



**Regional Codes Coordinating Committee Approved ACH Tradeoff  
Guidance for Code Officials, Raters, and Builders**

The Environmental and Green Advisory Board of the North Texas Council of Governments (NCTCOG) requested Energy Systems Lab of Texas A&M University (ESL) to review a proposal to implement a tradeoff to allow a maximum envelope leakage of 4 ACH50 for one and two family dwellings and less than 5 ACH50 for townhomes and multifamily dwellings of three stories or less above grade. To meet compliance using this tradeoff one of the two alternative compliance methods listed below must be followed by completing all of the measures listed in the options. This increases the flexibility of the code without affecting stringency.

This tradeoff has been approved for use by ESL, and the tradeoff applies only to jurisdictions in the NCTCOG area. To meet compliance using this tradeoff, one of the following methods should be followed:

**1. Approved ACH Tradeoff for the Prescriptive Path:**

The tradeoff relaxes the required 3 ACH50 per Sections R402.4.1.2 (N1102.4.1.2) of the residential provisions of the 2015 IECC and the 2015 IRC. The tradeoff will permit houses that test to less than or equal to 4 ACH50 as outlined in Options #1 and #2 in the table below. The tradeoff is limited as follows:

1. Limited to one- and two- family residences with a conditioned floor area between 1,000 and 6,000 square feet.
2. Limited to one- and two-family residences containing between 2 to 6 bedrooms.
3. Assumes all ductwork and mechanical equipment is located in the unconditioned attic.
4. Assumes typical wood framing in the walls and roof.
5. Assumes one of the following heating/cooling systems:
  - a. All electric system with a heat pump for heating, or
  - b. A system with electric cooling and natural gas heating.
 (Note: dwellings using electric resistance strip heating do not qualify for this tradeoff.)

**ESL 4 ACH50 Prescriptive Tradeoff Code Equivalency Compliance <sup>a</sup>**

Envelope Component	Option #1	Option #2
R402.4 Air Leakage	≤ 4 ACH50	≤ 4 ACH50
Wall Insulation R-value	R13 + R3 <sup>b</sup>	R13 + R3 <sup>b</sup>
Fenestration U-factor	≤ 0.32	≤ 0.32
Fenestration SHGC	≤ 0.25	≤ 0.25
Ceiling R-value	≥ R49	≥ R49
Duct Insulation R-value	R8	R6
Radiant Barrier Required	No	Yes

<sup>a</sup> Except for the values listed in the table, all other mandatory code provisions are applicable.

<sup>b</sup> The first value listed is the R-value of cavity insulation, the second value is the R-value of the continuous insulation or insulated siding.



## **2. Approved ACH Tradeoff for the Performance Path:**

The approved tradeoff for one and two family dwellings allows for a maximum envelope leakage of 4 ACH50, provided the envelope leakage in the Standard Reference Design is 3 ACH50 and all other requirements of Section R405 are met, including all other mandatory measures. And, **the annual energy cost or source energy usage of the Proposed Design** is equal to or less than that of the Standard Reference Design. This will require additional energy efficiency measures to be implemented. The approved tradeoff for multifamily or townhomes and buildings classified as Group R2 and R4 of three stories or less allows a maximum envelope leakage of less than 5 ACH50, provided the Standard Reference Design envelope leakage is 3 ACH50 and all of the other requirements of Section R405 are met, including all other mandatory measures. And, **the annual energy cost or source energy usage of the Proposed Design** is equal to or less than that of the Standard Reference Design. This will require additional energy efficiency measures to be implemented.

### **IC3:**

The ESL has incorporated the tradeoff in their IC3 Code Compliance Calculator as the 2015 NCTCOG path in the code drop down menu. Builders using IC3 will receive a code compliant notification if their designs meet the requirements of this tradeoff and all other energy code requirements.

### **REMRate, EnergyGauge, or other compliance software:**

Other compliance software products have not incorporated this tradeoff into their compliance reports. Building Officials receiving Section R405 submittals from software other than IC3 may approve a R405 compliance report that designates the building as not in compliance due to non-compliance with the 3 ACH50 envelope leakage mandatory measure, provided the report also states that the envelope leakage is no greater than 4 ACH50 for single family homes and less than 5 ACH50 for multifamily or townhomes, and meets all other mandatory measures of the energy code.

REScheck currently does not have the flexibility to accommodate this trade-off.

## **3. Tradeoff for ACH Mandatory Requirements in the ERI Path is being considered – but has not been approved at this time.**

Please see <http://esl.tamu.edu/terp/documents/builders-info/> for copies of the ESL approval letters for this tradeoff.



July 8, 2016

**Determination of Prescriptive Tradeoff Code Compliance Options  
for the NCTCOG Region**

In accordance with the Health and Safety Code, Section 388.003, subsection (e), the Energy Systems Laboratory of the Texas A&M University System has analyzed tradeoff code compliance options for the North Central Texas Council of Government (NCTCOG) Region to meet the requirements of the *2015 International Energy Conservation Code (IECC)* and the *2015 International Residential Code (IRC)*.

These tradeoff options are deemed to be not less stringent than the residential provisions of the *2015 IECC* and the *2015 IRC*. The tradeoff relaxes the required 3ACH<sup>50</sup> per Sections R402.4.1.2 (N1102.4.1.2) of the residential provisions of the *2015 IECC* and the *2015 IRC*. The tradeoff will permit houses that test to less than or equal to 4ACH<sup>50</sup> as outlined in Options #1 and #2 below. The tradeoff is limited as follows:

1. Limited to one- and two- family residences with a conditioned floor area between 1,000 and 6,000 square feet.
2. Limited to one- and two-family residences containing between 2 to 6 bedrooms.
3. Assumes all ductwork and mechanical equipment is located in the unconditioned attic.
4. Assumes typical wood framing in the walls and roof.
5. Assumes one of the following heating/cooling systems:
  - a. All electric system with a heat pump for heating, or
  - b. A system with electric cooling and natural gas heating.
 (Note: electric resistance strip heating does not qualify for this tradeoff.)

**ESL 4ACH<sup>50</sup> Prescriptive Tradeoff Code Equivalency Compliance<sup>a</sup>**

<b>Envelope Component</b>	<b>Option #1</b>	<b>Option #2</b>
R402.4 Air Leakage	≤ 4ACH <sup>50</sup>	≤ 4ACH <sup>50</sup>
Wall Insulation R-value	R13 + R3 <sup>b</sup>	R13 + R3 <sup>b</sup>
Fenestration U-factor	≤ 0.32	≤ 0.32
Fenestration SHGC	≤ 0.25	≤ 0.25
Ceiling R-value	≥ R49	≥ R49
Duct Insulation R-value	R8	R6
Radiant Barrier Required	No	Yes

<sup>a</sup> Except for the values listed in the table, all other mandatory code provisions are applicable.

<sup>b</sup> The first value listed is the R-value of cavity insulation, the second value is the R-value of the continuous insulation or insulated siding.



**ENERGY SYSTEMS LABORATORY**

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November 28, 2016

Ed Dryden, CBO  
Assistant Building Official  
Sustainable Development and Construction  
Building Inspections  
320 E. Jefferson Blvd., Room 115  
Dallas, TX 75203

Dear Mr. Dryden:

Per the request of the Energy and Green Advisory Board (EAGB) of the North Central Texas Council of Government (NCTCOG) and in accordance with Sec. 388.003 of the Health and Safety Code, the Energy Systems Laboratory (ESL) of the Texas A&M Engineering Experiment Station has performed a stringency analysis of certain proposed amendments and trade off analysis to the 2015 edition of the international Energy Conservation Code (IECC) and comparable sections to the energy provisions I Chapter 11 of the 2015 International Residential Code (IRC). In addition, the analysis considered the current Texas Building Energy Performance Standards and the 2015 edition of the IECC/IRC as published for the NCTCOG.

Part One of the request considered the requirements in reference to the ACH in the Mandatory Testing Section R402.4.1.1, in reference to the ACH. The ESL previously provided two prescriptive options for ACH compliance that met code stringency. Those options includes a trade-off of the 3 ACH in the Dallas-Fort Worth metro-plex area. Both options reduced code requirements in the following areas: window U-factor, wall R-value and infiltration ACH reduction and an increase in the attic insulation. One option also reduced the duct insulation R-value and added a radiant barrier.

Your request concerning the Performance Path (R405) can be evaluated in a similar manner as our prior Prescriptive Path analysis in that it increases the flexibility of the code without affecting stringency. So long as the proposed design demonstrates an annual energy cost that is equal to or less than that of the standard reference design, the tradeoff you propose is, by definition, as stringent or more stringent than the current Texas Building Energy Performance Standards.

An ACH trade-off is currently available using the ESL's International Code Compliance Calculator (IC3) when the Performance path and the NCTCOG Energy Code are selected.

Part Two of the request considered the possible Trade-Off for ACH Mandatory Requirements in the Energy Rating Index (ERI) path. This analysis is continuing and results will be provided upon completion.

Please feel free to contact us should you have any questions.

Sincerely,

Bahman L. Yazdani, P.E.  
Associate Director

Jeff Haberl, PhD  
Associate Director