Nonresidential Appendix NA6

Appendix NA6 – Alternate Default Fenestration Procedure to Calculate Thermal Performance

NA6.1 Scope

This appendix provides an alternate default ~~a~~ procedure for non-~~-~~rated NFRC ~~certified~~ fenestration products which only has Center of Glass (COG) values for both Nonresidential and ~~determining fenestration thermal performance for~~ Residential ~~skylights and~~ site–built ~~vertical~~ fenestration. For Nonresidential up to ~~less than~~ 1,0~~,~~00~~0~~ ft² in area ~~,~~ shall meet~~as excepted from~~ Sections §110.6(a)2, ~~and~~ §110.6(a)3 and §110.6(a)4. The calculated values are typically ~~lower~~ worse than those listed in Tables 140.3-A, 140.3-B, 140.3-C. For Residential up to 250 ft² in area or 0.5% time CFA whichever is greater shall meet Sections §110.6(a)2 and §110.6(a)3. The calculated values are also typically worse than those listed in ~~and~~ Table 150.1-C.

~~For fenestration 10,000 ft² or greater, t~~The Energy Commission's FC-1 Label Certificate Form shall be use to document the Alternate Default Fenestration calculated values. The FC-1 form will be ~~and be filled~~ completed using the ~~values~~ calculated values~~set forth in Table 116-A and Table 116-B of the Standards.~~

~~***NA6.2***~~ as determined in Equation NA6-1, NA6-2 and NA6-3~~Default U-factor~~

The default U-factor shall be determined using the following equation.

Equation NA6-1

$$U_T = C_1 + (C_2 \times U_c)$$

Where:

U_T = The fenestration product U-factor

C_1 = Coefficient selected from Table NA6-1

C_2 = Coefficient selected from Table NA6-1

U_C = Center of glass U-factor

Table NA6-1 – U-factor Coefficients

Product Type	Frame Type	C_1	C_2
Site-Built Vertical Fenestration	Metal	0.311	0.872
	Metal Thermal Break	0.202	0.867
	Non-Metal	0.202	0.867
Skylights with a Curb	Metal	0.711	1.065
	Metal Thermal Break	0.437	1.229
	Non-Metal	0.437	1.229
Skylights with no Curb	Metal	0.195	0.882
	Metal Thermal Break	0.310	0.878
	Non-Metal	0.310	0.878

~~*NA6.3*~~*NA6.2 Default Solar Heat Gain Coefficient, SHGC*

The SHGC of the fenestration product shall be calculated using the following equation:

Equation NA6-2

$$SHGC_T = 0.08 + (0.86 \times SHGC_c)$$

Where:

$SHGC_T$ ——— = SHGC for the fenestration including glass and frame

$SHGC_C$ ——— = SHGC for the center of glass alone

NA6.3 Default Visual Transmittance, VT

Equation NA6-3

$$VT_T = 0.85 \times VT_C$$

Where:

VT_T = The Visual Transmittance of the glazing including glass and frame

0.85 = Approximate metal framing in commercial application

VT_C = The Visual Transmittance of the center of glass alone

NA6.4 Responsibilities for Compliance

This section describes the responsibilities of energy consultants, designers, architects, builders, installers, and enforcement agencies when using the procedures of this appendix.

NA6.4.1 Energy Consultants, Designers, Architects

The person with responsibility for preparing the compliance documentation shall establish the inputs from the following:

- The center of glass U-factor, SHGC and VT shall be taken from manufacturers' literature and determined using methods consistent with NFRC 100, NFRC 200 and NFRC 202 procedures.
- The frame type (Metal, Metal Thermal Break, Non-metal) shall be verified from manufacturers' literature and through observations of frame sections provided by the manufacturer.

For the Pprescriptive Overall Ccompliance Mmethod, the ~~U_T and , $SHGC_T$, U_C, $SHGC_C$ and VTc determined through this procedure~~calculated values shall be entered on the prescriptive ENV-1-C form~~, Part 2 of 2~~. In addition the FC-12 Label Certificate must be also filled and located at the project site's location in according to Reference Nonresidential Appendix NA7.

For the ~~performance~~ Performance Ccompliance Approach~~method~~, the calculated values shall be entered ~~the U_T and $SHGC_T$, U_C and $SHGC_C$ determined through this procedure shall~~and ~~be~~ documented on the Performance PERF-1 and Performance ENV-1-C forms. In addition the FC-12 Label Certificate must be filled and located at the project site's location in according to Reference Nonresidential Appendix NA7.

For both the prescriptive and performance compliance method, the building plans shall contain a window schedule that lists the calculated ~~U_T and $SHGC_T$~~values in which matches the FC-1 Form or improved thermal

performance values than listed on the FC-1 Form.~~determined through this procedure above and~~ T~~t~~he specifications of the windows shall be consistent with the values used in this procedure, e.g. frame type glazing product, etc.

Permit applications must include fenestration U-factor ~~and,~~ SHGC and VT values documentation for the building plan checker. This documentation must include a copy of the manufacturer's documentation showing the Glazing Type information (center of glass U-factor, center of glass SHGC, center of glass VT, number of panes~~, and,~~ coatings~~)~~ and the frame type (frame material type, presence of thermal breaks, and identification of structural glazing (glazing with no frame)) that is used to determine U_T ~~and,~~ $SHGC_T$, and VT_T~~.~~. If the proposed design uses multiple fenestration products, manufacturer's documentation for each fenestration product shall be attached to the plans. Manufacturer's documentation must be provided for each unique combination of glazing and frame used for compliance. A copy of the manufacturer's documentation shall be located at the project's location.

If mixed fenestration is included in the compliance analysis, then the compliance submittal must clearly be identified which are certified fenestration products, and which are non-certified fenestration products (site-built less than 1~~0~~,000 ft² or skylights). The manufacturer's documentation and calculations for each product must be included in the submittal, and either the ENV-1-C or PERF-1 form must be included on the building plans. All non-certified fenestration products and is less than 1~~0,000~~,000 ft² or skylights for commercial and requires a filled FC-1~~2~~ or for Residential up to 250 ft² in area or 0.5% time CFA whichever is greater.~~.~~

NA6.4.2 Builder and Installer Responsibilities

The builder must ensure that the fenestration (glass and frame) documentation showing the U factor, ~~and~~ SHGC, and VT used for determining compliance is provided to the installer. The builder is responsible for ensuring that the persons preparing compliance documentation are specifying products the builder intends to install. The builder is responsible for ensuring that the installer installs glass with thermal performance equal to or better than the thermal performance used for energy compliance and that the frame type installed is the same as that used for compliance. The builder also must ensure that the field inspector for the enforcement agency is provided with manufacturer's documentation attached to each~~, an~~ Energy Commission's FC-1~~2~~ Label Certificate showing the thermal performance and method of determining thermal performance for the actual fenestration products installed. The builder should verify that these fenestration products are clearly shown on the building plans before fenestration products are purchased and installed. A copy of the manufacturer's documentation and FC-1~~2~~ shall be located at the project location.

NA6.4.3 Enforcement Agency Responsibilities

NA6.4.3.1 Plan Checker

The enforcement agency plan checker or reviewer is responsible for ensuring that the plans identify all site-built fenestration and skylights occasionally residential site-built fenestration will be used and also identified on the FC-1 Form. The plan checker shall ensure that site-built fenestration and skylights using the alternate default procedure shall meet the following:

1. U-factors, ~~and~~ SHGC and VT (for Commercial use only) values are clearly shown on the window schedules on the plans, and
2. T~~t~~he Glazing Type and Frame Type and which are the basis of this procedure are properly documented, and
3. M~~m~~anufacturer documentation of the Glazing Type and Frame Type has been provided for the each of the fenestration products using the procedure of this appendix, and
4. T~~t~~he building has less than 1~~0~~,000 ft² of vertical site-built fenestration or skylight for commercial or for Residential up to 250 ft² in area or 0.5% time CFA whichever is greater ~~,~~ and
5. A~~a~~ completely filled out FC-1~~2~~ Label Certificate for each non-certified fenestration product and~~.~~
6. Building plans should be consistent with the energy compliance documentation.

NA6.4.3.2 Enforcement Agency Inspector

The enforcement agency field inspector is responsible for ensuring that the building using the procedure in this appendix has less than 1~~0~~,000 ft² of site-built fenestration for commercial or for Residential up to 250 ft² in area or 0.5% time CFA whichever is greater.

The enforcement agency field inspector is responsible for ensuring that manufacturer's documentation has been provided for the installed fenestration at the project location. The field inspector is responsible for ensuring that the U-factor~~, and~~ SHGC and VT for the installed fenestration is consistent with the plans.~~,~~ T~~t~~he Prescriptive ENV-1-C ~~Part 2 of 2~~ or the Performance PERF-1~~,~~ and Performance ENV-1 and the Commission's FC-~~2~~1 Label Certificate for each fenestration product shall be~~, and~~ consistent with the~~that manufacturer~~manufacturer's documentation and with~~are consistent with~~ the fenestration product~~s~~ installed in the building.