Committee: Technical
Subcommittee: U-Factor

Scope of ballot:

The ballot is presenting initial language for a Commercial Trendline Approach (CTA) used for calculating U-factor of commercial fenestration products. There are some details that remain under investigation such as implementation, software requirements, training, etc., which will be developed and presented to membership before the CTA is implemented. Summary data, on various commercial products, is being supplied with this ballot to provide tolerance between CTA calculation and results obtained through WINDOW calculation; refer to the Drafts tab in SpecBuilder.

ANSI/NFRC 100 modifications:

This ballot pertains to:
1) Section 3 - Only the added definitions.
2) Section 5.12 - The added section for the technical procedures of the CTA
3) Appendix A, Section A.4 - Non-Standard Size calculation

Associated Program Administrative Topics

If this ballot passes, fully implementing the changes will affect:

1. Related documents changes
   a. The ANSI/NFRC 200 and 500 shall be held in abeyance until the NFRC 100 is approved by membership. All technical documents shall be forwarded to the Board of Directors at the same time.
   b. The NFRC 715 program document needs approved by membership prior to forwarding the 100, 200, 500 technical documents to the Board of Directors.

2. Software updates
   a. The extent of software needs has not yet been confirmed; laboratory sheets or actual software and project certificate distribution and storage requirements.
   b. The CPD may require modifications to include the CTA for commercial products; a potential new upload sheet.

3. The estimated cost of full implementation is not determined at this time

4. Estimated time for full implementation
   a. It is recommended the program is launched when other technical documents are approved by membership and Board, technical documents are ANSI approved, training is provided, and software is updated and approved.
   b. Currently, there is no estimated time for full implementation.

5. Business Rules
a. The simulation manual will contain modeling rules to utilize the CTA with specific
focus on modeling Class II spacer assemblies. The language and sections within
the Simulation Manual will require review from simulators and approval by TIPC
upon successful ANSI/NFRC 100 CTA ballot.
b. Undetermined if any modifications to the CPD are required.

6. Program Processes - Program process and training need developed

7. Pending other Committee/Board approval
   a. The ANSI/NFRC 200 and 500 and NFRC 715 are under balloting.
   b. Implementation plan that includes topics such as training, software updates, and
      sunsetting of current simulation methodology (CMA and site-built).

8. All of the above will be presented to the appropriate committees and Board for approval
   when completed.
ANSI/NFRC 100 New Commercial Ballot
NFRC Ballot Comments/Motion Form – Spring 2019
Technical Committee, U-Factor Subcommittee

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<th>Company Name, Rep Initials</th>
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<tr>
<td>Pella – J.H</td>
<td>001</td>
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**NEG**

**Editorial**

**Section and/ or Page #**

**Definitions**

**Comment/Alternate Language**

To better align the definition of “Commercial Building” with the IECC definition, consider adding “townhouses”, and change four stories to three stories:

- All buildings other than detached one and two-family houses, **townhouses**, multi-family residential structures not more than **four** three stories above-grade in height, and manufactured houses (mobile or modular homes).

**Motion 1**

**Motion 2**

**Result**

**Vote**

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**Legend:**

NEG: Negative with Comments
W-PM: Withdrawn Prior to Meeting
W: Withdrawn at Meeting
S: Substantive
E: Editorial
NGR: Non-Germane
## Company Name, Rep Initials

| FGIA – J.S.         | 002 |

### NFRC Member Vote Tally

| AP  | 26 |
| ABS | 19 |
| NEG | 8  |
| total | 53 |

### Legend:
- NEG: Negative with Comments
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## NFRC Ballot Comments/Motion Form – Spring 2019

### Technical Committee, U-Factor Subcommittee

**Modify definition of commercial building as follows:**

- **Commercial Building:** All buildings other than detached one and two-family houses, **TOWN HOUSES**, multi-family residential structures not more than **THREE** stories above-grade in height, and manufactured houses (mobile or modular homes).

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**Motion Language**

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Page 3 of 21
Add definition of Commercial Trendline Approach:

- **Commercial Trendline Approach (CTA):** a trendline methodology used for rating Commercial Fenestration

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Motion Language.............

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**Legend:**
- NEG: Negative with Comments
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- W: Withdrawn at Meeting
- S: Substantive
- E: Editorial
- NGR: Non-Germane
Consider adding a definition of “Commercial Trendline Approach (CTA)” such as the following or something similar:

- **A trendline methodology used for rating Commercial Fenestration**

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Motion Language..............
### Company Name, Rep Initials | Response Number
---|---
Vitro - M.B. | 005

**NEG**

#### Persuasive and Editorial

#### Section and/ or Page #

**Section 5.12.6.2.C**

#### Comment/Alternate Language

**Section 5.12.6.2.C (and its .ii sub-section) uses the term Spacerw to refer to a variable representing spacer width; however, the term Spacerw was defined in 5.12.5.2.B.ii as the spacer product type that gives the highest U-factor, and it is used as such in section 5.12.5.3.**

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**Motion Language.............**
Company Name, Rep Initials | Response Number
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Vitro - M.B. | 006

Legend:
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NEG
Persuasive and Editorial
Section and/ or Page #
Section 5.12.7.1
Comment/Alternate Language

The definition of terms in Section 5.12.7.1 do not seem correct as the description of Trendlinew and Trendlineb goes against their definition in a couple of cases. For example, Trendlineb is the whole product U-factor trendline using spacerb per section 5.12.5.3.B.ii, but section 5.12.7.1 defines Ub2 as the U-factor from Trendlineb using the worst spacer option.
Company Name, Rep Initials | Response Number
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Vitro - M.B. | 007
NEG

Section and/or Page #
Section 5.12.7

Comment/Alternate Language
The method of equations 5-6 and 5-7 seems wrong since the end point keff values need to be those for the best and worst spacer options (Spacerb and Spacerw), since that's how $U_{w1}$, $U_{w2}$, $U_{b1}$, and $U_{b2}$ are defined, and not by using some default high and low default values ($K_{eff1}$ and $K_{eff2}$). In other words, the Y end points for an interpolation need to be associated with the X end points. As it stands now, if the arbitrary values of either of the default low/high conductivity spacer assemblies ($K_{eff1}$ and $K_{eff2}$) were to be changed numerically, there would be a change in the calculated U-factor of the window, which doesn't seem right.

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Motion Language.............
There are multiple issues with references: Section 5.12.5.1 references "Section 5.12.5.1.2", which does not exist. Section 5.12.5.1.B references "Section 5.12.5.1.3", which does not exist. Section 5.12.5.3.A references 5.12.5.1.A and 5.12.5.1.B, but I think these references should be 5.12.5.2.A and 5.12.5.2.B, respectively.
In 5.12.5.1.B is the following which doesn't seem very clear: "Same spacer assembly product types with varying heights shall be treated as separate options or allowed to be grouped."
Company Name, Rep Initials | Response Number
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Quanex – D.H. | 010
NEG

Section and/ or Page #
Section 5.12.5.4

Comment/Alternate Language
Regarding section 5.12.5.4: There is no language to allow extrapolation of trendlines in the existing LEAFF methodology, so I'm unclear as to why it is included here. To be clear, I have no problem with the concept in general - in fact, I recommended its inclusion in the original RCBC discussions - but there is no justification for its use in commercial products with the multi-spacer approach, when it is disallowed for residential products with (presumably more accurate) single-spacer approach.
### Weekly Ballot Comments/Motion Form – Spring 2019

Technical Committee, U-Factor Subcommittee

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**NEG**

#### Section and/or Page #

Section 5.12.6 and Section 5.12.7

#### Comment/Alternate Language

Regarding the interpolation approach to spacers in 5.12.6 and 5.12.7: While I understand that spacer effects are less noticeable on the larger unit sizes associated with commercial fenestration, they are not negligible, and so we should attempt to account for them as accurately as possible. Therefore, my first question regarding the CTA is why it uses the multi-trendline approach to spacers in the first place, since commercial manufacturers are no more likely than residential manufacturers to carry more than 1 or 2 spacer platforms. The only purpose I could see for the multi-trendline approach is for varying sealant depths, but if that is the case, it should be specifically limited to that variable (sealant depth) and completely separate trendline groups required for different spacer and/or sealant products.

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**Motion Language**

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**Legend:**
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Page 12 of 21
Company Name, Rep Initials | Response Number
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Quanex – D.H. | 012
NEG

Section and/ or Page #
Section 5.12.6 and Section 5.12.7

Comment/Alternate Language

Regarding the use of spacer Keff values in 5.12.6 and 5.12.7: There is here is not good correlation between the Keff of the spacer assembly and the whole window U-factor, Uw. (See attached PDF of charts.) If we do decide to use an interpolated approach to spacers, I would recommend it be based on the Klin (Us*Hs) rather than the Keff (Us*Ws). The correlation is still not perfect, but is somewhat better.

Motion 1st | Motion 2nd | Result | Vote
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Motion Language

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Finally, I'm not sure why it was decided to use the natural logarithms to interpolate the spacer values, rather than just the raw values. Using the logarithmic equation will "front load" the SA effects, with differences near the lower end of the range having a bigger effect than than equivalent differences at the upper end of the range. (See final page of charts PDF.) I'm not saying this is absolutely wrong, but I'd like some explanation for why it's preferable.
We ask that the TG consider developing a bulletin explaining that CTA and LEAFF are substantially equivalent methods, and valid comparisons can be made between CTA and LEAFF ratings. Obtaining product ratings products from both methods is not necessary. The differences between the two methods are mostly logistical and administrative, and are not technical in nature.
Keystone votes negative because we believe the trendline requirements need to first be established and implemented for the Residential Program. We understand being proactive and wanting to improve the Commercial program is necessary, but implementation into the Commercial program should be on hold till the completion of the Residential Trendline requirements are worked out. Solidifying and outlining the residential requirements, software, and training, will only quicken the process for the Commercial Approach.

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Motion Language.............
The reasons for our negative are captured in FGIA's negative.
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**NEG**

### Section and/or Page #

**General**

### Comment/Alternate Language

**CMA needs to be rolled into this not dismissed**

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**NEG**

Non-germane

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**Motion Language………….**

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**Motion Text**

Move to send the ballot to the Technical Committee for approval and to forward to the Board for approval with implementation upon publication and completion of other documents associated with the Commercial Trendline Approach (CTA) and are ready for implementation.

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**Record of Votes**

**Voice Vote**

<table>
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<tr>
<th>Pass (unanimous)</th>
<th>Fail (unanimous)</th>
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**By Count**

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