National Fenestration Rating Council

National Fenestration Rating Council, Incorporated

NFRC Technical Interpretations

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National Fenestration Rating Council

The NFRC Technical Committee issues Technical Interpretations to *NFRC 100[sm]: Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to U-values), NFRC 200: Procedure for Determining Solar Heat Gain Coefficients at Normal Incidence, NFRC 300: Procedure for Determining Solar Optical Properties for Simple Fenestration Products, NFRC 400: Procedure for Determining Fenestration Product Air Leakage, and NFRC Simulation Manual.* These *NFRC Technical Interpretations* examine questions put forth by NFRC members and those entities involved in the NFRC rating system and certification and labeling program.

This document is published annually, but maybe published more frequently if the need arises. Please contact NFRC to assure that you are reading from the most recent edition of *NFRC Technical Interpretations. These NFRC Technical Interpretations, where applicable, while be incorporated into future editions of their respective program documents.*

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† *Revised since initial publication*
‡ *Added since previous publication*
** Applicable to more than one NFRC document*

NFRC Technical Interpretation Reference Sheet

TI Number/Description NFRC 100	Effective Date	Referenced Section(s)	Referenced Page(s)
TI-100-96001 – Breather or Capillary Tubes	09-18-96 Revised: 9-29-99	2.1 (g) NFRC 100 and 4.4.1. SLW	2 NFRC 100 and 5-7 & 5-8 SLW
TI-100-96009 – Computer software for adding and updating U-factor, SHGC and VT	06-03-96 Revised: 10-07-98	5.4 (2)	9-11
TI-100-96010 – Component Replacement in Individual Product	06-03-96 Revised: 10/04/02	4.3 (2)	6
TI-100-98002 – Material Conductivity	03-03-98	5.4 (1)	18-20
TI-100-98003 – Multipurpose Products Grouping for Validation	02-12-98 Revised: 05-03-00	4.1 (1)	5-6
TI-100-98006 – Operator Grouping	6-10-98	Sec.4 (1)	5-9
TI-100-98007 – Boundary Condition	08-28-98	Sec. 6.6	6-27
TI-100-98008 – Sealing of Weep Slots or Holes	08-28-98	5.1.5. Air Leakage	15
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TI-100-99002 – Grouping Air Cavities and 0.25” rule	03-19-99	Sim Manual 6.5.2	Sim. Manual Pgs. 6-21
TI-100-99003 – Rounding Procedure	10-04-02 Deleted	NFRC 100 Sec. 5.4.3.b NFRC 200 4.4.3.b, Sim. Manual 3.4 and 3.5	NFRC 100 Pg. 20, NFRC 200 Pg, 7, Sim. Manual Pgs. 3-15, 3-17
TI-100-99004 – Center of Glass grouping	06-14-99	NFRC 100 Sec. 6.2	Pgs. 24, 25
TI-100-99005 – Center of Glass grouping	06-14-99	NFRC 100 Sec. 6.2	Pgs. 24, 25
TI-100-99006 – Divider Grouping	06-14-99	NFRC 100 Sec. 6.2	Pgs. 25, 26
TI-100-99008 – Sidelite and Transom	12-13-99	NFRC 100 table 1	NFRC 100 Pg. 15, NFRC 200 Pg. 1
TI-100-99009 – Site-Built validation-spacer	12-13-99	NFRC Sec. 4.2.1	Pg. Iv
TI-100-00003 – Nominal Glass Thickness	08-08-00	4.2 and 6.2	7-8, 24-26
TI-100-00004 – Gas Concentration	08-11-00	Table 5-3	5-5 and 5-9
TI-100-00005 – Glass Block with adaptor	09-18-00	Sec. 5.1.2	12
TI-100-0001-2-Laminated glass U-factor, SHGC, VT	11/05/01	NFRC 100 Sec 2 NFRC 200 Sec 2 Sim Man Sec 5.5.1	NFRC 100 Pg. 1 NFRC 200 Pg 1 Sim Man Pg. 5-10

NFRC Technical Interpretation Reference Sheet

TI Number/Description NFRC 200	Effective Date	Referenced Section (s)	Referenced Page (s)
TI-200-95003 – Detachable Interior and Exterior Grills	09-29-95	2.1, 2.2, 5.4.3 [(2)]	1, 2-3, 11-12
TI-200-95005 – Midpoint Grouping of SHGC's	09-29-95	6.1 [(2)]	13-14
TI-200-95007 – Area-weighting SHGC's for Garden Windows	10-04-02 Revised	5.4 [(2)]	9-12
TI-200-96008 – Thin Polyester Film Product Modeling	03-04-96	5.4.1 [(2)]	9-11
TI-200-96009 – Computer software for adding and updating U-factor, SHGC and VT	06-03-96 Revised: 10/07/98	5.4 [(2)]	9-11
TI-200-96010 – Component Replacement in Individual Product	10/04/02 Deleted	4.3 [(2)]	6
TI-200-96012 – Obscured Glass SHGC and VT	10-24-96	$2.0_{(e)}$ [(2)]	I &2
TI-200-98004 – Corner Window	01-08-98	2.2(f) [(2)]	2
TI-200-99003 – Rounding Procedure	10-04-02 Deleted	NFRC 100 Sec. 5.4.3.b NFRC 200 4.4.3.b, Sim. Manual 3.4 and 3.5	NFRC 100 Pg. 20, NFRC 200 Pg, 7, Sim. Manual Pgs. 3-15, 3-17
TI-200-99008 – Sidelite and Transom	12-13-99	NFRC 100 table 1	NFRC 100 Pg. 15, NFRC 200 Pg. 1
TI-200-00001 – Divider for SHGC and VT Specialty Product table	02-22-00	Sim. Manual Sec. 5.6	Sim. Manual Pgs. 5-13, 5-16, 5-17, 5-18
TI-200-0001-2-Laminated glass U-factor, SHGC, VT	11/05/01	NFRC 100 Sec 2 NFRC 200 Sec 2 Sim Man Sec 5.5.1	NFRC 100 Pg. 1 NFRC 200 Pg 1 Sim Man Pg. 5-10

NFRC Technical Interpretation Reference Sheet

TI Number/Description NFRC 300	Effective Date	Referenced Section (s)	Referenced Page(s)
Revisions to or Proposed TIs NFRC 300			

TI Number/Description NFRC 400	Effective Date	Referenced Section (s)	Referenced Page(s)
TI-400-97001 – Operating Force	03-11-97	Section 4.7 (3)	2

TI Number/Description NFRC Simulation Laboratory Workbook	Effective Date	Referenced Section(s)	Referenced Page(s)
TI-SLW-0001-1-Interior Exposed Air Cavities	11/04/01	6.5.2	6-22
TI-SLW-0001-2-Laminated glass U-factor, SHGC, VT	11/05/01	NFRC 100 Sec 2 NFRC 200 Sec 2 Sim Man Sec 5.5.1	NFRC 100 Pg. 1 NFRC 200 Pg 1 Sim Man Pg. 5-10

Referenced Documents

(1) *NFRC 100: Procedure for Determining Fenestration Product U-factors*
(2) *NFRC 200: Procedure for Determining Product Solar Heat Gain Coefficients at Normal Incidence*
(3) *NFRC 400: Procedure for Determining Fenestration Product Air Leakage*
(4) *NFRC Simulation Manual*

NFRC 100:
TECHNICAL INTERPRETATIONS

National Fenestration Rating Council

TI-100-96001
10/07/98

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
What percentage gas-fill should be used in modeling gas-filled units built with breather or capillary tubes?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
5/06/96	06/13/96	9/18/96

Pertinent Document:	
NFRC 100 & Simulation Laboratory Workbook (SLW)	
Referenced Sections:	**Referenced Pages:**
2.1g NFRC 100 and 5.4.1 SLW.	2 NFRC 100 and 5-7 & 5-8 SLW

Interpretation:
Units manufactured with breather or capillary tubes open to the atmosphere must be modeled with 100% air, even if they were filled with gas other than air. IG Units manufactured with breather or capillary tubes not open to the atmosphere from the time of IG manufacture may be modeled with gas percentage (%) claimed by the manufacturer and not to exceed the limits in reference 3 of NFRC 100.
Technical Committee Revisions to Initial Interpretation:
September 29, 1999

National Fenestration Rating Council

TI-100-96009
10/07/98
Revised

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Does a simulator who is adding or updating the U-factor, SHGC, or VT of an individual product(s) need to use the latest version of NFRC approved software and the most current spectral data?

Date Requested:	***Initial Interpretation Date:***	***Final TIPC Approval Date:***
4/08/96	5/14/96	6/03/96

Pertinent Document:	
NFRC 100-91 and NFRC 200-95	
Referenced Sections:	***Referenced Pages:***
5.4 NFRC 100-91 and 5.4 NFRC 200-95	18 NFRC 100-91 and 9-11 NFRC 200-95

Interpretation:
Yes. Profiles modeled with FRAME 3.1 or earlier versions should be remodeled as necessary to take into account available rectangles, cavities, and all relevent TI's and changes to the Simulator's workbook. For U-Value calculations, the emittance from the file header can be used in place of the full spectral data file. When SHGCs and VTs are being computed the full spectral data files must be used. New products can only be added to a grouping if the grouping criteria is now satisfied with the latest NFRC approved software and the most current spectral data.

Technical Committee Revisions to Initial Interpretation:
Revised 09/18/96, 10/7/98

National Fenestration Rating Council

TI-100-96010
Revised
10/04/2002

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Can one or more components of a window system with a certified U-value be replaced by component(s) with improved or equal thermal performance.

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
4/08/96	5/14/96	6/03/96

Pertinent Document:	
NFRC 100-97	
Referenced Sections:	**Referenced Pages:**
4.2 NFRC 100-97	7- NFRC 100-97

Interpretation:
Yes. Component substitutions can be made as long as a simulator uses the approved NFRC simulation tools to verify the performance improvements. The original certified U-values must be used to represent the new product. For spacer substitutions, only the spacer must be modeled. For glazing system changes, only the center-of-glass must be modeled. For products certified under the Testing Alternative Method (100-97, Section 6.1.2), this will apply as long as the simulation laboratory states that the simulation tools are appropriate for such use.

Technical Committee Revisions to Initial Interpretation:
Revised: 10/7/98, revised 10/04/02

National Fenestration Rating Council

TI-100-98001
03/03/98

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
When performing a Frame Group Leader calculation, how does one determine the product with the highest frame and edge-of-glass heat loss where there is more than one cross-section in the product?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
11/14/97	02/11/98	03/03/98

Pertinent Document:	
NFRC 100 (April 1997)	
Referenced Sections:	**Referenced Pages:**
6.2	25

Interpretation:
When there is more than one cross-section in a product, the three digit total product "U-factor" shall be compared to determine the "Frame Group Leader". Each total product "U-factor" shall be based on the individual sections for that product as defined by the manufacturer, using the lowest Center-of-Glass "U-factor" glazing option. The Cross-sections in the product with the highest U-factor are the "Frame Group Leader".

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-98002
03/03/98

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Can the results of an ASTM E1530 “Standard test method for evaluating the resistance to thermal transmission of thin specimens of material by the guarded heat flow meter method” test of a thin, opaque material be used for simulation purposes?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
11/06/97	02/11/98	03/03/98

Pertinent Document:	
NFRC 100 (April 1997)	
Referenced Sections:	**Referenced Pages:**
5.4	18

Interpretation:
Yes. The conductivity results from an ASTM E1530 (“Standard test method for evaluating the resistance to thermal transmission of thin specimens of material by the guarded heat flow meter method”) test of a thin, material can be used as a user defined conductivity for simulation purposes.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-98003
05/03/00
Revised

NFRC TECHNICAL INTERPRETATION

nterpretation Requested:
Can multipurpose products incorporating nearly identical frame/sash base profile be classified and rated as one NFRC Product Line for the purposes of validation?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
02/23/00	05/03/00	05/03/00

Pertinent Document:	
NFRC 100 (April 1997)	
Referenced Sections:	**Referenced Pages:**
4.1	6

Interpretation:
Yes. Provided that the differences between the base profiles are limited to minor changes to accommodate different operating hardware. The minor changes will allow for the movement or addition of specific elements (i.e walls & cavities) to accommodate the different operating hardware. Any elements added to the profile to accommodate operating hardware shall be of the same material types used in the original profile. Note: This also allows the use of the hung window sash stiles as the bottom rail, deleting of the roller track of the horizontal slider, the addition of sash balance covers, or any other component changes that occur as a direct result of the hardware changes. The comparison between the total product U-factors of the two operator types when simulated in the residential size with the best glazing option shall not change more than 0.01 Btu/hr-ft^2-F.

Technical Committee Revisions to Initial Interpretation:
Revised: 05/03/00

National Fenestration Rating Council

TI-100-98006
06/10/98

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:		
Can two product lines of the same operator type that are identical, except for vinyl caps that can be attached on the interior side, be grouped for validation purposes?		
Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
05/11/1998	05/15/98	06/10/98

Pertinent Document:	
NFRC 100 (April, 1997)	
Referenced Sections:	**Referenced Pages:**
Sec. 4	Page 6, paragraph 3

Interpretation (Proposed):
No. Since TIPC has determined that the vinyl cap does not fit the definition of “cladding”, and therefore cannot be grouped under TI-93006, each product line must have a validation test performed.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-98007
08/28-98

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
What boundary condition must one apply when the frame is made of a metal material and the sash is made of a vinyl material?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
06/15/98	08/28/98	08/28/98

Pertinent Document:	
Simulation Manual	
Referenced Sections:	**Referenced Pages:**
sec. 6.6	6-27

Interpretation:
A single boundary condition must be applied to the entire interior surface of a given frame section, even if it contains different material components (i.e. vinyl sash and aluminum frame). The surface condition applied shall be the component with the greatest interior exposed area of that section. This may result in different boundary conditions being applied to different cross-sections (i.e. the fixed portion of a horizontal slider could be an aluminum boundary while the vent section could be a vinyl boundary). This interpretation allows this condition. This does not alter the rules of section 6.6 pertaining to applied caps and/or cladding.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-98008
08/28/98

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Should the exterior weep slots or holes in test samples be sealed?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
07/23/98	08/28/98	08/28/98

Pertinent Document:	
NFRC Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems	
Referenced Sections:	**Referenced Pages:**
5.1.5 air leakage	15

Interpretation:
Yes. Weep slots or holes are potential sources for air leakage, they therefore, shall be sealed.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-99001
03/19/99

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
How are the nailing flanges that are not exposed after the product is installed simulated and tested.

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
03/01/99	03/19/99	03/19/99

Pertinent Document:	
NFRC 100 (April 1997) and Simulation Manual (April 1997)	
Referenced Sections:	**Referenced Pages:**
NFRC 100 6.2 & 4(g), Sim. Manual 6.3.3	NFRC 100 pg. 24 & 5, Sim. Manual Pg. 6-7

Interpretation:
If the manufacturer indicates that the product is sold both with and without the nail flange or that the nail flange is removable, the product shall be simulated and tested without the nail flange. If the manufacturer indicates that the nail flange is not removable the product shall be simulated and tested with the nail flange covered with a nominal 1" by 4" fir trim per the simulation manual.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-99002
03/19/99

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Clarify the 0.25" inch rule used for modeling Air Cavities within Frame Cross-Sections.

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
03/01/99	03/19/99	03/19/99

Pertinent Document:	
Simulation Manual (April 1997)	
Referenced Sections:	**Referenced Pages:**
Sim. Manual 6.5.2	Sim. Manual Pg. 6-21

Interpretation:
Air Cavities "Air cavities usually have to be divided into multiple rectangles to fill the cavities. NFRC has reviewed their policy on the modelling of air cavities. Air cavities within a frame section which form a convective region can be broken up into as many rectangles as necessary, provided they are defined with a uniform thermal conductivity calculated using one rectangle with the overall height and width of the irregular shaped air cavity and an emissivity that is representative of dominant material. Figure 6.11 shows an example where an air cavity must be divided into three rectangles (see Case 1). NFRC requires that the conductivity of the three rectangles used to fill the air cavities have a thermal conductivity equal to the conductivity of the rectangle defined in Case 2 (ke). Case 3 in Figure 6.11 shows the three rectangles all with a conductivity of ke."

Technical Committee Revisions to Initial Interpretation:

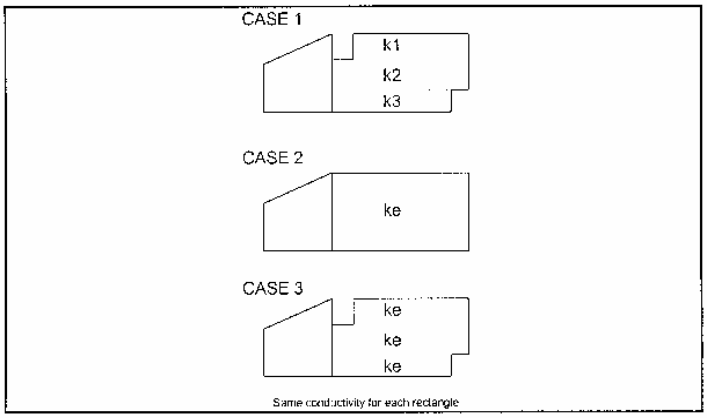
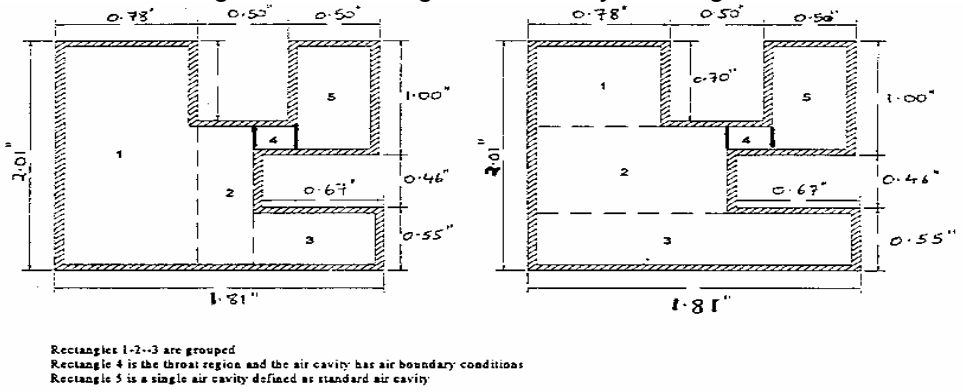


Figure 6.11 Defining Grouped Air Cavities

"There is one exception to the rule in the preceding paragraph. If the internal opening between any two solid member in the frame assembly is 6.35mm (0.25 in.) Or less, the air cavities on either side of that opening shall not be grouped. See figure 6.12."

Clarification:
Internal opening between two solid member in the frame assembly can be in any direction, horizontal, vertical or diagonal. This throat (throat: defined as the region were the internal opening between any two solid member in the frame assembly is 6.35 mm (0.25 in.) Or less) shall be identified from the original die or assembly drawings. If the air cavities are divided into multiple rectangles and the rectangles are not grouped due to 0.25" rule (throat restriction) following rules must be kept in mind: a) if the boundary between two adjoining air cavities along the horizontal heat transfer path is air than one must have this boundary emissivity defined as "air" having emissivity of 1.00. b) Decision of grouping or identification of throat region shall be made from original die drawings or assembly drawings.



Rectangles 1-2--3 are grouped
Rectangle 4 is the throat region and the air cavity has air boundary conditions
Rectangle 5 is a single air cavity defined as standard air cavity

National Fenestration Rating Council

TI-100-99004
06/14/99

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Is the simulator allowed to group air/argon, air/krypton and air/argon/krypton?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
06/03/99	06/14/99	06/14/99

Pertinent Document:	
NFRC 100	
Referenced Sections:	**Referenced Pages:**
NFRC 100 Sec 6.2	Page 24,25

Interpretation:
No. Only individual products that contain the same gas-type can be grouped. For example, a glazing option that has air only can not be grouped with a glazing option that contains argon or krypton gas. Variable concentrations of the same gas-fill type can be grouped as a center-of-glass grouping as long as the gas concentration, other than air, is more than 60% and doesn't vary by more than ±10% from the group leader. Glazing options with different gas-fills must be simulated as separate Individual Products in the Product Line.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-99005
06/14/99

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Is the simulator allowed to group clear/clear with clear/Low 'E', or group clear/Low 'E' with a Low 'E'/Low 'E'?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
06/03/99	06/14/99	06/14/99

Pertinent Document:	
NFRC 100	
Referenced Sections:	**Referenced Pages:**
NFRC 100 Sec 6.2	Page 24,25

Interpretation:
No. Only individual products that contain the same basic glazing configuration can be grouped. For example, a glazing option that has two clear sheets used in the composition of the insulating glass unit cannot be grouped with a insulating glass combination that contains one clear sheet and one low-e sheet (e=<0.50). The U-factor for the glazing options with variations in the surface emittance value, as defined above, can be grouped but be listed as separate Individual Products in the Product Line.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-99006
06/14/99

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
A client has a center-of-glass grouping with only variations in gap widths. At the larger gap widths no simulation is required for internal grids because of the 1/8" clearance on both sides. At the narrower gap width the grid must be simulated. **a.** Is it permissible to group the larger gap width with and without grid (B) with the smaller gap width with no grid (N)? In all cases no grid is simulated. **b.** Is it permissible to group the larger gap width with and without grid (B) with the smaller gap width with grid (Y)?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
06/03/99	06/14/99	06/14/99

Pertinent Document:	
NFRC 100	
Referenced Sections:	**Referenced Pages:**
NFRC 100 Sec 6.2	Page 25,26

Interpretation:
a) Yes, as long as it is listed as an Individual Product in the Product Line. **b)** No. Any individual glazing option that applies the 1/8" rule for grids and identifies that the individual product is being simulated for U-factor as with or without grids shall only be grouped, or be the center-of-glass group leader, with products that meet the 1/8" ruling. Any individual glazing option that is simulated without grids, whether due to air gap restrictions or non-compliance to the 1/8" rule, can not be grouped with a individual product that is identified as being simulated with or without grids.II)

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-99008
12/13/99

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
When a manufacturer builds a sidelite or transom product that cannot be area weighted at the standard NFRC sizes, how should these products be area weighted?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
11/14/99	12/13/99	12/13/99

Pertinent Document:	
NFRC 100, 200	
Referenced Sections:	**Referenced Pages:**
NFRC 100 table 1	NFRC 100 Pg. 15, NFRC 200 Pg. 1

Suggested Interpretation:
For sidelite and transom designs that when area weighted at the standard NFRC sizes, there is no center of glass and/or less than 2 1/2" edge of glass, the product shall be area weighted with each section at the manufacturer's standard frame height (pfd) plus 2.5 inches of edge of glass. In no case shall the total product height of transoms be less than 14 inches or the total product width of sidelights less than16 inches. This interpretation may affect the width of sidelites or the height of transoms only.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-99009
12/13/99

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
In section 4.2.1 of NFRC 100, section C (site-built). The paragraph references a spacer with a conductance of 6.24. There are no spacers commercially available with this conductance, therefore which spacer shall be used?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
12/04/99	12/13/99	12/13/99

Pertinent Document:	
NFRC 100-C	
Referenced Sections:	**Referenced Pages:**
NFRC section 4.2.1	Pg iv

Suggested Interpretation:
"For validation purposes only, under the Unspecified Product Sample Validation Criteria, the test sample and validation sample shall use a typical dual-sealed aluminum spacer."

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-00003
08/08/00

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Can nominal glass thickness be used for NFRC 100 U-factor calculations?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
July 25, 2000	August 2, 2000	August 2, 2000

Pertinent Document:	
NFRC 100-97	
Referenced Sections:	**Referenced Pages:**
4.2 and 6.2	7-8, 24-26

Interpretation:
Yes, provided the emissivity of the glass is taken from the approved NFRC Spectral data file and the air gap dimension is maintained at the dimensions specified by the manufacturer. The nominal glass thickness to be used shall be as listed in the attached table. The values in the table below have been taken from the ASTM C1036-85 standard.

Technical Committee Revisions to Initial Interpretation:

Nominal Glass Thickness	Glass Thickness Range	
	Minimum Glass Thickness	Maximum Glass Thickness
2.5 mm (0.098 inches)	2.16 mm (0.085 inches)	2.57 mm (0.101 inches)
3.0 mm (0.118 inches)	2.92 mm (0.115 inches)	3.40 mm (0.134 inches)
4.0 mm (0.158 inches)	3.78 mm (0.149 inches)	4.19 mm (0.165 inches)
5.0 mm (0.197 inches)	4.57 mm (0.180 inches)	5.05 mm (0.199 inches)
6.0 mm (0.236 inches)	5.56 mm (0.219 inches)	6.20 mm (0.244 inches)
8.0 mm (0.315 inches)	7.42 mm (0.292 inches)	8.43 mm (0.332 inches)
10.0 mm (0.394 inches)	9.02 mm (0.355 inches)	10.31 mm (0.406 inches)
12.0 mm (0.472 inches)	11.91mm (0.469 inches)	13.49 mm (0.531 inches)

National Fenestration Rating Council

TI-100-00004
08/11/00

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Table 5.3 of the NFRC Simulation Manual details the "Maximum Gas Concentration Achieved" for three gas fill techniques. What percentage of gas concentration is allowed when simulating a mixed gas (more than one gas type, e.g. Argon and Krypton)?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
08/02/2000	08/11/00	08/11/00

Pertinent Document:	
Both of the NFRC Simulation Manuals	
Referenced Sections:	**Referenced Pages:**
Table 5.3	5-9 and 5-5

Interpretation:
For IG units with multiple gases, the simulation shall be performed using the gas concentrations stipulated by the manufacturer, but in no case can the simulation exceed the "Maximum Gas Concentration" shown in table 5.3 for the fill technique used. In the case where the fill technique is "Two-Probe with concentration sensor" and the gas mix is Krypton & Argon, the Maximum Gas Concentration of the mixed gas shall not exceed 90%.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-00005
09/18/00

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Can an acrylic block system with a "Center-of-Glass Component Test" per Section 5.1.2 of NFRC 100 which utilizes an adaptor between the acrylic block and frame that allows for direct replacement of the standard glass, be considered an individual product in the same product line with the "standard glass"?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
07/18/2000	09/18/00	09/18/00

Pertinent Document:	
NFRC 100	
Referenced Sections:	**Referenced Pages:**
5.1.2	12

Interpretation:
Yes, as long as all components, including the adaptor, are included in the simulation for the acrylic block glazing system. This interpretation applies to "U" Factor only at this time.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-100-0001-2
11/05/01

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
How does a simulator model U-factor, SHGC and VT for laminated glass

Date Requested:	***Initial Interpretation Date:***	***Final TIPC Approval Date:***
11/03/01	10/29/99	11/05/01

Pertinent Document:	
NFRC 100, and 200 and Simulation Manual	
Referenced Sections:	***Referenced Pages:***
NFRC 100 Section.2, NFRC 200 Section 2, and Simulation Manual section 5.5.1	NFRC 100 Pg. 1, NFRC 200 Pg. 1, Simulation Manual Pg. 5-10

Suggested Interpretation:

Laminated glass U-factor calculation:
The simulator shall model the glass/laminate combination using the exact glass/laminate thickness and calculate a corresponding combination U-factor. The U-factor may be calculated by either using the Optics computer program (when approved) or by the following method:
Add the resistances of the materials where: Glass has a conductivity of 0.998 W/m·C (6.944 Btu·in/h·ft^2·°F) and PVB has a conductivity of 0.212 W/m·C (1.470 Btu·in/h·ft^2·°F) (note that you shall total the R-value for the actual thickness of the layer). Take the inverse of the total R-value, and multiply by the thickness of the panel to obtain the conductivity. The thickness and conductivity are then entered into a user-defined Glass Library entry in Window 4.1. An IG is then created in the glazing library and imported into the simulation file via FRAME or THERM. All glass/PVB thickness combinations offered shall be defined in the manner described above (note that center-of-glass groupings may be applied only after all glass/PVB thickness have been defined).

NFRC 200:
TECHNICAL INTERPRETATIONS

National Fenestration Rating Council

TI-200-95003
9/29/95

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Are the effects of detachable interior or exterior grilles/dividers ignored in the calculations of SHGCs?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
8/21/95	8/21/95	9/29/95

Pertinent Document:	
NFRC 200: Procedure for Determining Solar Heat Gain Coefficients at Normal Incidence	
Referenced Sections:	**Referenced Pages:**
2.1, 2.2; 5.4.3	1, 2-3, 11-12

Interpretation:
Yes. Detachable means user removable or applied after point of manufacture.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-200-95005
9/29/95

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
What is the midpoint (for groupings of SHGCs) of a group which only consists of two products?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
8/21/95	8/21/95	9/29/95

Pertinent Document:	
NFRC 200: Procedure for Determining Solar Heat Gain Coefficients at Normal Incidence	
Referenced Sections:	**Referenced Pages:**
6.1	13-14

Interpretation:
Either product can represent the other one.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-200-95007
Revised
10/04/2002

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
How does one area-weight the SHGCs of the individual components of garden windows and other similar products?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
8/21/95	8/21/95	9/29/95

Pertinent Document:	
NFRC 200: Procedure for Determining Solar Heat Gain Coefficients at Normal Incidence	
Referenced Sections:	**Referenced Pages:**
5.4	9-12

Interpretation:
SHGC for garden window cannot be determined by existing procedures and program documents.

Technical Committee Revisions to Initial Interpretation:
Revised 10/04/2002

National Fenestration Rating Council

TI-200-96008
03/04/96

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
How are the nominal 1/8" and 1/4" glass thickness requirements applied to thin polyester film products (such as Heat MirrorTM)?

Date Requested:	***Initial Interpretation Date:***	***Final TIPC Approval Date:***
1/17/96	*2/7/96*	*3/4/96*

Pertinent Document:	
NFRC 200-95	
Referenced Sections:	***Referenced Pages:***
5.4.1	*9-11*

Interpretation:
Model glass thickness do not apply to thin polyester films. The performance properties for these products, for their specific product thickness, is taken from the NFRC Spectral Data Library.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-200-96009
10/07/98

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Does a simulator who is adding or updating the U-factor, SHGC, or VT of an individual product(s) need to use the latest version of NFRC approved software and the most current spectral data?

Date Requested:	***Initial Interpretation Date:***	***Final TIPC Approval Date:***
4/08/96	5/14/96	6/03/96

Pertinent Document:	
NFRC 100-91 and NFRC 200-95	
Referenced Sections:	***Referenced Pages:***
5.4 NFRC 100-91 and 5.4 NFRC 200-95	18 NFRC 100-91 and 9-11 NFRC 200-95

Interpretation:
Yes. Profiles modeled with FRAME 3.1 or earlier versions should be remodeled as necessary to take into account available rectangles, cavities, and all relevent TI's and changes to the Simulator's workbook. For U-Value calculations, the emittance from the file header can be used in place of the full spectral data file. When SHGCs and VTs are being computed the full spectral data files must be used. New products can only be added to a grouping if the grouping criteria is now satisfied with the latest NFRC approved software and the most current spectral data.

Technical Committee Revisions to Initial Interpretation:
Revised 09/18/96, 10/7/98

National Fenestration Rating Council

TI-200-96012
10/24/96

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
How does one determine the SHGC and VT for products with obscured glass?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
10/09/96	10/18/96	10/24/96

Pertinent Document:	
NFRC 200-95	
Referenced Sections:	**Referenced Pages:**
2.0 (e)	1&2

Interpretation:
Products with obscured glass shall receive the same SHGC and VT rating as those products constructed with specular (i.e not obstructed) substrates of the same tint, thickness, and coating (if any) placement.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-200-98004
01/08/98

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
How can corner windows be rated using NFRC 200-95?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
11/03/97	01/05/98	01/08/98

Pertinent Document:	
NFRC 200-95	
Referenced Sections:	**Referenced Pages:**
2.2.f	2

Interpretation:
Corner windows get rated as though they are rectangular windows. Corner windows where the corner is formed of glass shall be considered as a flat rectangular window. Corner windows where the framing is an integral mullion where the head and sill framing is continuous shall be considered as a flat rectangular window. Corner windows where two windows are mulled together are rated separately as two windows.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-200-99008
12/13/99

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
When a manufacturer builds a sidelite or transom product that cannot be area weighted at the standard NFRC sizes, how should these products be area weighted?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
11/14/99	12/13/99	12/13/99

Pertinent Document:	
NFRC 100, 200	
Referenced Sections:	**Referenced Pages:**
NFRC 100 table 1	NFRC 100 Pg. 15, NFRC 200 Pg. 1

Suggested Interpretation:
For sidelite and transom designs that when area weighted at the standard NFRC sizes, there is no center of glass and/or less than 2 1/2" edge of glass, the product shall be area weighted with each section at the manufacturer's standard frame height (pfd) plus 2.5 inches of edge of glass. In no case shall the total product height of transoms be less than 14 inches or the total product width of sidelights less than16 inches. This interpretation may affect the width of sidelites or the height of transoms only.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-200-00001
2/22/00

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
For calculating SHGC and VT specialty product table can one use the actual divider size? Or shall you use the default 0.75" and 1.5" size for calculating the SHGC and VT specialty product table?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
01/20/00	02/22/00	02/22/00

Pertinent Document:	
Simulation Manual	
Referenced Sections:	**Referenced Pages:**
Simulation Manual section 5.6	Simulation Manual Pg. 5-13,5-16,5-17,5-18

Suggested Interpretation:
Only default 0.75" (PDD) for dividers less then 1" (PDD), and 1.5" (PDD) for dividers greater than or equal to 1.00" (PDD) shall be used to calculate SHGC and VT for the specialty product procedure.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-200-0001-2
11/05/01

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
How does a simulator model U-factor, SHGC and VT for laminated glass

Date Requested:	***Initial Interpretation Date:***	***Final TIPC Approval Date:***
11/03/01	10/29/99	11/05/01

Pertinent Document:	
NFRC 100, and 200 and Simulation Manual	
Referenced Sections:	***Referenced Pages:***
NFRC 100 Section.2,NFRC 200 Section 2, and Simulation Manual section 5.5.1	NFRC 100 Pg. 1, NFRC 200 Pg. 1, Simulation Manual Pg. 5-10

Suggested Interpretation:

Laminated glass U-factor calculation:
The simulator shall model the glass/laminate combination using the exact glass/laminate thickness and calculate a corresponding combination U-factor. The U-factor may be calculated by either using the Optics computer program (when approved) or by the following method:
Add the resistances of the materials where: Glass has a conductivity of 0.998 W/m·C (6.944 Btu·in/h·ft^2·°F) and PVB has a conductivity of 0.212 W/m·C (1.470 Btu·in/h·ft^2·°F) (note that you shall total the R-value for the actual thickness of the layer). Take the inverse of the total R-value, and multiply by the thickness of the panel to obtain the conductivity. The thickness and conductivity are then entered into a user-defined Glass Library entry in Window 4.1. An IG is then created in the glazing library and imported into the simulation file via FRAME or THERM. All glass/PVB thickness combinations offered shall be defined in the manner described above (note that center-of-glass groupings may be applied only after all glass/PVB thickness have been defined).

NFRC 400:
TECHNICAL INTERPRETATIONS

National Fenestration Rating Council

TI-400-97001
03/11/97

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
Does one have to perform an operating force test on swing doors, such as single leaf entrance doors, swinging doors and french doors, to meet the NFRC 400 requirements?

Date Requested:	**Initial Interpretation Date:**	**Final TIPC Approval Date:**
02/04/97	02/04/97	03/11/97

Pertinent Document:	
NFRC 400	
Referenced Sections:	**Referenced Pages:**
Section 4.7	2

Interpretation:
No. "Active door units" in section 4.7 of NFRC 400 was in reference to operable sliding glass door products with one or more operable panels.

Technical Committee Revisions to Initial Interpretation:

NFRC SIMULATION MANUAL

National Fenestration Rating Council

TI-SLW-0001-1
11/04/01

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:

How are open cavities on the interior having gaps of # 0.25 inch simulated?

Date Requested:	***Initial Interpretation Date:***	***Final TIPC Approval Date:***
08/24/01	10/08/01	11/04/01

Pertinent Document:

NFRC Simulation Manual

Referenced Sections:	***Referenced Pages:***
6.5.2	6-22

Interpretation :

Interior gaps # 0.25 inch between the frame and the sash or the sash and the sash (as in case of meeting rail), or frame and sash itself, shall be simulated as standard NFRC frame air cavity. The air cavity shall start at the first instance from the interior side where the throat is <= 0.25 inch.

Technical Committee Revisions to Initial Interpretation:

National Fenestration Rating Council

TI-SLW-0001-2
11/05/01

NFRC TECHNICAL INTERPRETATION

Interpretation Requested:
How does a simulator model U-factor, SHGC and VT for laminated glass

Date Requested:	***Initial Interpretation Date:***	***Final TIPC Approval Date:***
11/03/01	10/29/99	11/05/01

Pertinent Document:	
NFRC 100, and 200 and Simulation Manual	
Referenced Sections:	***Referenced Pages:***
NFRC 100 Section.2,NFRC 200 Section 2, and Simulation Manual section 5.5.1	NFRC 100 Pg. 1, NFRC 200 Pg. 1, Simulation Manual Pg. 5-10

Suggested Interpretation:

Laminated glass U-factor calculation:
The simulator shall model the glass/laminate combination using the exact glass/laminate thickness and calculate a corresponding combination U-factor. The U-factor may be calculated by either using the Optics computer program (when approved) or by the following method:
Add the resistances of the materials where: Glass has a conductivity of 0.998 W/m·C (6.944 Btu·in/h·ft^2·°F) and PVB has a conductivity of 0.212 W/m·C (1.470 Btu·in/h·ft^2·°F) (note that you shall total the R-value for the actual thickness of the layer). Take the inverse of the total R-value, and multiply by the thickness of the panel to obtain the conductivity. The thickness and conductivity are then entered into a user-defined Glass Library entry in Window 4.1. An IG is then created in the glazing library and imported into the simulation file via FRAME or THERM. All glass/PVB thickness combinations offered shall be defined in the manner described above (note that center-of-glass groupings may be applied only after all glass/PVB thickness have been defined).

NFRC 100 Technical Interpretation Reference Sheet

ALL TECHNICAL INTERPRETATIONS AS IDENTIFIED BELOW ARE NO LONGER ACTIVE, BUT ARE NOW A PART OF NFRC 100: PROCEDURE FOR DETERMINING FENESTRATION PRODUCT U-FACTORS, NFRC 100 SECTION B: PROCEDURE FOR DETERMINING DOOR SYSTEM PRODUCT THERMAL PROPERTIES, NFRC 200: PROCEDURE FOR DETERMINING FENESTRATION PRODUCT SOLAR HEAT GAIN COEFFICIENTS AT NORMAL INCIDENCE, OR THE NFRC SIMULATION MANUAL. THIS CHART IS FOR REFERENCE PURPOSES ONLY.

NFRC 100

TI Number	Initial Interpretation Date	NFRC 100 (02) Referenced Section(s)	NFRC 100 (02) Referenced Page(s)
91001 - Removable Nail Flange	7/23/1991	Section 6.3.3[1]	p.6-7
91002 - Non-rectangular Windows	6/23/1993	Section 4.1	p.6
91003 - FRAME Library Values	6/26/1993	Section 5.4	p.18
92001 - Product Line Definition	1/29/1994	Section 4.1	p.6
92002 - Window and Door Assemblies		DELETED	DELETED
92003 - Operator Type Groups	6/26/1993	Section 4.1	p.6
92004 - Casements and Awnings	1/30/1992	Section 4.1 and Table 1	p.5, 15
92005 - Stained Glass Windows	5/19/1992	B5.1[2]	p.14
92006 - Specialty Products	5/28/1992	B5.3[2]	p.16
92007 - Hardware, Reinforcing or Components	4/8/1995	Section 4.2	p.7
92008 - Resimulation and Retesting	6/24/1992	B5.4[2]	p.16
92009 - Doors without Windows	6/24/1992	B2.1[2]	p.1
93001 - Center-of-Glass Groups	1/28/1993	Section 6.2	p.24
93002 - Baseline Product Extension	1/28/1993	B5.4[2]	p.17
93003 - Glass Thickness Variation Between AA and BB	1/28/1993	Section 4.2	p.7
93004 - Glazing Divider Patterns	1/28/1993	Section 4.2	p.7
93005 - Door Slabs without Frames	9/29/1994	B3.24 and Figure B24[2]	p.6, 27
93006 - Aluminum or Vinyl Clad Fenestration	6/23/1993	Section 4.1	p.6
93007 - Frame Groups	9/29/1994	Section 6.2	p.25
93008 - Sidelites and Transoms	9/29/1994	Table 1	p.15
93009 - Single and Multiple Doors	9/29/1994	Table 1	p.15
93010 - Side Simulated vs. Size Tested	6/26/1993	Section 5.3	p.17
94001 - Reinforced Vinyl Products	1/29/1994	Section 4.2	p.7
94002 - Intergral Ventilators	1/21/1994	Section 4.2	p.8
94003 - Exterior Air Cavities	1/29/1994	Section 6.5.2[1]	p.6-22
94004 - Swinging Doors with Lites	9/29/1994	B5.1[2]	p.14
94005 - Embossed Panels on Doors	9/29/1994	B4.2[2]	p.9
94006 - Different Spacer Assemblies	9/29/1994	Section 6.2	p.25
94007 - Selection of Baseline Products for Testing	9/29/1994	Section 4.3	p.8
94008 - Metal and Molded Sidelites	9/29/1994	B5.1[2]	p.14
94009 - Inswing and Outswing Doors	9/29/1994	Section 4.2	p.7
94010 - Individual Door Products with Different Sills	4/8/1995	B3.3 and B.25[2]	p.7,10
94011 - Steel Door Frames	4/8/1995	B3.24[2]	p.6
94012 - Glazed and Unglazed Doors	4/8/1995	B3.3[2]	p.4
94014 - Double Hung Replacement Sash Kits	4/8/1995	NFRC 100	p.16
95001 - Air Cavities in Frame Voids	9/29/1995	Section 6.5.2[1]	p.6-20
96001 - Breather or Capillary Tubes	9/18/1996	PENDING	PENDING
98005 - Sliding Product Interior Exposed Air Cavities		TI-0001-1	
99007 - Laminated Glass U-factor, SHGC, VT		TI-0001-2	

[1] NFRC Simulation Manual

[2] NFRC 100 Section B: Procedure for Determining Door System Product Thermal Properties (Currently Limited to U-values)

NFRC 200

TI Number	Initial Interpretation Date	NFRC 200 (02) Referenced Section(s)	NFRC 200 (02) Referenced Page(s)
95004 - Reporting of Visible Transmittance		DELETED	DELETED
95006 - Midpoint Group Product or Group Representative	9/29/1995	Section 6.1	p.9
96001 - Visible Transmittance	3/4/1996	Section 3.5[1]	p.3-17
96002 - Specialty Products Procedure	3/4/1996	Section 5.6, Step 7[1]	p.5-15
96003 - Frame Grouping	3/4/1996	Section 5.6, Step 5[1]	p.5-14
96004 - Divider Grouping and Divider Width	3/4/1996	Section 5.6, Step 2[1]	p.5-12
96005 - Standard Divider Pattern	3/4/1996	Section 4.3	p.4
96006 - Glazing Thickness for Frame Modeling	3/4/1996	Section 5.2	p.7
96007 - Default Gap Width and Gas Fill	3/4/1996	Therm SM Section 5.4.2, Frame SM Section 5.6[1]	Therm SM p.5-8, Frame SM p.5-11
96011 - Model glass size in residential and nonresidential	6/3/1996	Section 5.2	p.7

[1] NFRC Simulation Manual
THERM SM: NFRC THERM SIMULATION MANUAL FRAME SM: NFRC FRAME SIMULATION MANUAL