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Sent: Friday, July 17, 2015 12:52 PM
To: 'info@app-techinc.com'
Subject: Changes to the Residential Compliance Manual

California Energy Commission

DOCKETED

15-MISC-01

TN # 76058

JUL 17 2015

Dear Mr. Splitt,

I wanted to reach out to you and review the changes we made to the Residential Compliance Manual in response to your Emergency Rulemaking petition.

We were able to edit several sections in the Manual in response to your recommendations. Attached are page excerpts containing the changes (highlighted) that address items in your petition, numbered according to each item. The edits include the following:

- Item 3: §150.0(q)

Section 3.3.1 - Clarified the reason for mandating minimum requirements for the building envelope. Even though the mandatory requirements do not necessarily increase energy efficiency, it provides a baseline to support the long-term goal of zero net energy.

Section 3.5.3.4 - Clarified that the minimum U-factor for fenestration is based on worst case scenario and using area-weighted averaging allows more flexibility in the placement of fenestration products throughout the building.

- Item 4: §150.1(c)3A, Exception 4
 1. **Section 3.5.3.2A and Section 3.5.5D** - Revised the language to show that there is a compliance path for non-rated site-built windows, even though they are rare. There can be a combination of different fenestration products used and this exception only applies to non-rated site-built products.
 2. **Section 3.5.3.2** – Added an example of a single-pane, operable, metal-framed fenestration product having a U-factor of 1.28 from Table 110.6-A. These are the worst case scenarios that can be assumed when the product is not rated by NFRC. However, the area weighted average U-factor must not exceed 0.58.
- Item 6: §141.0(b)1

Reference to Section 3.3.1 (item3.pdf) – The minimum requirements support the long term goal of zero net energy in existing buildings and does not allow a building envelope component to be traded off against other building components.

- Item 7: §141.0(b)2Biii

Example 9-13 – Added this example to show why this section is not relevant to this situation and what section of the Standards would apply.

Please let me know if there's any additional information my team can provide.

Regards,
Payam

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when revisions are made to the Energy Standards, and information regarding their use and eligibility and/or installation criteria are incorporated in compliance and reference manuals.

When the Energy Commission approves a new compliance option it is listed in the Special Cases section of the Energy Commission's website based on the adoption year of the Energy Standards:

http://www.energy.ca.gov/title24/2008standards/special_case_appliance/

3.3.1 Mandatory Features and Devices

§150.0

Mandatory requirements are necessary to support the long-term goal of zero net energy buildings. When compliance is being demonstrated with either the prescriptive or performance compliance paths, there are *mandatory measures* that must be installed. Minimum mandatory measures must be met regardless of the method of compliance being used. For example, a building may comply using performance computer modeling software with ~~only~~ a U-factor of U-0.44-065 insulation in a wood-framed attic roof, but a U-factor of at least U-0.0434 must be installed, ~~because that is the mandatory minimum.~~

The third method, applicable if the skylight has been tested and certified pursuant to NFRC procedures, requires a label that states, "Manufacturer stipulates that this rating was determined in accordance with applicable NFRC procedures."

Example 3-13

Question

How would the U-factor and the SHGC be determined if the tubular daylighting device in the example above has a dual pane diffuser (instead of single pane) mounted at the ceiling?

Answer

The procedure would be exactly the same as the example above, except that the double pane U-factor and SHGC values from ~~Standards TABLEs~~ 110.6-A and ~~TABLE~~ 110.6-B of the Energy Standards would be used instead of single pane values. Note that up to 3 ft² of tubular daylighting device is assumed to have the U-factor and SHGC required by Package A for prescriptive performance compliance (Exception 1 to §150.1(c)3A).

— Fenestration U-factor

3.5.3.4

Applicable Section: §150.0(q)

For fenestration products, ~~With the 2013-2016 update, the mandatory maximum U-factor is set by §150.0(q) states that the mandatory maximum U-factor is 0.58. This is based on the worst case scenario for a double-pane, vinyl framed fenestration product including skylights. for fenestration including skylights to be at maximum U-factor of 0.58. While there is an allowance for are~~Area-weighted averaging, can be used to allow flexibility for the placement of a fenestration product with a U-factor greater than 0.58. ~~this will limit the use of single-pane products. Up to 10 ft² or 0.5% of conditioned floor area (whichever is greater) is exempt from the maximum U-factor requirement.~~

metal-framed fenestration product has a U-factor of 1.28. To get credit for high performance window features such as low-e (low-emissivity) coatings and thermal break frames, the window manufacturer must have the window tested, labeled, and certified according to NFRC procedures.

- A. **Site-built Fenestration Products.** For special cases in low-rise residential construction in which site-built products are installed, the site-built products shall be treated the same as manufactured products: proof of U-factor and SHGC values must come from NFRC ratings or from Standards the default TABLE-Table 110.6-A and TABLE-Table 110.6-B of the Energy Standards, or alternatively use of Reference Nonresidential Appendix NA-6 if the area of the site-built is less than 250 ft².

Note: When only-unrated site-built fenestration is used in a residential application, there is an alternative procedure to calculate the default U-factor and SHGC values. Though-When using area-weighted averaging, this-the alternative may not result in meeting the prescriptive values as required by §Table 150.1-A. The alternative calculation can be found in-the Reference Nonresidential Appendices NA6, or it may require the-be necessary to use of the performance approach to meet energy compliance.

- B. **Field-fabricated Products §110.6(b).** Field-fabricated fenestration must always use the Energy Commission default U-factors from Standards TABLE-Table 110.6-A and SHGC values from TABLE-Table 110.6-B of the Energy Standards. There is no minimum requirement for VT, but-only-as it is used for informational purposes.

~~For a~~Acceptable methods of determining U-factor and SHGC are shown in Table 3-1A and Table 3-1B respectively.

Table 3-1A – Acceptable Methods for Determining U-factor

Fenestration Category					
<u>U-factor Determination Method</u>	<u>Manufactured Windows</u>	<u>Manufactured Skylights</u>	<u>Site-Built Fenestration (Vertical & Skylight)</u>	<u>Field- Fabricated Fenestration</u>	<u>Glass Block</u>
NFRC's Component					

3.5.5 Fenestration Prescriptive Exceptions

Applicable Section: §150.1(c)3A through §150.1(c)3C

A. **Doors and Tubular Daylighting Device**

In each dwelling unit, up to 3 ft² of the glazing area installed in doors and up to 3 ft² of tubular daylighting devices area with dual-pane diffusers at the ceiling are exempt from the prescriptive U-factor and SHGC requirements, where area is included in the maximum of 20% ~~percent~~ fenestration area. However, the U-factor shall not exceed a maximum is 0.58. See §150.0(q) and Exception 1 of §150.1(c)3A.

~~A.~~

B. **Skylights**

Each new dwelling unit may have up to 16 ft² of skylight area; the area is included in the maximum of 20% ~~percent~~ fenestration area and meets a maximum 0.55 U-factor and a maximum SHGC of 0.30. See Exception 2 of §150.1(c)3A.

Aside from the specific exceptions to the Fenestration Prescriptive requirements, U-factors and SHGCs for skylights can be significantly higher than they are for windows so long as their area weight-averaged U-factor and SHGC do not exceed the 0.55 U-factor and is not greater than the 0.30 SHGC when large amounts of individual skylights are used for prescriptive compliance. Alternatively, the performance approach should be used for meeting energy compliance.

C. **Dynamic Glazing**

If a dwelling unit includes a type of dynamic glazing that is electric-chromatic, chromogenic type or integrated shading device, and the glazing is automatically controlled, use the lowest U-factor and lowest SHGC to determine compliance with prescriptive Package A fenestration requirements. Since this type of product has compliance ratings which ~~that~~ varies, it cannot be weight averaged with ~~other~~ non-chromogenic products as per Exception 3 of §150.1(c)3A.

~~C.~~

D. **Site-Built Fenestration**

When residential dwelling unit contains combination of manufactured and site-built fenestration; only the site-built fenestration values can be determined by using Nonresidential Reference Appendix NA6; however, all fenestration and including site-built can default to TABLES-Tables 110.6-A or B.

~~D.~~

E. **Window Maximum Area**

The prescriptive requirements limit total glass area to a maximum of 20% ~~percent~~ of the

Requiring that U-factor and SHGC be calculated using a standardized procedure ensures that the thermal performance or efficiency data for fenestration products is accurate, and that the data provided by different manufacturers within each fenestration type (windows, doors, skylights, TDDs) can be easily compared to others within that type and can be independently verified.

For manufactured fenestration products, the mandatory requirements are that the U-factor and Solar Heat Gain Coefficient (SHGC) be rated by NFRC and be listed in NFRC's Certified Product Directory (CPD). The test procedure for U-factor is NFRC 100, and for SHGC is NFRC 200 and ~~NFRC-200~~, NRC-202 or ASTM E972 for translucent panels, and NFRC-203 for tubular daylighting devices skylights (TDDs), and for certain type of other skylights.

At the time of field inspection, the field inspector verifies the fenestration U-factor and SHGC values meets the energy compliance values by checking the NFRC label sticker on the window.

Alternatively, when manufacturers do not rate the thermal efficiencies by NFRC procedures, the Energy Commission default values must be used and documented on a temporary default label. See Figure 3-2, Sample Default Label ~~Figure 3-2~~.

Note: If no labels are available on site for verification, the field inspector should not allow ~~ease~~ any further installation of fenestration until proof of efficiency (label) is produced on site or filed in the field office. In cases when proof is not met, then the field inspector can ~~cease~~ should not allow construction until the architect/ specifier/ designer or builder can produce such labels.

The Energy Commissions default U-factors are listed in ~~TABLE~~ Table 110.6-A of the Energy Standards, and the default SHGC values are listed in ~~TABLE~~ Table 110.6-B of the Energy Standards (also in Appendix B of this compliance manual).

Note: While there is no minimum VT value requirement for residential compliance, the value may be shown on the temporary label for information only. A listing of NFRC certified ratings is available at <http://www.nfrc.org>~~http://www.nfrc.org/~~.

Energy Commission (CEC) default values in ~~TABLE~~ Table 110.6-A and TABLE Table 110.6-B in the Energy Standards lists the worst possible performing values that can be assumed when fenestration is not rated by NFRC. For example, a single-pane, operable,

metal-framed fenestration product has a U-factor of 1.28. To get credit for high performance window features such as low-e (low-emissivity) coatings and thermal break frames, the window manufacturer must have the window tested, labeled, and certified according to NFRC procedures.

- A. **Site-built Fenestration Products.** For special cases in low-rise residential construction in which site-built products are installed, the site-built products shall be treated the same as manufactured products: proof of U-factor and SHGC values must come from NFRC ratings or from Standards the default TABLE-Table 110.6-A and TABLE-Table 110.6-B of the Energy Standards, or alternatively use of Reference Nonresidential Appendix NA-6 if the area of the site-built is less than 250 ft².

Note: When ~~only~~ unrated site-built fenestration is used in a residential application, there is an alternative procedure to calculate the default U-factor and SHGC values. ~~Though~~ When using area-weighted averaging, this the alternative may not result in meeting the prescriptive values as required by §Table 150.1-A. The alternative calculation can be found in ~~the Reference Nonresidential Appendices NA6~~, or it may require the necessary to use of the performance approach to meet energy compliance.

- B. **Field-fabricated Products §110.6(b).** Field-fabricated fenestration must always use the Energy Commission default U-factors from Standards TABLE-Table 110.6-A and SHGC values from TABLEable 110.6-B of the Energy Standards. There is no minimum requirement for VT, ~~but only~~ as it is used for informational purposes.

~~For a~~ Acceptable methods of determining U-factor and SHGC are shown in Table 3-1A and Table 3-1B respectively.

Table 3-1A – Acceptable Methods for Determining U-factor

Fenestration Category					
			Site-Built		

0.54 - 0.50	6	0.34 – 0.30	20
0.49 – 0.45	8	0.29 – 0.25	24

C. ROOF SHEATHING

In eClimate zZones 2 through 15: if roof sheathing over an attic space with a continuous radiant barrier is being replaced, a continuous radiant barrier must be re-installed.

In Climate Zones 4, 8-16: if the entire roof sheathing over a ventilated attic space is being replaced, roof and ceiling insulation must be installed to meet the following prescriptive requirements (as specified in §150.1(c)1A):

Option A: R-8 or R-6 above roof deck insulation (see detailed explanation on required R-value in Compliance Manual Section 3) AND R-38 ceiling insulation

Option B: R-18 or R-13 below roof deck insulation (see detailed explanation on required R-value in Compliance Manual Section 3) AND R-38 ceiling insulation

Option C: Verified ducts in conditioned space AND R-30 or R-38 ceiling insulation

Example 9-13

Question

There is a Victorian building that has been converted to an office building and needs to have a shake roof replacement. This building has a vented unconditioned attic with the insulation on the ceiling. Would I need to meet §150.2(b)Hi?

Answer

No, this section does not apply. The occupancy type has been changed to nonresidential. Since the Victorian building has a shake roof and is considered a steep sloped roof, §141.0(b)2Bib for nonresidential buildings would apply.