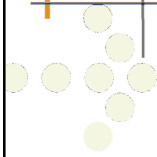


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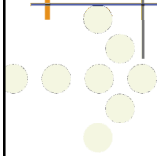
## Air Barrier Commissioning of Large Buildings 2011 BCBECC Conference & AGM

→ Robert Bombino, PE



21 September 2011

RDH



## Outline

- Food for Thought – New Requirements in Washington State
- Marty Houston – Contractor
- Mario Goncalves – Consultant
- Ed McNamara – Owner/Developer

## Air Barrier Commissioning of Large Buildings

- New 2009 Washington State Energy Code and Seattle Energy Code Requirement (Adopted Jan 1, 2011)
- Note – 2009 Implemented “air barrier requirement”

### → Washington State/City of Seattle Requirement

- Mimic requirements recently adopted by US Army Corp of Engineers
- Test whole building or some portion of building \*
- Compliance
  - Option 1
    - Inspect air barrier through course of construction and report to building official and
    - Test building (or portion) and report results to building official (no need to pass test)
  - Option 2
    - Test building and pass requirement of 0.4 cfm/ft<sup>2</sup> @ 75 Pa
    - For reference USACE requirement is 0.25 cfm/ft<sup>2</sup> @ 75 Pa and will be lowering their requirement to 0.15 cfm/ft<sup>2</sup> @ 75 Pa

## → Why and Why Not Test?

- Why – All the same reasons we want air barriers...
  - Energy
  - Condensation control
  - Water leakage control
  - Sound
  - Odors
  - Etc.
  - Except – actually test it – to confirm you have it!
- Why Not?
  - Cost
  - How to rectify if you fail? (Potentially buried components)
  - What do the results mean?
  - One more thing to get sued over

## → Challenges in WA/Seattle

- 0 to 100 mph on air barrier requirement
  - Many Architects/Engineers/Contractors still “unfamiliar” with the concept and execution of an “air barrier”
  - Very few (I believe only two) States have an air barrier requirement
- Very limited history of testing performed on whole buildings for “quantitative measurements”
  - Uncertainty if “goals” can be achieved
- Push back from industry – hence currently no need to “pass”
- Do we have enough information to confirm that 0.4 cfm/ft<sup>2</sup> is the right number – too high or too low?

## → Policy Supporters Reaction

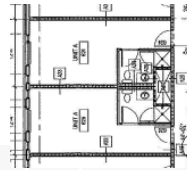
- Lots of questions and looking to those with some experience/insight
- Incentives to “pass”
- What type of testing can be performed during construction to give some insight on whole building test results?
  - Testing during construction?
    - Whole bunch of other challenges
    - What to test? When?
    - Constantly changing building.
    - Qualitative or Quantitative Testing?
    - What do the results mean?
    - Look for alternate test protocol/methods

## → Outcome Since New Code Adopted

- Scramble...
  - for some to get up to speed on “Air Barriers”
  - to understand new code requirement for testing
  - to perform test and understand results
- Proactive team of industry players putting their heads together – University of Washington new residence hall used as “test case” – collaboration between Seattle City Light, RDH, Walsh and UW
- Retrotec’s stock price skyrockets

## Site 33 – Project Description

- 5 story wood frame residential levels above 2 story non-combustible mixed use space
- Air barrier system combination of:
  - Exterior face of Densglass sheathing and silicone sealant at joints and penetrations.
  - Windows
  - Roof membrane
  - Concrete floor slab on grade
- Unique condition at Site 33 with vertical shafts housing mechanical systems at every pair of units



## Site 33 – Air Leakage Testing

- Design Phase
  - Lab mock-up testing by RDH
- Construction Phase
  - Free standing mock-up test
  - 5 Localized tests @ 100 sqft wall area
    - Quantitative and qualitative testing
    - Included punch windows
    - 1 test per floor (on wood framed levels)
  - Whole floor tests
    - Quantitative testing
    - Pressure neutralize approach
    - Thermographic scan and smoke testing
- Post Construction Phase
  - Whole Building Test per USACE Protocol

## → Cliff/Coles Notes Version

- Lab Mock-up, Field Mock-up and Localized Tests (Air Barrier Assembly Tests)
  - Very low air leakage, well below specified values
- Corner Unit Test
  - Pressure Neutralize Approach is easily doable
  - Good results, identify air leakage with thermo scan and smoke
- Full Floor Tests
  - Pressure Neutralize Approach is challenging
  - Quantitative and qualitative results are very useful in predicting/achieving whole building test desired result
- Whole Building Test
  - Passed on the first try.

## → Next up...