**RE85-16:** Replace the proposal with the following:

Public Comment RE85-16 SCHWARZ 1 :

**Proponent : Robert Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com) requests Approve as Modified by this Public Comment.**

**Modify as Follows:**

**2015 International Energy Conservation Code**

**R402.4.1.2 (N1102.4.1.2) Testing.** Single family detached buildings or *dwelling units* shall be tested and verified as having an air leakage rate not exceeding ~~1.1 square inches equivalent leakage area /100 square feet of d*welling unit enclosure area.* (ELA/100 sq ft of shell area)~~ three air changes per hour in Climate Zones 1 through 8, or 0.24 cubic feet per minute at 50 Pascals/100 square feet of d*welling unit enclosure area.*

Attached multifamily buildings or *dwelling unit*s shall be tested and verified as having an air leakage rate not exceeding ~~1.3 square inches equivalent leakage area/100 square feet of d*welling unit enclosure area*.(ELA/100 sq ft of shell area)~~ five air changes per hour in Climate Zones 1 through 8, or 0.30 cubic feet per minute at 50 Pascals/100 square feet of d*welling unit enclosure area*.

Testing shall be conducted in accordance with ASTM E 779 or ASTM E 1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, if installed at the time of the test, shall be open.
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.
5. Heating and cooling systems, if installed at the time of the test, shall be turned off.

6. Supply and return registers, if installed at the time of the test, shall be fully open.

**Commenter's Reason:** Single family detached building are distinctly different from multifamily attached buildings whether they are townhouses, duplexes, or three stories high. This Language was added to the proposal to clearly distinguish between attached and detached buildings as suggested by the confusion of the committee. In addition, the floor modification presented in Louisville which was ruled out of order created additional confusion. This reworded proposal addresses the fundamental reason for the floor modification and the confusion expressed by the committee. It changed the alternative air leakage matrix from ELA/100sqft of shell area to a more understandable and widely used matrix of CFM at 50 Pascals/100 square feet of d*welling unit enclosure area.*

The committee did not see the benefit of having a distinction between single family detached and multifamily attached air leakage testing standard. This is the crux of the mater. Single family homes are successfully achieving a 3 ACH air leakage rate across the country while multifamily attached units from townhomes to three story apartment units are not. This proposal addresses the disparity in being able to comply with the code head on by establishing less restrictive and achievable air leakage rates for multifamily attached buildings. It takes into account leakage across building assemblies that enclose a dwelling unit or provides a boundary between a dwelling unit's conditioned space and unconditioned space or an adjacent dwelling unit's conditioned space. Per the committee's suggestion additional language was added to ensure that it is clear that a detached building did not refer to a horse barn.

Contrary to the committee's statement that the construction industry is confused about the testing standard or what they are being held to, the reality is that they are simply not able to consistently achieve the requirement of the code. This is not due to misunderstanding the standard this is due to the complexity of multifamily attached buildings. This proposal keeps a widely accepted testing methodology/standard while broadening the matrix that can be used to demonstrate compliance. ACH50 is still allowed but now CFM at 50 Pascals/100 square feet of d*welling unit enclosure area is also allowed.* The current air leakage measurement matrix, ACH50, penalizes multifamily attached buildings and smaller houses due to its being based on house volume size. The proposed new optional matrix for compliance, CFM50/100 square feet of d*welling unit enclosure area*, eliminates volume from the equation and therefore the bias against small houses and multifamily attached buildings. In addition, multifamily attached buildings are treated more fairly as this standard

of measurement incorporates leakage through adiabatic walls, ceilings, and floors. Thus this proposal realizes that compartmentalization, as well as air leakage to the outdoors, is a reality and ensures that it is dealt with properly. In other words, the proposal gives the option to utilize a compliance matrix that recognizes that the most cost effective testing method, using a single blower door, will measure leakage across adjacent dwelling units as well as from the outside. By so doing a threshold of allowable air leakage is permitted that promotes efficiency as well as compartmentalization.

Defining dwelling unit enclosure area is a crucial portion of this proposals main point. In multifamily attached buildings a portion of the leakage is coming from connections between attached dwelling units. In order to calculate the surface area of the dwelling unit it must be defined. This ultimately give an attainable testing threshold for multifamily attached buildings and justifies the need for the new definition.

A number of different groups have recognized the need to allow a CFM50 /100 square feet of *dwelling unit enclosure area matrix to quantify the air leakage of a residential building. This includes the following:*

- The Building America program
- Green Building advisor
- USGBC LEED Multifamily High rise
- Army Corp of Engineers
- Energy Star Multifamily High-rise
- City of Fort Collins Colorado
- National Renewable Energy Laboratories

Johnathan Scott at EnergyLogic looked at all of EnergyLogic's ratings from 2015 and the relationship between volume and shell area. The relationship was tighter than he had thought. Our goal in doing this exercise was to try and determine a relationship between a measurement taken and expressed as XXX cubic feet per minute at 50 Pascals/100 square feet of *dwelling unit enclosure area and our traditional code matrix for expressing house infiltration Air Changes Per Hour at 5o Pascals of pressure.*

*Looking at the Formulas below:*

Formula A can be used to to specify a volume and get a shell estimate

Shell area = 1,832 + 0.1643*Volume

Formula B can be used to specify a shell area and estimate the volume.

Volume = -8,704 + 5.754*Shell area

Through this exercise we had anticipated greater variation between the two approaches but we believe we have proven this wrong.

We looked directly at the blower door data for homes that EnergyLogic rated in 2015, and calculated ACH50 and CFM50/ft^2, shown below. (is this sqft of shell or conditioned space?)

The orange line shows the proposed target, 0.192 CFM50/ft^2. This line shows that there would be a different ACH50 for homes with different geometry (range from about 2 to 4 ACH50 for all homes with CFM50/ft^2 measurement around 0.192)

Also, from the trend line you'll see that **for homes around the 0.192 CFM50/ft^2 standard, the average ACH50 number is 2.6**. Meaning, this is the target that you'd be asking builders to meet if you propose a 0.192 CFM50/ft^2 target.

Using the trend line from the observations in the second chart, we generated the table below showing what the ACH50 equivalent would be for different CFM50/ft^2 targets. We believe that 0.192 CFM50/ft^2 is an ambitious target as this target came from commercial buildings that have relatively little shell area for the volume, since they're typically large box-shaped buildings. We are proposing two targets based on the table below that are more suited for residential attached and detached buildings. The targets are not exactly aligned with the current code requirements because this proposal is requiring the same tightness limits in all climate zones.

Attached 0.30 CFM50/ ft^2 of shell area

Detached 0.24 CFM50/ ft^2 of shell area

| CFM50/ft^2 | ACH50 |
|---|---|
| 0.10 | 1.2 |

| | |
|---|---|
| 0.11 | 1.4 |
| 0.12 | 1.5 |
| 0.13 | 1.7 |
| 0.14 | 1.8 |
| 0.15 | 2.0 |
| 0.16 | 2.1 |
| 0.17 | 2.3 |
| 0.18 | 2.4 |
| 0.19 | 2.6 |
| 0.20 | 2.7 |
| 0.21 | 2.9 |
| 0.22 | 3.0 |
| 0.23 | 3.2 |
| 0.24 | 3.4 |
| 0.25 | 3.5 |
| 0.26 | 3.7 |
| 0.27 | 3.8 |
| 0.28 | 4.0 |
| 0.29 | 4.1 |

| | |
|---|---|
| 0.30 | 4.3 |
| 0.31 | 4.4 |
| 0.32 | 4.6 |
| 0.33 | 4.7 |
| 0.34 | 4.9 |
| 0.35 | 5.0 |
| 0.36 | 5.2 |
| 0.37 | 5.3 |

Public Comment WUIC5-16 WOESTMAN 1 :

**Proponent : John Woestman, representing Kellen Company representing Composite Lumber Manufacturers Association (CLMA) (jwoestman@kellencompany.com) requests Approve as Modified by this Public Comment.**

**Modify as Follows:**

**2015 International Wildland-Urban Interface Code**

**504.7 Appendages and projections.** *Unenclosed accessory structures* attached to buildings with habitable spaces and projections, such as decks, shall be not less than 1-hour fire-resistance-rated construction, heavy timber construction or constructed of one of the following:

1. *Approved noncombustible* materials.
2. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the *International Building Code*.
3. Ignition-resistant building materials in accordance with Section 503.2.
4. ~~Plastic composite deck boards and stair treads which comply with ASTM D7032 and comply with at least one of the methods below:~~
    - 4.1. ~~Weathered in accordance with ASTM D7032 and tested in accordance with ASTM E1354 with a radiant heat flux of 35 kW/m$^2$ and an electric spark igniter. The weathering shall not decrease the time to ignition by more than 20%, and shall not increase the effective heat of combustion by more than 20%, and shall not increase the peak heat release rate by more than 25%. After demonstrating satisfactory effects of weathering, tested in accordance with ASTM E2632 / E2632M with a peak heat release rate no greater than 25 kW/ft$^2$ (269 kW/m2).~~
    - 4.2. ~~After weathering as prescribed by ASTM D7032, tested in accordance with ASTM E2632 / E2632M with a peak heat release rate no greater than 25 kW/ft$^2$ (269 kW/m$^2$)..~~

**504.7.1 Walking surfaces of unenclosed accessory structures.** Walking surfaces of unenclosed accessory structures shall comply with Section 504.7 or shall comply with the following:

1. Materials tested in accordance with ASTM E2632 / E2632M with an effective peak heat release rate not more than 25 kW/ft$^2$ (269 kW/m$^2$), and

2. Materials tested in accordance with ASTM E84 with a Class B flame spread rating or materials where installed abutting an exterior wall, the exterior wall surface for a minimum height of 24 inches above the walking surface of the deck shall be either *approved noncombustible* materials or ignition-resistant materials in accordance with Section 503.2.

**505.7 Appendages and projections.** *Unenclosed accessory structures* attached to buildings with habitable spaces and projections, such as decks, shall be not less than 1-hour fire-resistance-rated construction, heavy timber construction or constructed of one of the following:

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    - 4.2. ~~After weathering as prescribed by ASTM D7032, tested in accordance with ASTM E2632 / E2632M with a peak heat release rate no greater than 25 kW/ft$^2$ (269 kW/m$^2$).~~

**505.7.1 Walking surfaces of unenclosed accessory structures.** Walking surfaces of unenclosed accessory structures shall comply with Section 504.7 or shall comply with the following:

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2. Materials tested in accordance with ASTM E84 with a Class B flame spread rating or materials where installed abutting an exterior wall, the exterior wall surface for a minimum height of 24 inches above the walking surface of the deck shall be either *approved noncombustible* materials or ignition-resistant materials in accordance with Section 503.2.

**Commenter's Reason:** This public comment revises this proposal to align with current requirements of the California Chapter 7A, but with several revisions: This proposal references ASTM E2632 in lieu of the very similar California test standard 12-7A-4A; and this public comment specifies a minimum of 24" above the walking surface where wall material may be required to be either noncombustible or ignition-resistant.

This proposal seeks to introduce practical and realistic performance requirements for materials used for the walking surfaces of unenclosed accessory structures (i.e. exterior decks) in wildland-urban interface areas. This proposal introduces ASTM E2632, commonly known as the under-deck fire test, to the IWUIC.

The requirements rely on a fire test specifically designed to test and evaluate the performance of decking when constructed as a deck assembly in simulated WUI fire exposure. While this is different than the ASTM E84 test of Section 503.2 for ignition-resistant building materials, the test configuration and test requirements of ASTM E2632 were developed specifically for deck materials in WUI applications.

The ASTM E2632 test procedure requires constructing a small deck structure (joists and deck boards) consistent with the manufacturer's installation instructions and then this deck structure is placed over a burner. The flames and heat from the ignited burner are designed to simulate combustibles burning under a deck which frequently occurs during a WUI fire. The test deck structure is subject to the intense flame and heat from the burner for 3 minutes, and the fire performance of the decking is evaluated for the next 40 minutes to determine the response of the decking. Please see the original proposal for pictures of the ASTM E2632 test and additional explanation of this test.

It is our understanding that based on testing of many decking products using the ASTM E2632 test method, it has been consistently observed that products meeting the conditions of acceptance as referenced in the proposed code change (an effective peak heat release rate not more than 25 kW/ft$^2$ (269 kW/m$^2$) produce a limited level of heat release during the flame exposure, with flames self-extinguishing shortly after the flame source is removed. This test method and acceptance criteria successfully differentiates "passing" products from those w here sustained flaming and progressive fire growth occurs, presenting an unacceptable ignition hazard to the adjoining structure.

**Analysis:** Note that Public Comments for WUIC4-16, WUIC5-16 and WUIC7-16 are similar in content and actions on these proposals should be consistent where applicable.