



FLEETWOOD WINDOWS & DOORS

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www.FleetwoodUSA.com

Energy Code Compliance

IECC (International Energy Compliance Code)
DOE (Department of Energy)
ASHRAE (American Society of Heating, Refrigeration & Air Conditioning Engineers)
LBL (Lawrence Berkley Laboratories)
NFRC (National Fenestration Rating Council)
CMA (Component Modeling Approach)

Building Department Professional:

This packet is being provided to you in advance to assist in the approval process. While performance energy reports have been used for over a decade, some are frustrated when these reports are submitted in the late stages. Therefore, along with this packet a Fleetwood Dealer is providing specific information regarding the project (attached packet).

Fleetwood's sole business is making windows and doors for custom built, modern houses. In modern designs much of the envelope is glass and window framing, making energy compliance a challenge. In the early 2000's, Fleetwood began using approved NFRC software to help homeowners prove envelope compliance with the IECC. **Our goal herein is to illustrate the legitimacy of residential projects using the Simulated Performance Alternative method.**

Federal or State?

Most states are using the Federal government code (IECC) but some states, such as California, have adopted their own energy code e.g. Title 24 (www.energy.ca.gov/title24/2016standards/) which is possible as long as the state can prove their code is equal to or more stringent than the IECC. Most of the information within this document is geared toward IECC.

Building Envelope Compliance

The IECC allows for several methods in which to validate building envelope compliance. The most common methods are ASHRAE calculations, NFRC labeling or a **Simulated Performance Alternative** *"The 2009 IECC and ASHRAE Standard 90.1-2007, as well as the 2012 IECC and ASHRAE Standard 90.1-2010, contain a number of compliance paths. Choosing an Energy Code Compliance Path TOPIC BRIEF (Resource 2) presents these paths in more detail"* (energycodes.gov/resource-center/ace/compliance/step2)

Commercial Fenestration Compliance

Most commercial projects use the IECC **Simulated Performance Alternative** method with the help of NFRC approved software *THERM 7.4, WINDOW 7.4 or CMA/CMAS*. These rate fenestration energy compliance by inputting **actual sizes** of the windows and doors.

<https://windows.lbl.gov/tools/therm/software-download>

<https://windows.lbl.gov/tools/window/software-download>

Residential Fenestration Compliance

Many residential projects use the same software to achieve envelope compliance (Prescriptive) but unlike the commercial building in the same Climate Zone, **actual sizes** are not tested. Instead, results are derived from prescribed specimen sizes most common in tract housing projects. However, these specimen sizes ('Market Standardization') do NOT reflect the house window sizes. Therefore, to achieve the most accurate energy rating Fleetwood will provide the **Simulated Performance Alternative** report.

Compliance Software

The Simulated Performance Alternative is made possible with compliance software such as ResCheck, which is free software offered by the Federal government. However, this software is limited and is not the best product to use with custom home projects. Other products to consider are:

- RemRate
- RemDesign
- EnergyPro

Energy Consultants

Compliance software is most effectively utilized when operated by a trained energy professional. Below is a list of a few firms Fleetwood can recommend:

- **Title 24 Consultant:**
Chuck Visnic
Energy Impacts
2613 Coronado Drive
Fullerton, CA 92835
Phone: 714-871-8197
energyi@pacbell.net
- **Title 24 Consultant:**
Tom Rotchford, PE, LEED AP
Solargy, Inc.
22028 Ventura Blvd., Suite 207
Woodland Hills, CA 91364
Phone: 818-347-6096 Ext 110
info@solargy.com
- **Title 24 Consultant:**
David Knight
Monterey Energy Group
26465 Carmel Rancho Blvd. #8
Carmel, CA 93923
Phone: 831-250-0314 (Direct)
Phone: 831-372-8328 (Office)
info@meg4.com
- **Title 24 Consultant:**
Gilberto Carrillo
Title 24 Guys LLC
10964 Memory Park Avenue
Mission Hills, CA 91345
Phone: 818-850-3385 (Office)
Phone: 818-220-2540 (Mobile)
gilberto@title24guys.com
- **IECC Consultant:**
Stephen Mogowski
Desert Skies Code Compliance
1576 E. Windsor Drive, Unit E
Gilbert, AZ 85296
Phone: 480-489-2692
info@buildcompliant.com

Trade-off Measures

Compliance software allows professionals to trade-off lower performing components in one part of the envelope for higher performing components elsewhere. Some of the measures being used are:

- Tank-less water heater
- Air exchanges
- Whole building air leakage (HERS)
- Air handler fans
- Whole house fans
- HVAC ducting inside conditioned space
- QII (Quality Insulation Installation)
- Floor and wall heating
- Interior blinds
- Thicker walls/insulation
- Attic insulation below the roof deck
- Install a PV system (photovoltaic)
- Convert garage, attic and basement space into Conditioned Space to reduce the percentage of glass to Conditioned Floor Area

Verify that the respective building code allows the measure because some versions of the IECC have greater restrictions. California's Title 24, on the other hand, allows many mechanical trade-offs.

ASHRAE?

ASHRAE has been around since the late 1800's. Many builders use ASHRAE calculations to prove building compliance by means of the total UA Alternative. However, this method is cumbersome and not as accurate as it could be if ONLY the windows were concerned. Therefore NFRC's mandate by the DOE and respective state governments was to create a more reliable and **more stringent** methodology of compliance determination. As result, the programs developed by LBL (*THERM* & *WINDOW*) have commonly replaced ASHRAE calculations. The IECC accepts ASHRAE calculations if done by a qualified engineer on the actual window sizes. Similarly, the IECC allows manufacturers to provide test reports using the NFRC approved *THERM 7.4* and *WINDOW 7.4* software (But only using Prescriptive standard sizes).

NFRC?

Fleetwood has successfully tested, and therefore publishes, **thousands** of NFRC laboratory results based on the Prescriptive sizes. When the NFRC developed this testing protocol they did so with tract builders in mind. For example, it was assumed that 7' x 7' patio doors are common. In reality, modern architecture and custom built homes are designed with sliding door openings commonly at 20' x 10' and often times much larger. The NFRC Prescriptive values worked well until we started understanding the negative affects it was having on custom projects. Specifically, when only the NFRC Prescriptive or Prescriptive Weighted Average results are used, the house *is **not** being calculated accurately*.

Fleetwood therefore provides **Simulated Performance Alternative** reports using THE SAME SOFTWARE AND SAME METHODS the NFRC uses to create the Prescriptive energy reports. The only difference is the **actual window sizes** are entered and calculated.

Supervising Entity

Building codes that specify the NFRC as the "Supervising Entity" may interpret the code as requiring NFRC prescriptive labels under NFRC 100 and 200. In these cases, project professionals should work closely with the permitting building department to verify THEIR interpretation. Many building departments throughout the country recognize the Simulated Performance Alternative calculations as more than satisfactory.

Compromises

Architectural Compromises

If a **Simulated Performance Alternative** energy report is disallowed the architectural integrity of the house is certain to be compromised. Example: Sliding doors in warmer climate zones do not need thermally broken aluminum. If only the Prescriptive results are allowed the architect may be forced to switch to thermal break, which adds wider sight lines, restricts sizes and costs more money (see "The Energy Code Trap" on Fleetwood's website). Additionally, "upgrading" glass can destroy the home's elevation appearance with darker tints or more reflective glazing. In fact, some communities prohibit reflective glass.

Homeowner Compromises

If the house is forced to use the NFRC Prescriptive results rather than the more accurate results the owner is forced to spend more money on fenestration simply to satisfy ambiguity and inefficiency of the building code. For example, in some parts of the country the owner may be forced to spend tens of thousands of dollars on glass and product "upgrades" that are only needed to offset the tract home energy results simulated by the NFRC.

New Construction or Remodel?

Whether the house is being constructed from the ground up or is a remodel, energy reports are needed to demonstrate compliance. If the builder is using the Prescriptive method to achieve energy compliance for the house envelope, metal windows will be difficult to pass unless the method is changed to the Performance method wherein software can be used to calculate actual size energy results – Fleetwood can provide this.

Custom Report Certification & Labeling

Many building departments do not require all fenestration products to carry a label, let alone an NFRC label. However, Fleetwood will provide an NFRC label for all tested products. Additionally, along with the **Simulated Performance Alternative** report Fleetwood will provide custom labels if desired. Each will clearly state: U-Factor, SHGC, Air Infiltration and Condensation Resistance (CR). Each label will clearly indicate the values as Manufacturer Certified.

Conclusion

If a **Simulated Performance Alternative** report is disallowed the NFRC prescriptive results must be disallowed too as both were created from the same software. The only difference is **actual sizes** were used.

If the NFRC calculated these factors they would achieve THE EXACT results as in our custom actual size reports

ⁱ Fundamentals Handbook chapter 31, pg. 31.4, or 2001 Handbook chapter 30, pg. 30.4: "U-Factor (Overall Coefficient of Heat Transfer)"

ⁱⁱ The NFRC was designed as a means of helping communities build Energy Efficient homes. Below is a link to the NFRC website with helpful documents:

<http://nfrccommunity.site-ym.com/?page=Techdocs>

EXCERPT: The validity of the software is held in high regard by the NFRC. "For NFRC Certification of fenestration products, either WINDOW5/THERM5 or WINDOW6/THERM6 may be used for the simulation of those products. However, after July 1, 2011 only WINDOW6/THERM6 will be authorized for NFRC Certification"

Energy Report (Weighted Average)

The information below is a typical example of what Fleetwood provides with every quote. The Simulated Performance Alternative Energy Report is a more accurate energy report than ASHRAE or simply reporting Prescriptive. Results are computed with the same software NFRC uses to rate Prescriptive Energy Ratings, but using actual sizes of the windows and doors:



Job Name: Energy Example
 Customer: FLEETWOOD WINDOWS AND DOORS
 Quote: #398125

MANUFACTURER

ENERGY REPORT

Job Specific Summary

The U-Factor and SHGC values provided in this report comply with NFRC 100 and NFRC 200. A summary of these values has been presented as a Weighted Average to assist dealers in assessing the general impact if changes are made to the Window or Door order, e.g. glass type change.

Additionally, Fleetwood has provided a column of Simulated Performance Alternative energy values that may be a useful tool in illustrating how the size of a Door or Window will impact the true living conditions inside the home. By request, Fleetwood will provide Manufacturer Labels for such values. For more information about Simulated Performance Alternative visit Fleetwood's website, under the Designers / Energy section then select Energy Code Compliance.

Product Type / Category Information: (Metric/SI version available upon request.)

Category:	Series:	Item:	Glazing*:	VT:	NFRC		Simulated Performance Alternative		Glazing Area (ft ²)*Qty:	
					U-Factor / SHGC	U-Factor / SHGC	U-Factor / SHGC	U-Factor / SHGC		
DOOR	Series 3070-T	2-0	A	0.47	0.32	0.21	0.27	0.24	220.42 [230x138]*1	
DOOR	Series 3300-T	1-0	A	0.49	0.34	0.22	0.28	0.24	138.00 [144x138]*1	
DOOR	Series 3900-T	6-0	A	0.34	0.41	0.17	0.30	0.21	104.72 [110x130]*1	
DOOR Weighted Average									(ft ²): 463.14	
					NFRC: U-Factor: 0.346	SHGC: 0.204				
					Simulated Performance Alternative	0.28		0.233		

Category:	Series:	Item:	Glazing*:	VT:	NFRC		Simulated Performance Alternative		Glazing Area (ft ²)*Qty:	
					U-Factor / SHGC	U-Factor / SHGC	U-Factor / SHGC	U-Factor / SHGC		
FIXED	Series 3850-F	3-0	A	0.55	0.23	0.24	0.22	0.25	72.22 [80x130]*1	
Undefined Weighted Average									(ft ²): 72.22	
					NFRC: U-Factor: 0.23	SHGC: 0.24				
					Simulated Performance Alternative	0.22		0.25		

Category:	Series:	Item:	Glazing*:	VT:	NFRC		Simulated Performance Alternative		Glazing Area (ft ²)*Qty:	
					U-Factor / SHGC	U-Factor / SHGC	U-Factor / SHGC	U-Factor / SHGC		
FIXED	Series 250-T	5-0	B	0.53	0.29	0.23	0.27	0.24	72.22 [80x130]*1	
FIXED	Series 3800-T	4-0	B	0.55	0.27	0.24	0.28	0.25	72.22 [80x130]*1	
WINDOW Weighted Average									(ft ²): 144.44	
					NFRC: U-Factor: 0.28	SHGC: 0.235				
					Simulated Performance Alternative	0.28		0.245		

The "Performance method" for certification is recommended; wherein envelope components can be "traded off" to allow the desired windows and doors. (See Energy Code Compliance for a list of common trade-offs.)

Total Weighted Average				Total Glazing Area:
NFRC: U-Factor:	0.32	SHGC:	0.21	(ft ²): 679.8
Simulated Performance Alternative	0.27		0.24	

The overall product U-Factor combines the center-of-glass, product frame and edge-of-glass U-Factors in a frame model.
 Note: All U-factors and SHGC values are shown with non-tinted glass. Tint on glass will further reduce the SHGC values.

*Glazing Type:	Description:	COG:	U-Value	SHGC	
A	CLR5B366I89TG	1"	Clear Cardinal 366 6mm-T_0.5argon_Clear Cardinal i89 6mm-T	0.19	0.26
B	CLR6B366I89GT	1.25"	Clear Cardinal 366 6mm-T_0.75argon_Clear Cardinal i89 6mm-T	0.2	0.26


NFRC Prescriptive Sizes:		
Series	Configuration	Width x Height (in)
Westwood 250	Fixed	47 x 59
Norwood 3070-T	OX or XX	78 x 78
Glacier 3300-T	OX or XX	78 x 78
Kona 3800-T	Fixed	47 x 59
3850-F	Fixed	47 x 59
Atlantic 3900-T	OX or XX	37 x 82


References:
 U-Factor: The rated Winter U-Factor of the fenestration product, in Btu/hr-ft²-F.
 SHGC: Solar Heat Gain Coefficient.
 VT: Visible Transmittance.
 Area (ft²): The area of the surface in square feet.
 NFRC: National Fenestration Rating Council.
 IECC: International Energy Conservation Code.

Temporary Label

Below are examples of temporary labels available for Fenestration Values:

NFRC	Default	Fleetwood Simulated Performance Alternative
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 FLEETWOOD Windows and Doors Norwood 3070-T Product Type: DOOR-MS Aluminum w/Thermal Breaks Double Glazing - Argon Fill - Low E CPDs:	
ENERGY PERFORMANCE RATINGS <i>U-Factor (U.S./I-P)</i> <i>Solar Heat Gain Coefficient</i> 0.32 0.21	
ADDITIONAL PERFORMANCE RATINGS <i>Visible Transmittance</i> <i>Air Leakage (U.S./I-P)</i> 0.47 ≤ 0.3	
<i>Condensation Resistance</i> 44 —	
<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>	

Manufacturer's Fenestration Default Values  FLEETWOOD Windows & Doors Norwood 3070-T Product Type: DOOR-MS Aluminum w/Thermal Breaks 1": Clear Cardinal 366 6mm-1, 0.5argon, Clear Cardinal 499 6mm-1	
ENERGY PERFORMANCE VALUES <i>U-Factor (U.S./I-P)</i> <i>Solar Heat Gain Coefficient</i> 0.59 0.63	
<small>Manufacturer stipulates that the values stated above are in accordance with the 2010 California Energy Code, listed in the Default Fenestration Product Values tables 116-A/B for the Frame type, Product type, and Glazing; according to the stated Manufacturer Series/Product/Glazing. This information may be useful in determining compliance of energy codes with the IECC and Title 24.</small>	

 MANUFACTURER LABEL	
PRODUCT: Norwood 3070-T TYPE: DOOR-MS 230" x 138" (584mm x 350mm) Aluminum w/Thermal Breaks Double Glazing - Argon Fill - Low E	
ENERGY PERFORMANCE RATINGS (Simulated Performance Alternative) <i>U-Factor</i> <i>Solar Heat Gain Coefficient</i> 0.27 1.53 0.24 <i>(U.S./I-P)</i> <i>(Metric/SI)</i>	
ADDITIONAL PERFORMANCE RATINGS <i>Visible Transmittance</i> <i>Air Leakage</i> 0.47 ≤ 0.3 1.5 <i>(U.S./I-P)</i> <i>(U.S./I-P)</i> <i>(Metric/SI)</i>	
<i>Condensation Resistance</i> 44 —	
<small>Manufacturer declares that these ratings are based on the actual size and were calculated using the Window 6 & Therm 6 computer software, the same software used by other 3rd party Certification entities. All values listed above are true, correct and complete.</small>	