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# Pressure Testing of Ducts and the IECC—A Time That Has Come?

#### 2007 RESNET Building Performance Conference February 17-21, 2007

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### **Duct Testing and the IECC--Overview**

- Background—what, why, how, constraints, etc.
- Summary of issues
- Strawman proposal to illustrate DOE's current thinking
- Discussion (please hold comments until here)

Comments may also be sent to:

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#### **Duct Testing and the IECC—Background**

- Objectives of DOE's Building Energy Codes Program
  - Make incremental improvements to the national model codes (chiefly, the IECC and IRC)
  - Coordinate these codes with beyond-code programs
    - Eliminate code barriers to new/efficient techniques
    - Move proven technologies into the mainstream
    - Exploit the large 'N' of the codes infrastructure
      - Supply builders with simple/easy compliance tools
      - Keep the codes easy to use and usable

### Most ducts are unacceptably leaky

Code already requires that ducts be sealed:

"All ducts, air handlers, filter boxes, and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.3.1 of the *International Residential Code*."

--2006 IECC, Section 403.2.2

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Code already requires that ducts be sealed:

"Joints of duct systems shall be made substantially airtight by means of tapes, mastics, gasketing or other approved closure systems..."

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--2006 IRC, M1601.3.1

## Studies confirm that the current code leaves many/most ducts unacceptably leaky

#### Duct Testing and the IECC—Expected Benefits of Duct Testing

- Substantial energy savings—potentially averaging in the neighborhood of 5% to 10%+
- Improved comfort and safety
- Stronger market/infrastructure for testing
- Encouragement for builders to get homes rated and/or go beyond code

#### • Synergy:

- HERS/Estar/Etc has built an infrastructure so that this proposal can be contemplated for the code
- Pushing this one element into the code can now extend that infrastructure and promote more HERS/Estar/Etc

## Duct Testing and the IECC—Prospects for a Code Change

#### Major changes to the code(s) don't come easy

- How should the test be structured?
  - Metric to use? (CFM<sub>xx</sub>, CFM%, CFM/sf, etc.)
  - Test conditions?
  - When? (after rough-in, post-construction, etc.)
  - Required levels?

- Who should perform the test?
  - HVAC installer?
  - Third-party tester?
  - HVAC installer with random third-party verifications?

- How should the code text be structured?
  - Mandatory requirement (i.e., can't be traded away)?
  - Basic prescriptive requirement?
  - Performance-only requirement?
  - Prescriptive requirement with a "way out"?
    - Performance only?
    - Prescriptive exceptions (e.g., ducts indoors, high HVAC efficiency, etc.)
  - How to coordinate prescriptive and performance?

- Documentation and technical support
  - How to avoid the appearance of "zero theoretical savings"
  - How to quantify savings
    - Various duct locations
    - Various climates
    - Various house configurations
  - What are the costs of testing by various parties?
  - What will be the additional cost of sealing?

# Duct Testing and the IECC—When should the test occur?

#### After rough-in?

- Con
  - Less accurate (no measurement of leakage to outdoors)
  - Less chance to encourage whole-house testing and ratings
- Pro
  - Lower cost
  - Less disruption
    - Right time for catching/correcting problems
    - Avoids another visit and/or sub on the schedule
- Discussion
  - Maybe allow post-construction test as a higher-credit alternative?
  - When should third-party verifications occur?

# Duct Testing and the IECC—Who should conduct the test?

#### A third party?

- Con
  - Requires another sub on the schedule
  - Requires a second visit by HVAC installer to correct problems
  - Higher cost
  - Almost unheard of
- Pro
  - Know-how
  - Avoids cheating
  - Promotes a healthy testing/rating industry
- Discussion
  - Probably DOA at the code hearings

# Duct Testing and the IECC—Who should conduct the test?

#### The HVAC installer?

- Con
  - Ignorance
  - Cheating
- Pro
  - Avoids another visit and/or sub on the schedule
  - Avoids second visit to correct problems
  - Lower cost
- Discussion
  - Can sufficient instructions be crafted into the code text?
  - Must someone (DOE) develop a training system?
  - Could allow installer to test, official has option to verify
  - Official could design a sampling system
  - Do most testing errors tend toward worse scores?
  - Are some test protocols harder to foul up?

# Duct Testing and the IECC—How should the code text be designed?

#### The duct test is a mandatory requirement?

- Con
  - Less chance of success at code hearings
- Pro
  - Encourages *duct testing* rather than the least distasteful trade-off opportunity
- Discussion
  - Success at the code hearings may depend on some easy exceptions (ducts indoors, high HVAC efficiency, better insulation package, etc.)
  - Success at the code hearings my depend on limiting exceptions to the performance path

- What are the probable characteristics of a duct-testing code change that:
  - Achieves substantial energy savings
  - Imposes a minimum of cost and inconvenience (and therefore has a chance of ICC approval)
  - Builds on and builds up the testing/rating industry and infrastructure

• Replace subjective language

E.g.,

"...shall be sealed" becomes something like:

"...shall be sealed so as to exhibit flow losses not more than X% when tested according to Y"

- Require test after ductwork rough-in
- Allow post-construction test at builder's option

(This would require that the code have specifications for more than one kind of test.)

- Set the prescriptive requirement at a somewhat lenient level (i.e., eliminate disasters and make modest average improvement)
- Allow trade-off credit for better test scores via the performance path

- Allow the test to be conducted by the HVAC installer for prescriptive compliance
- But make provision for the building official to require a third-party tester

E.g.,

"The official shall be permitted to require verification of leakage test results by an approved third-party tester."

 Require a third-party tester if credit is taken for a better-than-prescriptive score

#### **Duct Testing and the IECC**

### DISCUSSION

### Comments to: todd.taylor@pnl.gov