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### Trending Toward Tighter Buildings

Denali Jones, P.E. Associate, Senior Project Manager



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### Welcome!

- $\rightarrow$  We are recording.
- $\rightarrow$  Some FAQs:
  - $\rightarrow\,$  You will get a follow-up email regarding how to access the recording and a pdf of slides.
  - → If you need a completion certificate for self-reporting or EPP and/or AIA or AIBC credits, please follow the link in the chat box to let us know.
- $\rightarrow$  Please use chat for housekeeping questions.
- $\rightarrow$  Please use Q&A box for questions for the speaker.
  - ightarrow We will break at the end for questions.
  - $\rightarrow\,$  Use upvote feature to let us know what you're most curious about!

More questions? Please contact us at events@learnbuildingscience.com.



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### air barrier **abaa** association of america

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### Denali Jones ASSOCIATE, SENIOR PROJECT MANAGER Denali's work is focused new buildings projects, working closely with design and construction teams to help identify key performance issues early and provide practical solutions to building enclosure challenges. Regarded as an industry expert at air leakage testing, Denali has extensive experience conducting whole-building air leakage testing on large buildings and has led numerous training seminars throughout North America. He works closely with code officials to develop and improve air leakage testing procedures and has contributed to several national air leakage testing protocols and standards. He also supports air leakage testing efforts throughout all RDH offices. RDH

### Laverne Dalgleish

### EXECUTIVE DIRECTOR

Laverne works to champion energy conservation in buildings while educating the building owners and designers about the benefits of energy conservation such as durability, comfort, reduced maintenance, reduced HVAC equipment costs and the positive impact on the environment.

Mr. Dalgleish educates building owners and designers on the benefits of effective and working air barrier systems in buildings. This education mission includes working with standards development organizations, training and education groups, government policy departments, and quality assurance program developers for the construction industry. Mr. Dalgleish was the key developer of the ABAA Quality Assurance Program for the installation of air barrier systems in buildings.

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### RDH

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### Material

ightarrow ASTM E2178

ightarrow Must be less than 0.004 cfm/sf at 75Pa

















### **History of Airtightness in WSEC**

- 2009
  - Defines & requires an air barrier
  - Air barrier must be tested goal is 0.4 cfm/sf but not required to pass
- 2012
  - Similar to 2009, but need to pass at 0.4 cfm/sf
  - Failed test requires an investigation, explanation, and attempt to seal leaks
- 2015 Same as 2012, but with 0.3 cfm/sf
- 2018 Big changes

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### 2018 WA State Energy Code

- Required to meet 0.25 cfm/sf
- If tested leakage rate is greater than 0.25 but not greater than 0.40, conduct visual inspection & seal leaks to the extent practicable, then provide report to owner and code official
- If tested leakage rate is greater than 0.40 cfm/sf seal leaks and retest the building as needed until 0.40 cfm/sf or less is achieved

### How Are We Doing?

Lots of data from testing in WA
200+ buildings tested
More than 15,000,000 sf of enclosure area tested

Median result: 0.217 cfm/sf •

• Tightest: 0.025 cfm/sf

Leakiest: 0.886 cfm/sf .

Sortable by: .

- Test date

  - Occupancy type Air barrier type (walls)
  - Enclosure area

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### **Quality Assurance**

### ightarrow Design

- ightarrow Specify the right materials
- $\rightarrow~$  Review all the details (look for what is missing)

### ightarrow Construction

- ightarrow Use experienced (certified/accredited) contractors & installers
- ightarrow Review submittals & shop drawings (by others?)
- ightarrow Mockups
- ightarrow Regular site visits (deficiency logs)
- ightarrow Testing



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### Challenges with multifamily testing

- → Intent: measure unintended leakage through air barrier systems, while isolating intentional openings (HVAC) from the test
- → Reality: exhaust vents are almost always the largest single source of leakage
- $\rightarrow$  Can only be sealed effectively from outside
- ightarrow Difficult to access





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Providence of the second se Positive pressure – 0.308 cfm/sq ft Average – 0.235 cfm/sq ft	- Equiv. leakage area = 12 - Equiv. leakage area = 24 Delta = 1	2.9 SF @75Pa 4.6 SF @75Pa 1.7 SF @75Pa
For the unit 222 testing: Microwave sealed, vent shroud not Microwave not sealed, vent shroud Microwave not sealed, vent shroud oughly 7 sq in)	sealed – 83 sq in leakage a not sealed – 83 sq in leaka sealed – 76 sq in leakage a	area age area area (delta of
7 sq in per unit extrapolated out over area, which could potentially account between the negative and positive	er 171 units equals 8.3 SF I nt for <b>70%</b> of the difference numbers.	Equiv. leakage e in air leakage









### Takeaways

- Main cause of larger positive leakage than negative is exhaust strategy (multifamily)
- Mechanically attached sheet approach is not inherently leakier under positive pressure
- · Best approach for multifamily testing seal everything from the exterior
- · Other factors with multifamily
  - Often lower budget
  - Often lower oversight
  - More variability in quality of trades & GCs

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# Brief History of Airtightness in IECC 2009 & Prior Requirements for fenestration Generic language about air sealing 2012 Defines & requires an air barrier 3 different compliance paths - materials, assemblies, or testing (0.4 cfm/sf) 2015 - Similar to 2012 2018 - Similar to 2015, but with C406.9

### **More Widespread Adoption**

Many jurisdictions are considering adding testing requirements
 CA, OR, NY, CO, UT, Toronto, others

· Some hesitancy around the testing itself

- Will there be enough qualified technicians to perform the testing?
- · Can we test really large buildings?
- Will the people running the tests be qualified?
- What happens if the test fails?

### Whole Building Airtightness Program

- First ever ISO 17024 compliant certification program for airtightness testing
- Pilot program rolled out in March
- 5-day intensive course with mockup testing
- 3 more classes this year
- Essential for larger adoption of testing







