRIPTION
FA-PL2210		Single Casement Thermally Broken Aluminum
FA-PL3401		Projecting (Awning) Thermally Broken Aluminum
FA-PL5720		Vertical Slider PVC reinforced with Steel
FA-PL1152		Vertical Slider Thermally Broken Aluminum
FA-PL9915		Fixed Thermally Broken Aluminum

GLAZING LISTING:

GLAZING REF	SUPPLIER ID	DESCRIPTION
GA-TT-001		1" Double Glazed, 1/4" HC Low-e, 1/4" Clear, Argon (90%), 1/2" gap
GA-TT-002		1" Triple Glazed, 1/8" Clear, Coated film, 1/8" SC, Argon (90%), 3/8" gap
GA-TT-003		1" Double Glazed, 1/4" Bronze, 1/4" SC Low-e, Argon (90%), 1/2" gap

SPACER LISTING:

SPACER REF	SUPPLIER ID	DESCRIPTION
SA-AM-001		250P Mill Finish Aluminum Low profile (1/2")
SA-AM-002		15A Polymer Spacer (3/8")

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Page 2 of 3



Overview, CMA Program, CMAST

Fenestration Manufacturer to-date:

- Benson Industries, LLC
- EFCO, A Pella Company
- FM Graham
- Kawneer Company Inc.
- Peerless
- TRACO
- Wausau Window & Wall Systems


Access CMA on NFRC site

- <http://cmast.nfrc.org/>
- Register, download, begin to design!
- Free for six months
- Fees thereafter:

CMA Software Usage Fees ⁽¹⁾

	≤25 Users	>25 Users
Initial Software License Fee	\$500	\$500
Initial Additional License Fee (per user) ⁽²⁾	\$125	\$100
Annual Maintenance Software License Fee	\$250	\$250
Annual Maintenance Additional License Fee (per user) ⁽²⁾	\$25	\$15

CMAST ~ Using the Certified Products Directory (CPD)



Welcome to the NFRC Component Modeling Approach (CMA) Program for Non-Residential Energy Certification and Rating

Home Switch Units Find Help

1/11/11 2:29

Find Label Certificate Results

Certificate	Project	Specified By	Issue Date	Address
PJ-SVG-354	Bingham Entrepreneurship & Energy Research Center	Skyview Glass LLC	7/2/2010 4:28:13 PM	450 North 2200 West, Vernal, Utah 84078
PJ-EFC-462	City Creek Reserve Center	EFCO Corporation	12/16/2010 7:34:11 PM	50 East South Temple, Salt Lake City, UT 84101
PJ-EFC-465	Huntsman Cancer Hospital	EFCO Corporation	12/20/2010 5:18:43 PM	2000 Circle of Hope, Salt Lake City, UT 84112
PJ-EFC-427	OWATC Health Technology Building	EFCO Corporation	11/6/2010 2:05:41 AM	200 North Washington Boulevard, Ogden, UT 84404
PJ-EFC-304	USTAR Life Sciences Research Center	EFCO Corporation	3/15/2010 7:11:14 PM	650 East 1600 North, Logan, Utah 84341
PJ-EFC-339	Utah Museum of Natural History	EFCO Corporation	5/19/2010 10:04:59 PM	301 Wakara Way, Salt Lake City, Utah 84108

NEW SEARCH **DISPLAY**

CMAST ~ Using the Certified Products Directory (CPD)



Welcome to the NFRC Component Modeling Approach (CMA)

Easiest way to get a form to print out: click on this link

Project #PJ-SVG-354

<p>Project: Certificate PJ-SVG-354 Ken Nittler 530-885-9891 ken@westlab.net</p> <p>Specified by: Skyview Glass LLC</p> <p>Frame by: Kawneer Company Inc.</p> <p>Glazing by: Vitro</p>	<p>Inspection Agency: Keystone Certifications, Inc.</p> <p>Status: Certified 07-02-2010</p> <p>Approved Calculation Entity: Ken Nittler</p> <p>Access Label Certificate</p>
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PRODUCTS LISTING:

CPD ID	Name	Product Type	Framing Ref	Glazing Ref	Spacer Ref	At NFRC Size					
						U (open) [BTU / hr-ft ² -F]	SHGC (open)	VT (open)	U (closed) [BTU / hr-ft ² -F]	SHGC (closed)	VT (closed)
P-KAW-3271	Bingham Center - 451T Storefront	Glazed Wall/Sloped Glazing	FA-KAW-5290	GA-VTR-3102	SA-ALL-2325	0.416	0.256	0.582			
P-KAW-3274	Bingham Center - System 1 Curtain Wall	Glazed Wall/Sloped Glazing	FA-KAW-5294	GA-VTR-3102	SA-ALL-2325	0.452	0.260	0.590			



NATIONAL FENESTRATION RATING COUNCIL LABEL CERTIFICATE

PRODUCT LISTING

FOR CODE COMPLIANCE

LABEL CERTIFICATE ID: *PJ-SVG-354* **Issuance Date:** 7/2/2010

NFRC CERTIFIED PRODUCT RATING INFORMATION: *

The NFRC Certified Product Rating Information listed here is to be used to verify that the ratings meet applicable energy code requirements.

PRODUCT LISTING:

CPD ID	Total Area ft ²	Name	Framing Ref	Glazing Ref	Spacer Ref	CERTIFIED Performance Rating at NFRC Standard Size		
						U-factor** Btu/ hr-ft ² -°F	SHGC**	VT**
P-KAW-3271	3,070.69	Bingham Center - 451T Storefront	FA-KAW-5290	GA-VTR-3102	SA-ALL-2325	0.42	0.26	0.58
P-KAW-3274	6,689.72	Bingham Center - System 1 Curtain Wall	FA-KAW-5294	GA-VTR-3102	SA-ALL-2325	0.45	0.26	0.59

FRAME, GLAZING and SPACER ASSEMBLIES

FRAMING LISTING:

FRAMING REF	SUPPLIER ID	DESCRIPTION
FA-KAW-5294	KAW	1600 Curtain Wall, System 1
FA-KAW-5290	KAW	451T Storefront

GLAZING LISTING:

GLAZING REF	SUPPLIER ID	DESCRIPTION
GA-VTR-3102	VTR	1" Overall 0.25" SB70XL 0.5" Air 0.25" Clear

SPACER LISTING:

SPACER REF	SUPPLIER ID	DESCRIPTION
SA-ALL-2325	ALL	1/2" Aluminum Spacer

Note: For NFRC-approved frame, glazing and spacer component performance information see the NFRC Approved Component Library Database: www.nfrc.org/CMAS

**Certification information provided is for those fenestration systems listed and may not encompass all systems for the project.*

*** Each individual product certified performance rating is based on NFRC standard size in accordance with NFRC procedures.*

FOR CODE COMPLIANCE

SC Commercial Energy Code Requirement-IRC 09

TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC
3	0.50 ^c	0.65	0.35 ^{e, j}

j. For impact-resistant fenestration complying with Section R301.2.1.2 of the *International Residential Code*, the maximum SHGC shall be 0.40.

Commercial Code Compliance

Compare Project Ratings to SC Energy Code Requirements

PRODUCT LISTING:

ID	Name	U Btu/h-ft ² -F	SHGC	VT
P-POL-1234	2011 Polaris Curtain Wall	0.40	0.29	0.40
P-POL-1234	2011 Polaris Store Front	0.45	0.30	0.39
P-POL-1234	2011 Polaris Casement	0.44	0.30	0.38

U-factor < 0.50?

SHGC < 0.35?

**If yes, in
compliance
!!**

Energy Code Requirements from ASHRAE 90.1-2007/2010 referenced NFRC 100 and 200 only

5.8.2.4 U-factor. U-factors shall be determined in accordance with NFRC 100. U-factors for skylights shall be determined for a slope of 20 degrees above the horizontal.

5.8.2.5 Solar Heat Gain Coefficient. *SHGC* for the overall *fenestration area* shall be determined in accordance with NFRC 200.

NFRC & Code Compliance

No NFRC ratings, use defaults:

TABLE A8.2 Assembly U-Factors, Assembly SHGCs, and Assembly Visible Light Transmittances (VLTs) for Unlabeled Vertical Fenestration

Frame Type	Glazing Type	Unlabeled Vertical Fenestration					
		Clear Glass			Tinted Glass		
		U-Factor	SHGC	VLT	U-Factor	SHGC	VLT
All frame types							
	Single glazing	1.25	0.82	0.76	1.25	0.70	0.58
	Glass block	0.60	0.56	0.56	n.a.	n.a.	n.a.
Wood, vinyl, or fiberglass frames							
	Double glazing	0.60	0.59	0.64	0.60	0.42	0.39
	Triple glazing	0.45	0.52	0.57	0.45	0.34	0.21
Metal and other frame types							
	Double glazing	0.90	0.68	0.66	0.90	0.50	0.40
	Triple glazing	0.70	0.60	0.59	0.70	0.42	0.22

NFRC & Code Compliance

Energy Code Requirements for ASHRAE 90.1-07/10

TABLE 5.5-3 Building Envelope Requirements for Climate Zone 3 (A, B, C)*

Fenestration	Nonresidential		Residential	S
	Assembly Max. U	Assembly Max. SHGC		
<i>Vertical Glazing, 0%–40% of Wall</i>				
Nonmetal framing (all) ^c	U-0.65			
Metal framing (curtainwall/storefront) ^d	U-0.60	SHGC-0.25 all		
Metal framing (entrance door) ^d	U-0.90			
Metal framing (all other) ^d	U-0.65			
<i>Skylight with Curb, Glass, % of Roof</i>				
0%–2.0%	U _{all} -1.17	SHGC _{all} -0.39		
2.1%–5.0%	U _{all} -1.17	SHGC _{all} -0.19		
<i>Skylight with Curb, Plastic, % of Roof</i>				
0%–2.0%	U _{all} -1.30	SHGC _{all} -0.65		
2.1%–5.0%	U _{all} -1.30	SHGC _{all} -0.34		
<i>Skylight without Curb, All, % of Roof</i>				
0%–2.0%	U _{all} -0.69	SHGC _{all} -0.39		
2.1%–5.0%	U _{all} -0.69	SHGC _{all} -0.19		



Energy Codes in US

- Use Online Code Environment and Advocacy Network (OCEAN)
- <http://www.bcap-ocean.org/code-status>

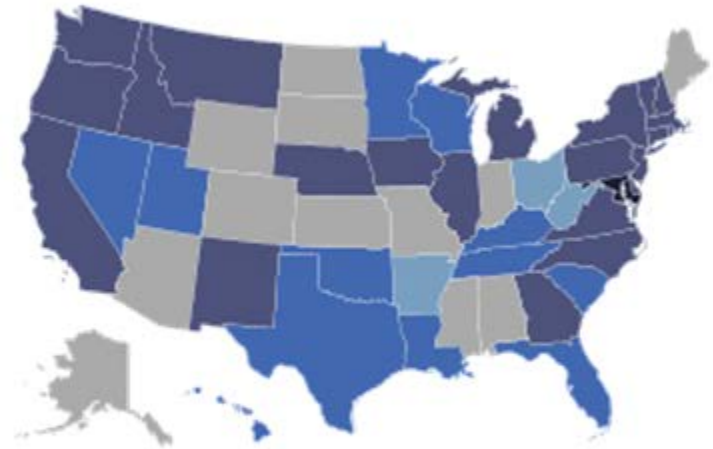
Click on State

Code Status



Commercial Adoption

States that have Adopted ASHRAE Standard 90.1



Residential Adoption

States that have Adopted the IECC

Summary & Conclusions

- **NFRC's *Residential Fenestration Rating & Certification Program* is:**
 - Well established, and in use for many years
 - Easy to understand
 - A great tool for proving code compliance; the temporary label makes for easy verification
 - Required for *ENERGY STAR*[®] rating of products

Additional Resources

- **NFRC Webpage:** www.nfrc.org
- **CMA Webpage:** http://nfrc.org/sb_aboutprogram.aspx
- **Labs and Agencies:** <http://nfrc.org/labsagencies.aspx>
- **CMAST Support** <http://support.nfrc.org>

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