

**Action**

**MEMORANDUM**

May 14, 2010

TO: County Council

FROM: Amanda Mihill, Legislative Analyst *A. Mihill*

SUBJECT: **Action:** Expedited Bill 10-10, Buildings – Energy Efficiency – Repeal

<b>Transportation, Infrastructure, Energy &amp; Environment Committee recommendation:</b> enact Bill 10-10.
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Expedited Bill 10-10, Buildings – Energy Efficiency – Repeal, sponsored by the Council President at the request of the County Executive, was introduced on March 23, 2010. A public hearing was held on April 13, at which 6 people testified (4, including the Executive, in support of Bill 10-10 and 2 in opposition to Bill 10-10).

Bill 10-10 would repeal the requirement that certain residential buildings meet certain ENERGY STAR standards; and generally amend the law relating to buildings, energy, and environmental policy. The Transportation, Infrastructure, Energy & Environment Committee discussed Bill 10-10 on April 28 in conjunction with a related item, Executive Regulation 26-09, Adoption of the 2009 International Building, Energy Conservation, Mechanical, Fuel-Gas, and Residential Codes. Action on the proposed regulation is scheduled for earlier this morning (agenda item 2A).

**Background**

The Council enacted Bill 30-07, Buildings – Energy Efficiency on April 22, 2008. Bill 30-07 required certain covered buildings to meet the ENERGY STAR standard by January 1, 2010. Bill 30-07 defined “covered building” as a newly constructed single family residential building or a multi-family residential building that is not covered by the County Green Buildings Law or is not eligible to earn an ENERGY STAR rating.

Bill 30-07 contained an uncodified provision which would delay the ENERGY STAR standard’s effective date from January 1 to April 1, 2010, if:

- the Director of the Department of Environmental Protection certifies by October 1, 2009 that an alternative approach would achieve the same energy efficiency goals and be less costly to builders and buyers of covered buildings; or
- the Sustainability Working Group finds that there is an insufficient number of qualified home energy performance raters doing business in the County.

On December 1, 2009, the Council enacted Expedited Bill 44-09, Buildings – Energy Efficiency – Deferral which deferred the effective date for requiring certain residential buildings to meet ENERGY STAR standards from January 1 to April 1, 2010. According to the Executive’s transmittal memorandum for Bill 44-09 (©9), DEP analyzed several alternative standards to the ENERGY STAR requirement and concluded that the 2009 International Energy Conservation Code, with the addition of a blower door test to verify compliance, would achieve the same energy goals as Bill 30-07. DEP concluded that the cost of complying with the IECC 2009 Code would be comparable, but could not conclude with certainty that IECC 2009 would cost less than the ENERGY STAR standard.

In his transmittal memorandum for Bill 10-10, the Executive noted that the IECC 2009 includes 2 verification paths – a blower door test or visual inspection of various components of a building’s air barrier and insulation. The Executive is convinced that IECC 2009, regardless of the choice of verification, will achieve the energy efficiency goals of Bill 30-07. The Executive stated that he was reluctant to specify one verification method over another given the consensus-based code development process and was concerned that requiring a blower door test would increase the cost of constructing a new home by \$200-\$400. At the public hearing, after questioning by Councilmember Berliner, Stan Edwards indicated that DEP believed the Executive’s view was “prudent” in terms of comparability to the ENERGY STAR standards. In conversations with Council staff, DPS staff indicated that they will require additional visual inspections, including an insulation inspection, which in their view makes it less likely that a house will be too leaky.

### **Issue/Committee Recommendation**

The primary issue the Committee considered was whether members concurred with the Executive’s conclusion that the 2009 building codes, regardless of verification method, would achieve the energy efficiency goals of ENERGY STAR. Both ENERGY STAR and the 2009 codes require a detailed visual inspection and a duct blaster test, which is used to measure duct leakage. The major difference in verification methods between ENERGY STAR and the 2009 codes is the blower door test, which is used to determine the air tightness of a house. A blower door test is used to determine compliance with ENERGY STAR, but the test is optional under the 2009 codes. Industry members raised concerns associated with the blower door test. Council staff identifies some advantages and disadvantages of using this test below.

#### **Advantages**

- indicates whether the house will meet the County’s energy efficiency goals;
- indicates whether the house is built too tight, which could result problems

#### **Disadvantages**

- happens late in the process, after walls are “closed in” so it costs more to find and fix problems;
- will cost additional money to conduct the

- associated with lower indoor air quality;
- the test is the best diagnostic test available to determine tightness.
- test;
- industry representatives argue that the test is unreliable and results can vary.

To address this issue, Council staff presented the Committee with the following options:

**1. Adopt 2009 codes and retain the ENERGY STAR requirement.** If the Committee is not convinced that the 2009 building codes will achieve comparable energy efficiency goals to the ENERGY STAR standard, the Committee could recommend the Council adopt the 2009 codes and not approve Bill 10-10.

**2. Adopt 2009 codes and do not retain the ENERGY STAR requirement.** If the Committee concurs with the Executive and is convinced that the 2009 codes will achieve the same energy efficiency goals as ENERGY STAR, with either a detailed visual inspection or a blower door test, the Committee could recommend that the Council adopt the 2009 codes and approve Bill 10-10.

**3. Adopt 2009 codes, do not retain the ENERGY STAR requirement, and require a blower-door test to verify energy conservation.** If the Committee believes that the 2009 codes should result in the same energy efficiency goals, but is not convinced that a visual inspection is sufficient to ensure that the County's energy efficiency goals will be met, the Committee could recommend adopting the 2009 codes with a local modification to require a blower door test to verify compliance with the 2009 codes and approve Bill 10-10.

**Committee recommendation:** The Committee recommended a variation of option (3). The Committee (3-0) recommended approval of Bill 10-10, but recommended (2-1, Councilmember Floreen opposed) to require a blower door test for 1 in 10 homes and sunset the blower door test requirement after 1 year. This option allows the Council to revisit this issue prior to the sunset date to determine whether the energy efficiency of a house built to the 2009 codes is comparable to ENERGY STAR. Councilmember Floreen supported adopting the 2009 codes, but did not support mandating the blower door test for new homes.

This packet contains:

Circle

Expedited Bill 10-10	1
Legislative Request Report	5
Memorandum from County Executive	6
Fiscal Impact Statement	8
CE Memorandum for Bill 44-09	9
Select Correspondence	
Stan Edwards, DEP	11
Larry Cafritz, Custom Builders Council	13
Raquel Montenegro, MNCBIA	19
Randy Melvin, Winchester Homes	21
ENERGY STAR Verification Options	
Builder Option Package	25
Performance Path	28
Thermal Bypass Checklist	30

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Expedited Bill No. 10-10  
Concerning: Buildings – Energy  
Efficiency - Repeal  
Revised: 4/30/2010 Draft No. 2  
Introduced: March 23, 2010  
Expires: September 23, 2011  
Enacted: \_\_\_\_\_  
Executive: \_\_\_\_\_  
Effective: [[April 1, 2010]]  
Sunset Date: None  
Ch. \_\_\_\_\_, Laws of Mont. Co. \_\_\_\_\_

## COUNTY COUNCIL FOR MONTGOMERY COUNTY, MARYLAND

By: Council President at the request of the County Executive

**AN EXPEDITED ACT** to:

- (1) repeal the requirement that certain residential buildings meet certain ENERGY STAR standards; and
- (2) generally amend the law relating to buildings, energy, and environmental policy.

By repealing

Montgomery County Code  
Chapter 8, Buildings  
Article VIII. Energy Efficiency

2008 Laws of Montgomery County, ch. 7, § 5

<b>Boldface</b>	<i>Heading or defined term.</i>
<u>Underlining</u>	<i>Added to existing law by original bill.</i>
[Single boldface brackets]	<i>Deleted from existing law by original bill.</i>
<u>Double underlining</u>	<i>Added by amendment.</i>
[[Double boldface brackets]]	<i>Deleted from existing law or the bill by amendment.</i>
* * *	<i>Existing law unaffected by bill.</i>

*The County Council for Montgomery County, Maryland approves the following Act:*

1           **Sec. 1. Article VIII of Chapter 8 is repealed as follows:**

2   **[Article VIII. Energy Efficiency]**

3   **[8-54. Definitions.]**

4           [In this Article, the following words have the meanings indicated:

5           “*Covered building*” means a newly constructed:

- 6                   (1)   single-family residential building; or
- 7                   (2)   multi-family residential building which is:
- 8                           (A)   not a covered building under Section 8-48; and
- 9                           (B)   eligible to earn the ENERGY STAR rating.

10          “*Department*” means the Department of Permitting Services.

11          “*Director*” means the Director of the Department or the Director’s designee.

12          “*ENERGY STAR rating*” means the ENERGY STAR rating developed by the  
13          federal Environmental Protection Agency which measures a building’s energy  
14          efficiency.

15          “*Home Energy Rating System*” or “*HERS*” means the energy efficiency rating  
16          system for residential buildings developed by RESNET.

17          “*Qualified home energy performance rater*” means an individual who:

- 18                   (1)   is certified by RESNET as a home energy performance rater; or
- 19                   (2)   meets other equivalent requirements approved by the Director.

20          “*RESNET*” means the Residential Energy Services Network.

21          “*Performance path*” means the process developed by the federal  
22          Environmental Protection Agency under which a building may achieve the  
23          ENERGY STAR rating if it:

- 24                   (1)   achieves the applicable HERS index score; and
- 25                   (2)   is verified and field-tested by a qualified home energy  
26          performance rater.

27 “*Prescriptive path*” means the process developed by the federal Environmental  
28 Protection Agency under which a building may achieve the ENERGY STAR  
29 rating if it:

- 30 (1) complies with the applicable ENERGY STAR Builder Option  
31 Package; and
- 32 (2) is verified and field-tested by a qualified home energy  
33 performance rater.]

34 **[8-55. ENERGY STAR standard.]**

35 [A covered building must achieve the ENERGY STAR rating under the  
36 performance or prescriptive path.]

37 **[8-56. Building permits; use and occupancy certificates.]**

38 [(a) Design plans. An applicant for a building permit for a covered building  
39 must submit to the Department:

- 40 (1) design plans for the building that are likely to achieve the  
41 standard under Section 8-55, as certified by a qualified  
42 home energy performance rater; and
- 43 (2) any other document or information the Department finds  
44 necessary to decide whether the building will achieve the  
45 standard under Section 8-55.

46 (b) Building permit. The Department must require compliance with  
47 Section 8-55 as a condition of any building permit issued for a  
48 covered building.

49 (c) Final use and occupancy certificate. The Department must not  
50 issue a final use and occupancy certificate for a covered building,  
51 if a use and occupancy certificate is otherwise required, unless it  
52 finds that the building complies with Section 8-55.]

53 **[8-57. Regulations.]**

54 [The County Executive must adopt regulations under Method (2) to  
55 administer this Article. Those regulations must specify:

56 (a) any process for becoming a qualified home energy performance  
57 rater that the Director finds is equivalent to the RESNET  
58 certification process;

59 (b) any standards and procedures under which the Director may  
60 approve full or partial waivers of Section 8-55 when compliance  
61 would be impractical or unduly burdensome and the waiver  
62 would serve the public interest; and

63 (c) standards and procedures for any enforcement mechanism that  
64 the Department finds necessary to accomplish the purposes of  
65 this Article.]

66 **Sec. 2. Section 5 of Chapter 7 of the 2008 Laws of Montgomery County,**  
67 **as amended by Section 1 of Chapter 32 of the 2009 Laws of Montgomery**  
68 **County, is repealed as follows:**

69 [(a) Section 8-55, as added by Section 4 of this Act, applies to any covered  
70 building for which a building permit application is filed on or after April  
71 1, 2010.

72 (b) By October 1, 2009, the County Executive must adopt, and submit to  
73 the Council under County Code Section 2A-15, regulations required by  
74 Section 8-57, as added by Section 4 of this Act.]

75 **Sec. 3. Expedited Effective Date.** The Council declares that this Act is  
76 necessary for the immediate protection of the public interest. This Act takes effect on  
77 April 1, 2010.



# LEGISLATIVE REQUEST REPORT

Expedited Bill 10-10

Buildings—Energy Efficiency—Repeal

- DESCRIPTION:** Repeals the requirement that certain residential buildings meet ENERGY STAR standards.
- PROBLEM:** Bill 30-07, Buildings – Energy Efficiency required “covered buildings” to meet the Energy Star standard for energy efficiency. In this context, covered buildings include (1) all single family homes; and (2) multi-family buildings that are eligible for the Energy Star rating and not covered by the County’s Green Buildings Law. Bill 44-09, Buildings – Energy Efficiency – Deferral deferred the effective date of these provisions to April 1, 2010.
- Bill 30-07 included language that authorized the Department of Environmental Protection (DEP) to “suspend” the applicability of the Energy Star standard until April 1, 2010 if DEP found an alternative standard that: (1) achieved the same energy efficiency goals; and (2) was less costly to builders and buyers of covered buildings. Following a comprehensive analysis of a number of alternative standards, DEP concluded that the 2009 International Energy Conservation Code (IECC 2009), with a local modification that would require a blower door test as a method of verifying compliance, would result in building energy performance that was comparable to the Energy Star standard.
- Maryland adopted IECC 2009 as the State energy code (effective January 1, 2010) and mandated that all local jurisdictions adopt this code by June 1, 2010. As adopted by the International Code Council (ICC), IECC 2009 includes two paths for verification – a blower door test or visual inspection of various components of a building’s air barrier and insulation. This bill recognizes that the ICC’s consensus-based code development process determined that IECC 2009 will achieve the same energy performance regardless of the verification option selected by the builder.
- GOALS AND OBJECTIVES:** To repeal the ENERGY STAR mandate that applies to single-family homes and certain other residential buildings.
- COORDINATION:** Department of Permitting Services
- FISCAL IMPACT:** Completed.
- ECONOMIC IMPACT:** To be requested.
- EVALUATION:** To be requested.
- EXPERIENCE ELSEWHERE:**
- SOURCE OF INFORMATION:** Hadi Mansouri, Chief, Division of Building Construction, DPS  
Stan Edwards, Chief, Compliance Division, DEP
- APPLICATION WITHIN MUNICIPALITIES:** To be determined.
- PENALTIES:** Class A



OFFICE OF THE COUNTY EXECUTIVE  
ROCKVILLE, MARYLAND 20850


Isiah Leggett  
County Executive

MEMORANDUM

March 16, 2010

RECEIVED  
MONTGOMERY COUNTY  
COUNCIL  
2010 MAR 18 AM 9:53

TO: Nancy Floreen, Council President

FROM: Isiah Leggett, County Executive 

SUBJECT: Proposed Legislation to Repeal the Energy Star Standard for Covered Buildings

I am forwarding to Council for introduction an Expedited Bill that would repeal provisions of the County Code which were added by Bill 30-07, Buildings – Energy Efficiency that require “covered buildings” to meet the Energy Star standard for energy efficiency. In this context, covered buildings include: (1) single family homes; and (2) multi-family buildings that are eligible for the Energy Star rating and not covered by the County’s Green Buildings Law (i.e., buildings that are three stories or less). I am also forwarding a Legislative Request Report for this bill.

Bill 30-07 made the Energy Star standard applicable to any covered building for which a building permit application is filed on or after January 1, 2010. Bill 44-09, Buildings – Energy Efficiency – Deferral (which the Council passed on December 10, 2009) deferred the applicability of the bill to building permit applications filed on or after April 1, 2010.

Bill 30-07 included language that authorized the Department of Environmental Protection (DEP) to “suspend” the applicability of the Energy Star standard until April 1, 2010 if DEP found an alternative standard that: (1) achieved the same energy efficiency goals; and (2) was less costly to builders and buyers of covered buildings. Following a comprehensive analysis of a number of alternative standards, DEP concluded that the 2009 International Energy Conservation Code (IECC 2009), with a local modification that would require a blower door test as a method of verifying compliance, would result in building energy performance that was comparable to the Energy Star standard. The blower door test is projected to cost \$200-\$400 for the average sized home.

Maryland adopted IECC 2009 as the State energy code (effective January 1, 2010) and mandated that all local jurisdictions adopt this code by June 1, 2010. As adopted by the International Code Council (ICC), IECC 2009 includes two paths for verification – a blower door test or visual inspection of various components of a building’s air barrier and insulation. Based on discussions with the Department of Permitting Services (DPS) and DEP, I am convinced that IECC 2009 will achieve the energy efficiency goals of Bill 37-07 regardless of

Nancy Floreen  
March 16, 2010  
Page 2

the verification option selected by the builder. Recognizing that the ICC's consensus-based code development process includes representatives from across the construction industry, including code regulators and industry representatives, I am reluctant to specify one verification method is more effective than the other. In addition, mandating a blower door test would increase the cost of constructing a new home by \$200-\$400 (or more if multiple tests were required), something I do not recommend given the current state of the construction industry.

Representatives of DPS can provide more information to Council on IECC 2009, and the processes used by builders and DPS to ensure that buildings comply with applicable energy codes. In addition, it would be appropriate for DPS and DEP to update the Council periodically on the status of changes to building codes like IECC, as well as voluntary standards like Energy Star. Significant changes to codes and standards are likely in the years ahead due to increased interest in improving the energy efficiency of all buildings, and the development of new energy related technologies and practices.

#### Attachments

cc: Kathleen Boucher, Assistant Chief Administrative Officer  
Carla Reid, Director, Department of Permitting Services  
Robert Hoyt, Director, Department of Permitting Services



056033

OFFICE OF MANAGEMENT AND BUDGET

Isiah Leggett  
County Executive

Joseph F. Beach  
Director

MEMORANDUM

April 14, 2010

TO: Nancy Floreen, President, County Council  
FROM: Joseph F. Beach, Director  
SUBJECT: Expedited Bill 10-10, Buildings - Energy Efficiency - Repeal

2010 APR 19 AM 8:53

RECEIVED  
MONTGOMERY COUNTY  
COUNCIL

The purpose of this memorandum is to transmit a revised fiscal and economic impact statement to the Council on the subject legislation.

LEGISLATION SUMMARY

Bill 10-10 would repeal the requirement that single-family homes and certain other residential buildings meet ENERGY STAR standards.

FISCAL AND ECONOMIC SUMMARY

This bill, in conjunction with Executive Regulation 26-09, will have no net fiscal impact on the County. [Executive Regulation 26-09 ("2009 International Building, Energy Conservation, Mechanical, Fuel-Gas, and Residential Codes") will, among other things, meet the intent of the ENERGY STAR requirements through the adoption of the State-mandated 2009 International Energy Conservation Code.]

Since Expedited Bill 10-10 repeals the requirement that certain buildings meet ENERGY STAR requirements, it would have an economic impact on the owner of an affected building: the owner would no longer have to incur the cost of verifying that the building meets ENERGY STAR requirements.

The following contributed to and concurred with this analysis: Stan Edwards, Department of Environmental Protection; Hadi Mansouri, Department of Permitting Services; David Platt, Department of Finance; John Greiner, Office of Management and Budget.

JFB:jg

- c: Kathleen Boucher, Assistant Chief Administrative Officer
- Dee Gonzalez, Offices of the County Executive
- Bob Hoyt, Director, Department of Environmental Protection
- Stan Edwards, Department of Environmental Protection
- Carla Reid, Director, Department of Permitting Services
- Hadi Mansouri, Department of Permitting Services
- David Platt, Department of Finance
- John Greiner, Office of Management and Budget
- John Cuff, Office of Management and Budget

Office of the Director



OFFICE OF THE COUNTY EXECUTIVE  
ROCKVILLE, MARYLAND 20850


Isiah Leggett  
County Executive

MEMORANDUM

November 12, 2009

2009 NOV 13 AM 11:36

RECEIVED  
MONTGOMERY COUNTY  
COUNCIL

TO: Phil Andrews, Council President  
FROM: Isiah Leggett, County Executive   
SUBJECT: Proposed Legislation

I am forwarding for your consideration an expedited bill that would modify the applicability of Bill 30-07, Buildings – Energy Efficiency (which the Council passed on April 22, 2008) to make it applicable to covered buildings for which a building permit application is filed on or after April 1, 2010. I am also forwarding a Legislative Request Report for this bill.

Bill 30-07 requires the following “covered buildings” to meet the Energy Star standard for energy efficiency: (1) all single family homes; and (2) multi-family buildings that are eligible for the Energy Star rating and not covered by the County’s Green Buildings Law (i.e., buildings that are three stories or less). Under Bill 30-07, the Energy Star standard is applicable to covered buildings for which a building permit application is filed on or after January 1, 2010.

Bill 30-07 included language that authorized the Department of Environmental Protection (DEP) to “suspend” the applicability of the Energy Star standard until April 1, 2010 if DEP found an alternative standard that: (1) achieved the same energy efficiency goals; and (2) was less costly to builders and buyers of covered buildings.

After enactment of Bill 30-07, DEP conducted a comprehensive analysis of the following alternative standards: (1) the 2009 International Energy Conservation Code (IECC 2009); (2) the National Association of Home Builder’s National Green Building Standard; and (3) the Department of Energy’s Builder Challenge. DEP concluded that IECC 2009, with a local modification that would require a blower door test as a method of verifying compliance, would achieve the same energy goals as the Energy Star standard. DEP also concluded that the cost of complying with this alternative standard would be *comparable to* the cost of complying with Energy Star. However, based on available data, DEP could not conclude with certainty that the cost of complying with this alternative standard would be *less than* the cost of complying with Energy Star.

\*\*

Phil Andrews  
November 12, 2009  
Page 2

The State recently adopted IECC 2009 as the State energy code standard (effective October 1, 2009) and mandated that all local jurisdictions adopt the IECC 2009 by April 1, 2010. The Department of Permitting Services (DPS) has drafted proposed regulations that would amend the County's building code to adopt IECC 2009. The proposed regulations will be published in the December 2009 County Register and submitted to Council in early 2010.

In light of the comparability of the IECC 2009 and Energy Star standards, I recommend that the Council make a final decision regarding the appropriate energy conservation standard for covered buildings under Bill 30-07 at the same time that it considers the proposed regulations to adopt the IECC 2009 for other types of new buildings. This would allow the Council to obtain a full understanding of how the IECC 2009 relates to the Energy Star standard before making a final decision regarding the appropriate standard for single family homes and multi-family buildings that are three stories or less.

I look forward to working with the Council as it considers this bill.

Attachments (2)

cc: Kathleen Boucher, Assistant Chief Administrative Officer  
Robert Hoyt, Director, Department of Environmental Protection  
Carla Reid, Director, Department of Permitting Services  
Leon Rodriguez, County Attorney

1/1

**Testimony on Behalf of County Executive Isiah Leggett  
Regarding Expedited Bill 10-10, Buildings-Energy Efficiency**

**Stan Edwards, Chief  
Division of Environmental Policy & Compliance  
Department of Environmental Protection**

**April 13, 2010**

Good afternoon. My name is Stan Edwards. I am the Chief of the Division of Environmental Policy & Compliance in the Department of Environmental Protection (DEP). Thank you for the opportunity to testify on behalf of the County Executive in support of Expedited Bill 10-10, which would repeal provisions of current law which were added by Bill 30-07, Buildings – Energy Efficiency and require “covered buildings” to meet the Energy Star standard for energy efficiency. In this context, covered buildings include (1) all single family homes; and (2) multi-family buildings that are eligible for the Energy Star rating and not covered by the County’s Green Buildings Law (i.e., buildings that are 3 stories or less).

Bill 30-07 made the Energy Star standard applicable to covered buildings for which a building permit application was filed on or after January 1, 2010. Bill 44-09, Buildings – Energy Efficiency – Deferral (which the Council passed on December 10, 2009) deferred the effective date of Bill 30-07 to April 1, 2010.

Bill 30-07 included language that authorized DEP to “suspend” the applicability of the Energy Star standard until April 1, 2010 if DEP found an alternative standard that: (1) achieved the same energy efficiency goals; and (2) was less costly to builders and buyers of covered buildings. Working with the Department of Permitting Services, DEP conducted a comprehensive analysis of a number of alternative standards. This analysis concluded that the 2009 International Energy Conservation Code (IECC 2009) contained methods and materials related to energy efficiency that would result in building energy performance comparable to the Energy Star standard. Maryland adopted IECC 2009 as the State energy code (effective January 1, 2010) and mandated that all local jurisdictions adopt this code by June 1, 2010.

The primary difference between IECC 2009 and the current Energy Star standard is the process for verifying compliance. Energy Star requires a blower door test. As adopted by the International Code Council (ICC), IECC 2009 includes two paths for verification – a blower door test or visual inspection of various components of a building’s air barrier and insulation. Based on discussions with DEP and DPS, the County Executive is convinced that IECC 2009 will achieve the energy efficiency goals of Bill 37-07 regardless of the verification option selected by the builder. Recognizing that the ICC’s consensus-based code development process includes representatives from across the construction industry, including code regulators and industry representatives, he is reluctant to specify one verification method is more effective than the other.

Representatives of DPS can provide more information to Council on IECC 2009, and the processes used by builders and the Department to ensure buildings comply with applicable energy codes. In addition, it would be appropriate for DPS and DEP to update the Council periodically on the status of changes to building codes like IECC, as well as voluntary standards

like Energy Star. Significant changes to codes and standards are likely in the years ahead due to increased interest in improving the energy efficiency of all buildings, and the development of new energy related technologies and practices.

I would be happy to address any questions the Council may have.





2

**EXECUTIVE COMMITTEE**  
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 (Liberty Home Builders Inc.)

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Axiom Engineering Design LLC

BRYAN WHITTINGTON

Whittington Design/Build

CARTER WILLSON

Carter Inc.

Comments on Behalf of the Custom Builders Council  
 on  
 Expedited BILL 10-10, Buildings – Energy Efficiency – Repeal  
 Public Hearing before the Montgomery County Council  
 April 13, 2010

Good afternoon, I am Larry Cafritz, representing the Custom Builders Council (CBC). Our builders specialize in building one-of-a-kind homes for specific customers on specific lots. I am testifying today in support of the County Executive's Expedited Bill 10-10, Buildings – Energy Efficiency.

Energy loss, in residential construction, is often due to the lack of insulation and lack of 'air-tightness'. We support efforts to clarify and improve energy efficiency. We believe that a component of being "sustainable" is to effect change in a cost-effective manner.

We believe that adopting the *IECC 2009* increases the energy efficiency of new homes to the Energy Star guideline, and meets the intent of Bill 30-07; we believe that it achieves that goal in the more cost-expeditious manner.

While current building code requires wall and ceiling insulation, and insulation in unconditioned spaces, there has been no insulation inspection. The new code addresses energy loss by adding the following requirements and inspections:

- 1) *Prior to drywall installation, the inspector must follow a thorough and detailed 17-step inspection process (see the attached four-page list) to verify air seal and insulation (in the walls, ceilings, floors, attics, window and door jambs, and behind recessed lighting and electrical boxes, among other places, as well as various systems and-components).*
- 2) *In addition, the code requires that the air duct system be sealed and tested for tightness using a duct blaster test.*

When a house under construction fails to pass these new inspections, it requires that the inefficiencies be addressed **before** the walls are 'closed-in' ... this corrects the inefficiencies at the **most efficient** point in the construction cycle. Consequently, any deficiencies can be fixed at a time that is much less disruptive to buyers and builders schedules and at a more reasonable cost -- when compared to fixing a problem if identified by a blower door test **after** home completion. (The blower door test, designed to measure air exchange and done after the house is completed, adds a redundant step at an additional cost ... It is wasteful and counter productive to unnecessarily require independent third party testing for something that can be addressed, in a more efficient and cost effective manner, via the new inspection processes.)

Custom Builders, because of the desires and demands of our customers, are often on the cutting edge of innovations and new building practices, which must be balanced by

**BUILDING HOMES, CREATING NEIGHBORHOODS**

13

practical, bottom-line measures. The IECC 2009 establishes energy efficiency, and recognizes that the best time to address inefficiencies is to correct them while a house is under construction, ***not after*** it has been completed.

For these reasons, the CBC supports Bill 10-10 and respectfully requests that the Council adopt the legislation, as drafted by the County Executive.

The Members of the CBC look forward to working with the Council and Staff in the April 28 T&E worksession to answer questions about practices that effectively, and sustainably, increase energy efficiency in new residential single-family homes.

Thank you for the opportunity to provide comments this afternoon.

Attachment: *Residential Energy Efficiency*, pages 29-32 of the 2009 International Energy Conservation Code

TABLE 402.2.5  
STEEL-FRAME CEILING, WALL AND FLOOR INSULATION  
(R-VALUE)

WOOD FRAME R-VALUE REQUIREMENT	COLD-FORMED STEEL EQUIVALENT R-VALUE <sup>a</sup>
Steel Truss Ceilings <sup>b</sup>	
R-30	R-38 or R-30 + 3 or R-26 + 5
R-38	R-49 or R-38 + 3
R-49	R-38 + 5
Steel Joist Ceilings <sup>b</sup>	
R-30	R-38 in 2 × 4 or 2 × 6 or 2 × 8 R-49 in any framing
R-38	R-49 in 2 × 4 or 2 × 6 or 2 × 8 or 2 × 10
Steel-Framed Wall	
R-13	R-13 + 5 or R-15 + 4 or R-21 + 3 or R-0 + 10
R-19	R-13 + 9 or R-19 + 8 or R-25 + 7
R-21	R-13 + 10 or R-19 + 9 or R-25 + 8
Steel Joist Floor	
R-13	R-19 in 2 × 6 R-19 + 6 in 2 × 8 or 2 × 10
R-19	R-19 + 6 in 2 × 6 R-19 + 12 in 2 × 8 or 2 × 10

a. Cavity insulation R-value is listed first, followed by continuous insulation R-value.

b. Insulation exceeding the height of the framing shall cover the framing.

**402.2.6 Floors.** Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

**402.2.7 Basement walls.** Walls associated with conditioned basements shall be insulated from the top of the *basement wall* down to 10 feet (3048 mm) below grade or to the basement floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections 402.1.1 and 402.2.6.

**402.2.8 Slab-on-grade floors.** Slab-on-grade floors with a floor surface less than 12 inches (305 mm) below grade shall be insulated in accordance with Table 402.1.1. The insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall. Insulation located below grade shall be extended the distance provided in Table 402.1.1 by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil. The top edge of the insulation installed between the *exterior wall* and the edge of the interior slab shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the *exterior wall*. Slab-edge insulation is not required in jurisdictions designated by the *code official* as having a very heavy termite infestation.

**402.2.9 Crawl space walls.** As an alternative to insulating floors over crawl spaces, crawl space walls shall be permitted to be insulated when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the floor to the finished grade level and then vertically and/or horizon-

tally for at least an additional 24 inches (610 mm). Exposed earth in unvented crawl space foundations shall be covered with a continuous Class I vapor retarder. All joints of the vapor retarder shall overlap by 6 inches (153 mm) and be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (153 mm) up the stem wall and shall be attached to the stem wall.

**402.2.10 Masonry veneer.** Insulation shall not be required on the horizontal portion of the foundation that supports a masonry veneer.

**402.2.11 Thermally isolated sunroom insulation.** The minimum ceiling insulation R-values shall be R-19 in Zones 1 through 4 and R-24 in Zones 5 through 8. The minimum wall R-value shall be R-13 in all zones. New wall(s) separating a sunroom from *conditioned space* shall meet the *building thermal envelope* requirements.

#### 402.3 Fenestration. (Prescriptive).

**402.3.1 U-factor.** An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements.

**402.3.2 Glazed fenestration SHGC.** An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the SHGC requirements.

**402.3.3 Glazed fenestration exemption.** Up to 15 square feet (1.4 m<sup>2</sup>) of glazed fenestration per dwelling unit shall be permitted to be exempt from U-factor and SHGC requirements in Section 402.1.1. This exemption shall not apply to the U-factor alternative approach in Section 402.1.3 and the Total UA alternative in Section 402.1.4.

**402.3.4 Opaque door exemption.** One side-hinged opaque door assembly up to 24 square feet (2.22 m<sup>2</sup>) in area is exempted from the U-factor requirement in Section 402.1.1. This exemption shall not apply to the U-factor alternative approach in Section 402.1.3 and the total UA alternative in Section 402.1.4.

**402.3.5 Thermally isolated sunroom U-factor.** For Zones 4 through 8, the maximum fenestration U-factor shall be 0.50 and the maximum skylight U-factor shall be 0.75. New windows and doors separating the sunroom from *conditioned space* shall meet the *building thermal envelope* requirements.

**402.3.6 Replacement fenestration.** Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for U-factor and SHGC in Table 402.1.1.

#### 402.4 Air leakage (Mandatory).

**402.4.1 Building thermal envelope.** The *building thermal envelope* shall be durably sealed to limit infiltration. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. The following shall be caulked, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material:

1. All joints, seams and penetrations.

2. Site-built windows, doors and skylights.
3. Openings between window and door assemblies and their respective jambs and framing.
4. Utility penetrations.
5. Dropped ceilings or chases adjacent to the thermal envelope.
6. Knee walls.
7. Walls and ceilings separating a garage from conditioned spaces.
8. Behind tubs and showers on exterior walls.
9. Common walls between dwelling units.
10. Attic access openings.
11. Rim joist junction.
12. Other sources of infiltration.

**402.4.2 Air sealing and insulation.** Building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options given by Section 402.4.2.1 or 402.4.2.2:

**402.4.2.1 Testing option.** Building envelope tightness and insulation installation shall be considered acceptable when tested air leakage is less than seven air changes per hour (ACH) when tested with a blower door at a pressure of 33.5 psf (50 Pa). Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation and combustion appliances.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;
2. Dampers shall be closed, but not sealed, including exhaust, intake, makeup air, backdraft and flue dampers;
3. Interior doors shall be open;
4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling system(s) shall be turned off;
6. HVAC ducts shall not be sealed; and
7. Supply and return registers shall not be sealed.

**402.4.2.2 Visual inspection option.** Building envelope tightness and insulation installation shall be considered acceptable when the items listed in Table 402.4.2, applicable to the method of construction, are field verified. Where required by the *code official*, an *approved* party independent from the installer of the insulation shall inspect the air barrier and insulation.

**402.4.3 Fireplaces.** New wood-burning fireplaces shall have gasketed doors and outdoor combustion air.

**402.4.4 Fenestration air leakage.** Windows, skylights and sliding glass doors shall have an air infiltration rate of no

more than 0.3 cfm per square foot (1.5 L/s/m<sup>2</sup>), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m<sup>2</sup>), when tested according to NFRC 400 or AAMA/WDMA/CSA 101/1.S.2/A440 by an accredited, independent laboratory and *listed* and *labeled* by the manufacturer.

**Exceptions:** Site-built windows, skylights and doors.

**402.4.5 Recessed lighting.** Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and *labeled* as meeting ASTM E 283 when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the *conditioned space* to the ceiling cavity. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

**402.5 Maximum fenestration U-factor and SHGC (Mandatory).** The area-weighted average maximum fenestration U-factor permitted using trade-offs from Section 402.1.4 or 404 shall be 0.48 in Zones 4 and 5 and 0.40 in Zones 6 through 8 for vertical fenestration, and 0.75 in Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using trade-offs from Section 405 in Zones 1 through 3 shall be 0.50.

## SECTION 403 SYSTEMS

**403.1 Controls (Mandatory).** At least one thermostat shall be provided for each separate heating and cooling system.

**403.1.1 Programmable thermostat.** Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

**403.1.2 Heat pump supplementary heat (Mandatory).** Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

**403.2 Ducts.**

**403.2.1 Insulation (Prescriptive).** Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.

**Exception:** Ducts or portions thereof located completely inside the *building thermal envelope*.

**403.2.2 Sealing (Mandatory).** All ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed.

Joints and seams shall comply with Section M1601.4.1 of the *International Residential Code*.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Leakage to outdoors shall be less than or equal to 8 cfm (226.5 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area* or a total leakage less than or equal to 12 cfm (12 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area* when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

2. Rough-in test: Total leakage shall be less than or equal to 6 cfm (169.9 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area* when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of *conditioned floor area*.

**Exceptions:** Duct tightness test is not required if the air handler and all ducts are located within *conditioned space*.

TABLE 402.4.2  
AIR BARRIER AND INSULATION INSPECTION COMPONENT CRITERIA

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air-permeable insulation is not used as a sealing material. Air-permeable insulation is inside of an air barrier.
Ceiling/attic	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down stair is sealed.
Walls	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
Windows and doors	Space between window/door jambs and framing is sealed.
Rim joists	Rim joists are insulated and include an air barrier.
Floors (including above-garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.
Crawl space walls	Insulation is permanently attached to walls. Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed.
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
Garage separation	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are air tight, IC rated, and sealed to drywall. Exception—fixtures in conditioned space.
Plumbing and wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower/tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical/phone box on exterior walls	Air barrier extends behind boxes or air sealed-type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.

**403.2.3 Building cavities (Mandatory).** Building framing cavities shall not be used as supply ducts.

**403.3 Mechanical system piping insulation (Mandatory).** Mechanical system piping capable of carrying fluids above 105°F (41°C) or below 55°F (13°C) shall be insulated to a minimum of R-3.

**403.4 Circulating hot water systems (Mandatory).** All circulating service hot water piping shall be insulated to at least R-2. Circulating hot water systems shall include an automatic or readily *accessible* manual switch that can turn off the hot-water circulating pump when the system is not in use.

**403.5 Mechanical ventilation (Mandatory).** Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

**403.6 Equipment sizing (Mandatory).** Heating and cooling equipment shall be sized in accordance with Section M1401.3 of the *International Residential Code*.

**403.7 Systems serving multiple dwelling units (Mandatory).** Systems serving multiple dwelling units shall comply with Sections 503 and 504 in lieu of Section 403.

**403.8 Snow melt system controls (Mandatory).** Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F, and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F.

**403.9 Pools (Mandatory).** Pools shall be provided with energy-conserving measures in accordance with Sections 403.9.1 through 403.9.3.

**403.9.1 Pool heaters.** All pool heaters shall be equipped with a readily *accessible* on-off switch to allow shutting off the heater without adjusting the thermostat setting. Pool heaters fired by natural gas shall not have continuously burning pilot lights.

**403.9.2 Time switches.** Time switches that can automatically turn off and on heaters and pumps according to a preset schedule shall be installed on swimming pool heaters and pumps.

**Exceptions:**

1. Where public health standards require 24-hour pump operation.
2. Where pumps are required to operate solar- and waste-heat-recovery pool heating systems.

**403.9.3 Pool covers.** Heated pools shall be equipped with a vapor-retardant pool cover on or at the water surface. Pools heated to more than 90°F (32°C) shall have a pool cover with a minimum insulation value of R-12.

**Exception:** Pools deriving over 60 percent of the energy for heating from site-recovered energy or solar energy source.

## SECTION 404 ELECTRICAL POWER AND LIGHTING SYSTEMS

**404.1 Lighting equipment (Prescriptive).** A minimum of 50 percent of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps.

## SECTION 405 SIMULATED PERFORMANCE ALTERNATIVE (Performance)

**405.1 Scope.** This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating, cooling, and service water heating energy only.

**405.2 Mandatory requirements.** Compliance with this section requires that the mandatory provisions identified in Section 401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of R-6.

**405.3 Performance-based compliance.** Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*. *Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.

**Exception:** The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.

### 405.4 Documentation.

**405.4.1 Compliance software tools.** Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official*.

**405.4.2 Compliance report.** Compliance software tools shall generate a report that documents that the *proposed design* complies with Section 405.3. The compliance documentation shall include the following information:

1. Address or other identification of the residence;
2. An inspection checklist documenting the building component characteristics of the *proposed design* as listed in Table 405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design*, and shall document all inputs entered by the user necessary to reproduce the results;
3. Name of individual completing the compliance report; and



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**Expedited BILL 10-10, Buildings – Energy Efficiency – Repeal  
 Public Hearing before the Montgomery County Council  
 April 13, 2010**

Good afternoon, I am Raquel Montenegro, representing the Maryland National Capital Building Industry Association (MNCBIA). The MNCBIA represents over 600 companies and the interests of more than 15,000 individuals in the building and development industry.

The Building Industry strongly supports energy efficiency measures, and sustainable practices. Many of our members build homes with appliances, windows and doors, and heating and cooling systems that often meet, and exceed Energy Star guidelines, and these home builders' business practices have been at the forefront of green building. It is important to note that, consequently, according to the EPA, homes built today are, on average 30% more energy efficient than homes built just ten years ago.

The MNCBIA supports Bill 10-10; we believe that adopting the International Efficient Construction Code (IECC) 2009 will result in new homes increasing their energy efficiency to Energy Star's requirement without incurring an unnecessary cost. We support the County's Executive decision to use "the visual inspection of various components of a building's air barrier and insulation" as the path to verification.

We appreciate the County Executive's recognition of the current economic instability, and his acknowledgment that our builders are striving to keep their costs in check, even if 'it is only' an additional cost of \$200-400.

From the industry's perspective, there are several additional substantive reasons not to rely on the "blower door test" as a path for verification of energy efficiency.

- The door blower test is **not** a scientific measured process; it does not result in the same outcome, when repeated, or when done by two different raters – the velocity of the wind, the temperature of the air, the amount of humidity – do affect the barometric pressure inside the house which then alters the results. Sometimes the variation can range by as much as 10-20%.
- The tester must calculate the volume of cubic feet in the structure; depending on how accurate (or inaccurate) the measurements are, the final result of the blower door test can vary, by as much as 15%.
- The blower door test, which is conducted after a house is complete, **does not pinpoint** where the energy-inefficiencies occur ... it simply measures the 'air exchange.

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Rather than rely on a test that is conducted *after* a house is finished, the additional inspections required by IECC 2009 will catch inefficiencies, *during construction*, when the builder, with his subcontractor, can actually fix them within the construction schedule.

The IECC 2009 increases the energy-efficiency of new homes to the Energy Star guidelines, provides a means to verify the energy-efficiency, and meets the intent of Bill 30-07; we believe that it achieves that goal in the more cost-expeditious manner.

For these reasons, the MNCBIA supports Bill 10-10 and respectfully requests the Council to adopt the legislation, as drafted by the County Executive.

We appreciate your consideration of our perspective on the applicability of the IECC 2009 and Bill 10-10 and we look forward to working with Council and Council staff at the April 28 worksession to provide additional information that supports effective, and sustainable, energy efficiency in new residential single-family homes.

Thank you.



4

**Expedited BILL 10-10  
Montgomery County, MD  
Public Hearing April 13, 2010**

Good afternoon, I am Randy Melvin- Director Research and Standards for Winchester Homes, Inc. I am testifying on behalf of Winchester Homes, Inc. in support of County Executive's Expedited Bill 10-10.

For those of you may not be familiar with Winchester, we are a Bethesda Maryland based builder/developer. We are also the builder of Camberly Homes, our luxury line of homes. By listening to our customers, continuously improving our products and processes, and giving back to the communities where we work and live we have had the good fortune to be able to build over 18,000 homes in the area over the past 30 years. Over the past several year's improvements to our homes wrapping, flashing, windows and numerous other details have all contributed to enhanced air tightness and energy efficiency.

We have learned from our experiences, which include building EnergyStar Certified Homes, and recently completed energy related research, on our homes, that the information a blower door test, (a blower door test is a means of measuring air tightness of a home at a point in time under specific circumstances) in field practice, is not an exact science. While we believe it is a natural tendency to assume a blower door test would provide superior information to a visual air sealing inspection, our research, as well as others, have found this is not the case. The 2009 International Energy Conservation Code further substantiates this position by allowing the choice of either a specifically defined visual inspection or a blower door test for means of verifying the approximate air tightness of a home.

To briefly describe our research, we asked the energy experts at the NAHB Research Center to identify any gaps between our current 2006 energy codes built homes the requirements of the 2009 International Energy Conservation Code or equivalent to be adopted. They examined 4 of our homes, one of which had previously received Energy Star Certification. The homes represent a cross section of our product line. (Including towns , typical size single family home, large single family home, different jurisdiction/subdivisions, built by different subcontractors, and containing single and multiple zone heating and cooling systems.) The homes had previously been built under normal production and county inspection process under the 2006 energy code. We, our subcontractors, and inspectors had no knowledge we would be testing these homes. One of the specific items of interest was the air tightness and blower door tests were completed on each of these homes among other items. The result of the blower door tests are as follows:

## Blower Door Test Results:

Model	Volume FT <sup>3</sup>	Pressure ACH <sub>50</sub>	Depress ACH <sub>50</sub>	Average ACH <sub>50</sub>	Required by 2009 IECC
Newbury (Typical Single)	44,838	6.5*	5.5	6.0	≤7.0 ACH <sub>50</sub>
Sinclair (Typical Single With Sunroom)	44,523	6.5*	5.5	6.0	≤7.0 ACH <sub>50</sub>
Southridge (Large Single Energy Star)	61,598	5.9	5.1	5.5	≤7.0 ACH <sub>50</sub>
Liberty (End Unit Townhouse)	27,078	7.1	5.9	6.5	≤7.0 ACH <sub>50</sub>

\*Post test adjustment required

All the homes passed the air tightness requirements of the 2009 IECC or equivalent, even in the absence of the 2009 IECC detailed visual inspection. With the addition of the detailed inspection during construction it would clearly provide assurances of well sealed homes on a consistent basis.

Please note that because large homes have more interior volume relative to exterior surface area it is easier for them to meet air sealing requirements than with small homes. All else being equal, large homes will have less air leakage on a sq./ft. basis than smaller homes.

What was of particular interest and clearly demonstrates the inexact science of the blower test in a field application, is that when we compared the results of our blower door test done by a RESNET approved, nationally know Research Energy Engineer, with the RESNET approved Rater who had previously done the blower door test for the EnergyStar rating on this home, we found 100% variation. Specifically the Energy Star rater data shod the home to be 3.39 ACH<sub>50</sub> or twice as air tight as the research center had calculated. Other have also found variations between rating on the same home by different raters are not uncommon.

Reasons for considerable variations in Bower Door test results, for the same home, include, but by no means are limited to all of the following:

- Variable interpretation and application for volume calculations for the same home. While RESNET provides the following definition for a homes volume calculation; "Determine conditioned and indirectly conditioned volume of space by multiplying conditioned floor area by ceiling height. The house may need to be split into different spaces with different ceiling heights and added to each other for both conditioned and indirectly conditioned spaces. For areas with vaulted ceilings, volume must be calculated geometrically." it is not uniformly interpreted and or executed with consistent level of detail, such as taking the time to detail every option in a home such as tray ceilings, bulkheads (dropped ceilings), bay windows that may impact the volume. In addition other variation are common such as variability in how floor area is measured. E.G. measuring walls to interior of drywall vs. outside face of brick veneer. It is interesting to note that while the Research Center calculated the volume of the Southridge at 61,590 ft<sup>3</sup> the EnergyStar RESNET rater calculated the exact same home to at 52,956 ft<sup>3</sup>.
- Operator error in operating equipment. (E.G pressure hose forgotten to be stuck through the door)
- A cracked window was not observed during the test
- Calibration of the equipment was inaccurate at the time of the test
- Fire place damper open or closed (we have found this one item alone causes a variation of 400-450 CFM)
- One window or more sashes in a home not observed to be slightly cracked open.
- Tester is rushed and completes only 5 depressure tests in lieu of 5 pressure and 5 depressure.
- Errors in calculations even if starting with accurate raw data.

In conclusion, the developers of the 2009 IECC understood provided a choice of methods in verifying the air tightness of residential dwellings. While no method of inspection or measurement is perfect, the detailed visual inspection has many benefits and the blower door test clearly has many imperfections. We believe to the benefit of both consumers and builders alike, as provide for in the 2009 IECC, both of these methods of air tightness verification should be retained.



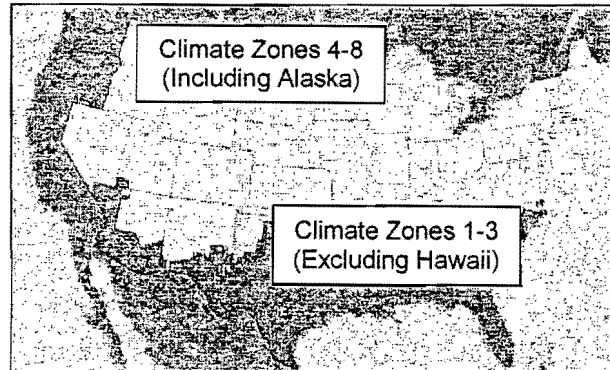
# ENERGY STAR Qualified Homes National Builder Option Package

The requirements for the ENERGY STAR Builder Option Package (BOP) are specified in the table below.

To qualify as ENERGY STAR using this BOP, a home must meet the requirements specified and be verified and field-tested in accordance with the HERS Standards by a RESNET-accredited Provider. Note that compliance with these guidelines is not intended to imply compliance with all local code requirements that may be applicable to the home to be built.<sup>1</sup>

	Hot Climates <sup>2</sup> (2004 IRC Climate Zones 1,2,3)	Mixed and Cold Climates <sup>2</sup> (2004 IRC Climate Zones 4,5,6,7,8)
<b>Cooling Equipment</b> (Where Provided)	Right-Sized <sup>3</sup> : <ul style="list-style-type: none"> <li>ENERGY STAR qualified A/C (14.5 SEER / 12 EER); <u>OR</u></li> <li>ENERGY STAR qualified heat pump<sup>4</sup> (14.5 SEER / 12 EER / 8.2 HSPF)</li> </ul>	Right-Sized <sup>3</sup> : <ul style="list-style-type: none"> <li>13 SEER A/C; <u>OR</u></li> <li>ENERGY STAR qualified heat pump<sup>4</sup> (14.5 SEER / 12 EER / 8.5 HSPF)</li> </ul>
<b>Heating Equipment</b>	<ul style="list-style-type: none"> <li>80 AFUE gas furnace; <u>OR</u></li> <li>ENERGY STAR qualified heat pump<sup>3,4</sup> (14.5 SEER / 12 EER / 8.2 HSPF); <u>OR</u></li> <li>80 AFUE boiler; <u>OR</u></li> <li>80 AFUE oil furnace</li> </ul>	<ul style="list-style-type: none"> <li>ENERGY STAR qualified gas furnace (90 AFUE); <u>OR</u></li> <li>ENERGY STAR qualified heat pump<sup>3,4</sup> (See Note 3 for specifications); <u>OR</u></li> <li>ENERGY STAR qualified boiler (85 AFUE); <u>OR</u></li> <li>ENERGY STAR qualified oil furnace (85 AFUE)</li> </ul>
<b>Thermostat<sup>4</sup></b>	ENERGY STAR qualified thermostat (except for zones with radiant heat)	
<b>Ductwork</b>	Leakage <sup>5</sup> : ≤ 4 cfm to outdoors / 100 sq. ft.; <u>AND</u> R-6 min. insulation on ducts in unconditioned spaces <sup>6</sup>	
<b>Envelope</b>	<ul style="list-style-type: none"> <li>Infiltration<sup>7,8</sup> (ACH50): 7 in CZ's 1-2   6 in CZ's 3-4   5 in CZ's 5-7   4 in CZ 8; <u>AND</u></li> <li>Insulation levels that meet or exceed the 2004 IRC<sup>9</sup>; <u>AND</u></li> <li>Completed Thermal Bypass Inspection Checklist<sup>10</sup></li> </ul>	
<b>Windows</b>	Windows that meet or exceed version 4.0 of the ENERGY STAR Program Requirements for Residential Windows, Doors, and Skylights (additional requirements for CZ 2 & 4) <sup>11,12,13</sup>	
<b>Water Heater<sup>14,15</sup></b>	Gas (EF): 40 Gal = 0.61   60 Gal = 0.57   80 Gal = 0.53 Electric (EF): 40 Gal = 0.93   50 Gal = 0.92   80 Gal = 0.89 Oil or Gas <sup>16</sup> : Integrated with space heating boiler	
<b>Lighting and Appliances<sup>17,18</sup></b>	Five or more ENERGY STAR qualified appliances, light fixtures, ceiling fans equipped with lighting fixtures, water heaters, and/or ventilation fans	

Note: Due to the unique nature of some state codes and/or climates, EPA has agreed to allow regionally-developed definitions of ENERGY STAR in California, Hawaii, and the Pacific Northwest to continue to define program requirements. The States of Montana and Idaho may use either the requirements of the national program or the regionally-developed program in the Pacific Northwest.



Map is for illustrative purposes only and is based on figure N1101.2 from the 2004 International Residential Code (IRC).



# ENERGY STAR Qualified Homes National Builder Option Package Notes

1. Where requirements of the local codes, manufacturers' installation instructions, engineering documents, or regional ENERGY STAR programs overlap with the requirements of these guidelines, EPA offers the following guidance:
  - a. In cases where the overlapping requirements exceed the ENERGY STAR guidelines, these overlapping requirements shall be met;
  - b. In cases where overlapping requirements conflict with a requirement of these ENERGY STAR guidelines (e.g., slab insulation is prohibited to allow visual access for termite inspections), then the conflicting requirement within these guidelines shall not be met. Furthermore, qualification shall still be allowed if the rater has determined that no equivalent option is available that could meet the intent of the conflicting requirement of these ENERGY STAR guidelines (e.g., switching from exterior to interior slab edge insulation).

2. The appropriate climate zone shall be determined by the 2004 International Residential Code (IRC), Figure N1101.2.
3. Cooling equipment shall be sized according to the latest editions of ACCA Manuals J and S, ASHRAE 2001 Handbook of Fundamentals, or an equivalent procedure. Maximum oversizing limit for air conditioners and heat pumps is 15% (with the exception of heat pumps in Climate Zones 5 - 8, where the maximum oversizing limit is 25%). The following operating conditions shall be used in the sizing calculations and verified where reviewed by the rater:

Outdoor temperatures shall be the 99.0% and 1.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the home's location or most representative city for which design temperature data are available; Indoor temperatures shall be 75 F for cooling and 70 F for heating; Infiltration rate shall be selected as "tight", or the equivalent term.

In specifying equipment, the next available size may be used. In addition, indoor and outdoor coils shall be matched in accordance with ARI standards.

The stated efficiency requirements are aligned with the increased requirements for ENERGY STAR labeled central air conditioners and air-source heat pumps that went into effect as of January 1, 2009. Equipment manufactured before January 1 is still eligible to earn the ENERGY STAR based on the old performance level. Therefore, there will be a transition period when labeled equipment is commercially available at both the old and new performance levels. Builders must transition to equipment meeting these new ENERGY STAR requirements as stocks of equipment qualified at the old performance levels are exhausted.

4. Homes with heat pumps in Climate Zones 4 and 5 must have an HSPF  $\geq 8.5$ , which exceeds the ENERGY STAR minimum of 8.2 HSPF. Homes with heat pumps in Climate Zones 6, 7, and 8 cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements. In homes in all Climate Zones with heat pumps that have programmable thermostats, the thermostat must have "Adaptive Recovery" technology to prevent the excessive use of electric back-up heating.
5. Ducts must be sealed and tested to be  $\leq 4$  cfm to outdoors / 100 sq. ft. of conditioned floor area, as determined and documented by a RESNET-certified rater using a RESNET-approved or equivalent ASTM-approved testing protocol. Duct leakage testing can be waived if all ducts and air handling equipment are located in conditioned space (i.e., within the home's air and thermal barriers) AND the envelope leakage has been tested to be  $\leq 3$  ACH50 OR  $\leq 0.25$  CFM 50 per sq. ft. of the building envelope.
6. EPA recommends, but does not require, locating ducts within the home's conditioned space (i.e., inside the air and thermal barriers), and using a minimum of R-4 insulation for ducts inside the conditioned space to prevent condensation.
7. Envelope leakage must be determined by a RESNET-certified rater using a RESNET-approved testing protocol.
8. To ensure consistent exchange of indoor air, whole-house mechanical ventilation is recommended, but not required.
9. Insulation levels of a home must meet or exceed Sections N1102.1 and N1102.2 of the 2004 IRC. These sections allow for compliance to be determined by meeting prescriptive insulation requirements, by using U-factor alternatives, or by using a total UA alternative. These sections also provide guidance and exceptions that may be used. However, note that the U-factor for steel-frame envelope assemblies addressed in Section N1102.2.4 shall be calculated using the ASHRAE zone method, or a method providing equivalent results, and not a series-parallel path calculation method as is stated in the code. Additionally, Section N1102.2.2, which allows for the reduction of ceiling insulation in space constrained roof/ceiling assemblies, shall be limited to 500 sq. ft. or 20% of ceiling area, whichever is less. In all cases, insulation shall be inspected to Grade I installation as defined in the RESNET Standards by a RESNET-certified rater.

Note that the fenestration requirements of the 2004 IRC do not apply to the fenestration requirements of the National Builder Option Package. Therefore, if UA calculations are performed, they must use the IRC requirements (with the exception of fenestration) plus the fenestration requirements contained in the national BOP. For more information, refer to the "Codes and Standards Information" document.

10. The Thermal Bypass Inspection Checklist must be completed for homes to earn the ENERGY STAR label.
11. Window performance levels must meet or exceed ENERGY STAR Program Requirements for Residential Windows, Doors, and Skylights— version 4.0, with additional requirements for climate zones 2 and 4. Refer to the county-level BOPs on EPA's Web site for the specific window performance levels required in each county of the country. Additional information about version 5.0 of the



# ENERGY STAR Qualified Homes National Builder Option Package Notes

program requirements for windows, which is more stringent and offers additional savings, can be found at [www.energystar.gov/windows](http://www.energystar.gov/windows).

12. All decorative glass and skylight window area counts toward the total window area to above-grade conditioned floor area (WFA) ratio. For homes with a WFA ratio >18%, the following additional requirements apply:
  - a. In IRC Climate Zones 1, 2, and 3, an improved window SHGC is required, and is determined by:  
**Required SHGC =  $[0.18 / \text{WFA}] \times [\text{ENERGY STAR SHGC}]$**   
*Where the ENERGY STAR SHGC is the minimum required SHGC of the climate-appropriate window specified in this BOP.*
  - b. In IRC Climate Zones 4, 5, 6, 7, and 8, an improved window U-Value is required, and is determined by:  
**Required U-Value =  $[0.18 / \text{WFA}] \times [\text{ENERGY STAR U-Value}]$**   
*Where the ENERGY STAR U-Value is the minimum required U-Value of the climate-appropriate window specified in this BOP.*
13. Up to 0.75% WFA may be used for decorative glass that does not meet ENERGY STAR requirements. For example, a home with total above-grade conditioned floor area of 2,000 sq. ft. may have up to 15 sq. ft. (0.75% of 2,000) of decorative glass.
14. More efficient water heating equipment represents a significant opportunity for energy savings and a meaningful way to differentiate ENERGY STAR qualified homes from those with standard equipment. An ENERGY STAR qualified water heater not only satisfies the Water Heater efficiency requirements, but also counts toward the requirement for five or more ENERGY STAR qualified lighting products or appliances as detailed in the Lighting and Appliances guideline.
15. To determine domestic hot water (DHW) EF requirements for additional tank sizes, use the following equations:  
Gas DHW EF  $\geq 0.69 - (0.002 \times \text{Tank Gallon Capacity})$ ; Electric DHW EF  $\geq 0.97 - (0.001 \times \text{Tank Gallon Capacity})$ .
16. In homes with gas or oil hydronic space heating, water heating systems must have an efficiency  $\geq 0.78$  EF. This may be met through the use of an instantaneous water heating system or an indirect storage system with a boiler that has a system efficiency  $\geq 85$  AFUE. Homes with tankless coil hot water heating systems cannot be qualified using this BOP, but can earn the label using the ENERGY STAR Performance Path requirements.
17. Any combination of ENERGY STAR qualified products listed may be installed to meet this requirement. ENERGY STAR qualified ventilation fans include range hood, bathroom, and inline fans. ENERGY STAR qualified lighting fixtures installed in the following locations shall not be counted: storage rooms (e.g., closets, pantries, sheds), or garages. Eligible appliances include ENERGY STAR qualified refrigerators, dish washers, and washing machines.
18. Efficient lighting fixtures represent a significant opportunity for persistent energy savings and a meaningful way to differentiate ENERGY STAR qualified homes from those meeting minimum code requirements. To learn more about the benefits of increasing the use of efficient fixtures through the installation of the ENERGY STAR Advanced Lighting Package (ALP), refer to [www.energystar.gov/alp](http://www.energystar.gov/alp).

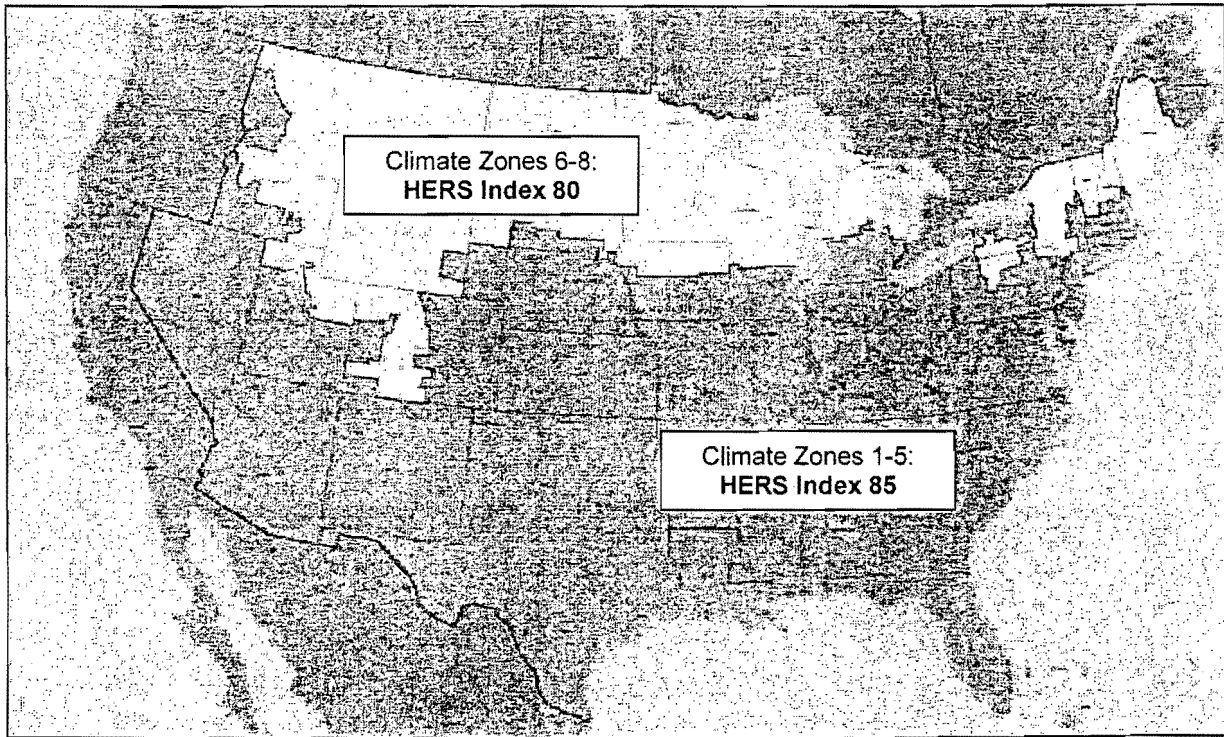


# ENERGY STAR Qualified Homes National Performance Path Notes

## ENERGY STAR Performance Requirements:

To qualify as ENERGY STAR, a home must meet the minimum requirements specified below and be verified and field-tested in accordance with the RESNET Standards by a RESNET-accredited Provider. Note that compliance with these guidelines is not intended to imply compliance with all local code requirements that may be applicable to the home to be built.<sup>1</sup>

### Maximum HERS Index Required to Earn the ENERGY STAR<sup>2</sup>



Note: Due to the unique nature of some state codes and/or climates, EPA has agreed to allow regionally-developed definitions of ENERGY STAR in California, Hawaii, and the Pacific Northwest to continue to define program requirements. The States of Montana and Idaho may use either the requirements of the national program or the regionally-developed program in the Pacific Northwest.

## ENERGY STAR Mandatory Requirements:

<b>Envelope</b> <sup>3,4,5</sup>	Completed Thermal Bypass Inspection Checklist															
<b>Ductwork</b> <sup>6,7</sup>	Leakage ≤ 6 cfm to outdoors / 100 sq. ft.															
<b>ENERGY STAR Products</b>	<p>Include at least one ENERGY STAR qualified product category:</p> <ul style="list-style-type: none"> <li>▪ Heating or cooling equipment<sup>8,9</sup>; <u>OR</u></li> <li>▪ Windows that meet the following eligibility requirements<sup>10</sup>; <u>OR</u></li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>ENERGY STAR Window Zone:</th> <th>Southern</th> <th>South / Central</th> <th>North / Central</th> <th>Northern</th> </tr> </thead> <tbody> <tr> <td>Window U-Value:</td> <td>≤ 0.65</td> <td>≤ 0.40</td> <td>≤ 0.40</td> <td>≤ 0.35</td> </tr> <tr> <td>Window SHGC:</td> <td>≤ 0.40</td> <td>≤ 0.40</td> <td>≤ 0.55</td> <td>Any</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>▪ Water heating equipment; <u>OR</u></li> <li>▪ Five or more ENERGY STAR qualified light fixtures<sup>11,12</sup>, appliances<sup>13</sup>, ceiling fans equipped with lighting fixtures, and/or ventilation fans<sup>14</sup></li> </ul>	ENERGY STAR Window Zone:	Southern	South / Central	North / Central	Northern	Window U-Value:	≤ 0.65	≤ 0.40	≤ 0.40	≤ 0.35	Window SHGC:	≤ 0.40	≤ 0.40	≤ 0.55	Any
	ENERGY STAR Window Zone:	Southern	South / Central	North / Central	Northern											
Window U-Value:	≤ 0.65	≤ 0.40	≤ 0.40	≤ 0.35												
Window SHGC:	≤ 0.40	≤ 0.40	≤ 0.55	Any												
<b>ENERGY STAR Scoring Exceptions</b>	<ul style="list-style-type: none"> <li>▪ On-site power generation may not be used to achieve the HERS Index required to qualify the home.</li> <li>▪ A maximum of 20% of all screw-in light bulb sockets in the home may use compact fluorescent lamps (CFLs) to achieve the HERS index required to qualify the home. CFLs used for this purpose must be ENERGY STAR qualified.</li> </ul>															





# ENERGY STAR Qualified Homes National Performance Path Notes

1. Where requirements of the local codes, manufacturers' installation instructions, engineering documents, or regional ENERGY STAR programs overlap with the requirements of these guidelines, EPA offers the following guidance:
  - a. In cases where the overlapping requirements exceed the ENERGY STAR guidelines, these overlapping requirements shall be met;
  - b. In cases where overlapping requirements conflict with a requirement of these ENERGY STAR guidelines (e.g., slab insulation is prohibited to allow visual access for termite inspections), then the conflicting requirement within these guidelines shall not be met. Furthermore, qualification shall still be allowed if the rater has determined that no equivalent option is available that could meet the intent of the conflicting requirement of these ENERGY STAR guidelines (e.g., switching from exterior to interior slab edge insulation).
2. The appropriate climate zone for each building site shall be determined by the 2004 International Residential Code (IRC), Table N1101.2. The HERS Index must be calculated in accordance with the RESNET Mortgage Industry National Home Energy Rating Standards.
3. The Thermal Bypass Inspection Checklist must be completed for homes to earn the ENERGY STAR label.
4. Envelope leakage must be determined by a RESNET-certified rater using a RESNET-approved testing protocol.
5. To ensure consistent exchange of indoor air, whole-house mechanical ventilation is recommended, but not required.
6. Ducts must be sealed and tested to be  $\leq 6$  cfm to outdoors / 100 sq. ft. of conditioned floor area, as determined and documented by a RESNET-certified rater using a RESNET-approved testing protocol. If total duct leakage is  $\leq 6$  cfm to outdoors / 100 sq. ft. of conditioned floor area, then leakage to outdoors does not need to be tested. Duct leakage testing can be waived if all ducts and air handling equipment are located in conditioned space (i.e., within the home's air and thermal barriers) AND the envelope leakage has been tested to be  $\leq 3$  ACH50 OR  $\leq 0.25$  CFM 50 per sq. ft. of the building envelope. Note that mechanical ventilation will be required in this situation.
7. EPA recommends, but does not require, locating ducts within conditioned space (i.e., inside the air and thermal barriers), and using a minimum of R-4 insulation for ducts inside conditioned space to prevent condensation.
8. All cooling equipment, regardless of whether it is used to satisfy the ENERGY STAR products requirement, must be sized according to the latest editions of ACCA Manuals J and S, ASHRAE 2001 Handbook of Fundamentals, or an equivalent computation procedure. Maximum oversizing limit for air conditioners and heat pumps is 15% (with the exception of heat pumps in Climate Zones 5 - 8, where the maximum oversizing limit is 25%). This can be accomplished either by the rater performing the calculations or reviewing documentation provided by the professional contractor or engineer who calculated the sizing (e.g., HVAC contractor). The following operating conditions shall be used in the sizing calculations and verified where reviewed by the rater:

Outdoor temperatures shall be the 99.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the home's location or most representative city for which design temperature data are available. Note that a higher outdoor air design temperature may be used if it represents prevailing local practice by the HVAC industry and reflects extreme climate conditions that can be documented with recorded weather data; Indoor temperatures shall be 75<sup>0</sup> F for cooling; Infiltration rate shall be selected as "tight", or the equivalent term.

In specifying equipment, the next available size may be used. In addition, indoor and outdoor coils shall be matched in accordance with ARI standards.
9. In homes with heat pumps that have programmable thermostats, the thermostat must have "Adaptive Recovery" technology to prevent the excessive use of electric back-up heating.
10. Where windows are used to meet the ENERGY STAR qualified product requirement, they shall be ENERGY STAR qualified or meet or exceed the listed eligibility requirements listed in this document, which are aligned with the ENERGY STAR Program Requirements for Residential Windows, Doors, and Skylights— version 4.0. To determine the ENERGY STAR window zone assigned to each county of the country, download the applicable county-level BOP on EPA's Web site and refer to the top right corner of the document. Additional information about version 5.0 of the program requirements for windows, which is more stringent and offers additional savings, can be found at [www.energystar.gov/windows](http://www.energystar.gov/windows).
11. For the purposes of meeting the ENERGY STAR requirement, qualified lighting fixtures in the following locations cannot be counted: storage rooms (e.g., closets, pantries, sheds), or garages.
12. To learn more about the benefits of increasing the use of efficient fixtures through the installation of the ENERGY STAR Advanced Lighting Package (ALP), refer to [www.energystar.gov/alp](http://www.energystar.gov/alp).
13. Eligible appliances include ENERGY STAR qualified refrigerators, dish washers, and washing machines.
14. ENERGY STAR qualified ventilation fans include range hood, bathroom, and inline fans.



## ENERGY STAR Qualified Homes Thermal Bypass Inspection Checklist

The Thermal Bypass Inspection Checklist must be completed for homes to earn the ENERGY STAR label. The Checklist requires visual inspection of framing areas where air barriers are commonly missed and inspection of insulation to ensure proper alignment with air barriers, thus serving as an extra check that the air and thermal barriers are continuous and complete. State, local, and regional codes, as well as regional ENERGY STAR program requirements, supersede the items specified in this Checklist.

### Guidance on Completing the Thermal Bypass Inspection Checklist:

1. Accredited HERS Providers and certified home energy raters shall use their experience and discretion in verifying that each Inspection Checklist item is installed per the inspection guidelines (e.g., identifying minor defects that the Provider or rater deems acceptable versus identifying major defects that undermine the intent of the Checklist item).
2. Alternative methods of meeting the Checklist requirements may be used in completing the Checklist, if the Provider deems them to be equivalent, or more stringent, than the Inspection Checklist guidelines.
3. In the event an item on the Checklist cannot be verified by the rater, the home cannot be qualified as ENERGY STAR, unless the builder assumes responsibility for verifying that the item has met the requirements of the Checklist. This option is available at the discretion of the Provider or rater but may not be used to verify more than six (6) items on the Inspection Checklist. This responsibility will be formally acknowledged by the builder signing-off on the Checklist for the item(s) that they verified. The column titled "N/A" should be used when the checklist item is not present in the home or when local code requirements take precedent.
4. The Checklist may be completed for a batch of homes using a RESNET-approved sampling protocol when qualifying homes as ENERGY STAR. For example, if the approved sampling protocol requires rating one in seven homes, then the Checklist will be completed for the one home which was rated.
5. In the event that a Provider or rater finds an item that is inconsistent with the Checklist Inspection guidelines, the home cannot be qualified as ENERGY STAR until the item is corrected in a manner that meets the ENERGY STAR requirements. If correction of the item is not possible, the home cannot earn the ENERGY STAR label.
6. The Provider or rater is required to keep a hard copy record of the completed and signed Checklist. The signature of a builder employee is also required if the builder verified compliance with any item on the Checklist.
7. For purposes of this Checklist, an air barrier is defined as any solid material that blocks air flow between a conditioned space and an unconditioned space, including necessary sealing to block excessive air flow at edges and seams. Additional information on proper air sealing of thermal bypasses can be found on the Building America Web site ([www.eere.energy.gov/buildings/building\\_america](http://www.eere.energy.gov/buildings/building_america)) and in the EEBA Builder's Guides ([www.eeba.org](http://www.eeba.org)). These references include guidance on identifying and sealing air barriers, as well as details on many of the items included in the Checklist.



# ENERGY STAR Qualified Homes Thermal Bypass Inspection Checklist

Home Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_

Thermal Bypass	Inspection Guidelines	Corrections Needed	Builder Verified	Rater Verified	N/A
1. Overall Air Barrier and Thermal Barrier Alignment	<b>Requirements:</b> Insulation shall be installed in full contact with sealed interior and exterior air barrier except for alternate to interior air barrier under item no. 2 ( <i>Walls Adjoining Exterior Walls or Unconditioned Spaces</i> )				
	<b>All Climate Zones:</b>				
	1.1 Overall Alignment Throughout Home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2 Garage Band Joist Air Barrier (at bays adjoining conditioned space)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.3 Attic Eave Baffles Where Vents/Leakage Exist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Only at Climate Zones 4 and Higher:</b>				
	1.4 Slab-edge Insulation (A maximum of 25% of the slab edge may be uninsulated in Climate Zones 4 and 5.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Best Practices Encouraged, Not Req'd.:</b>				
	1.5 Air Barrier At All Band Joists (Climate Zones 4 and higher)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.6 Minimize Thermal Bridging (e.g., OVE framing, SIPs, ICFs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Walls Adjoining Exterior Walls or Unconditioned Spaces	<b>Requirements:</b> <ul style="list-style-type: none"> <li>Fully insulated wall aligned with air barrier at both interior and exterior, <b>OR</b></li> <li>Alternate for <b>Climate Zones 1 thru 3</b>, sealed exterior air barrier aligned with RESNET Grade 1 insulation fully supported</li> <li>Continuous top and bottom plates or sealed blocking</li> </ul>				
	2.1 Wall Behind Shower/Tub	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2 Wall Behind Fireplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.3 Insulated Attic Slopes/Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.4 Attic Knee Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.5 Skylight Shaft Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.6 Wall Adjoining Porch Roof	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.7 Staircase Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.8 Double Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Floors between Conditioned and Exterior Spaces	<b>Requirements:</b> <ul style="list-style-type: none"> <li>Air barrier is installed at any exposed fibrous insulation edges</li> <li>Insulation is installed to maintain permanent contact with sub-floor above including necessary supports (e.g., staves for blankets, netting for blown-in)</li> <li>Blanket insulation is verified to have no gaps, voids or compression.</li> <li>Blown-in insulation is verified to have proper density with firm packing</li> </ul>				
	3.1 Insulated Floor Above Garage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.2 Cantilevered Floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Shafts	<b>Requirements:</b> Openings to unconditioned space are fully sealed with solid blocking or flashing and any remaining gaps are sealed with caulk or foam (provide fire-rated collars and caulking where required)				
	4.1 Duct Shaft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.2 Piping Shaft/Penetrations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.3 Flue Shaft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Attic/ Ceiling Interface	<b>Requirements:</b> <ul style="list-style-type: none"> <li>All attic penetrations and dropped ceilings include a full interior air barrier aligned with insulation with any gaps fully sealed with caulk, foam or tape</li> <li>Movable insulation fits snugly in opening and air barrier is fully gasketed</li> </ul>				
	5.1 Attic Access Panel (fully gasketed and insulated)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.2 Attic Drop-down Stair (fully gasketed and insulated)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.3 Dropped Ceiling/Soffit (full air barrier aligned with insulation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.4 Recessed Lighting Fixtures (ICAT labeled and sealed to drywall)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.5 Whole-house Fan (insulated cover gasketed to the opening)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Common Walls Between Dwelling Units	<b>Requirements:</b> Gap between drywall shaft wall (i.e., common wall) and the structural framing between units is fully sealed at all exterior boundary conditions				
	6.1 Common Wall Between Dwelling Units	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Home Energy Rating Provider: \_\_\_\_\_ Rater Inspection Date: \_\_\_\_\_ Builder Inspection Date: \_\_\_\_\_

Home Energy Rater Company Name: \_\_\_\_\_ Builder Company Name: \_\_\_\_\_

Home Energy Rater Signature: \_\_\_\_\_ Builder Employee Signature: \_\_\_\_\_