

**Version Tracking Document for
ENERGY STAR Qualified Homes, Version 3 (Rev. 02)
02/07/2011**

In the time since Revision 01 of the Version 3 ENERGY STAR New Homes guidelines were released, EPA has modified, clarified and refined various aspects of the program documents, primarily in response to partner questions and comments. This document is a summary of these edits, organized by the program document containing the change. EPA has also posted the revised program documents, labeled version 3 (Rev. 02), on its Web site at www.energystar.gov/homes.

All revisions are categorized as a Change, Clarification, or Refinement. These are defined as follows:

Change – The addition, deletion, or modification of a program requirement. A change will typically result from a partner question or feedback indicating that EPA’s original intent is not being met; a change in EPA’s intent is required; or due to changes in relevant standards (e.g., ENERGY STAR labeled product requirements, NAECA standards, IECC codes). A change is the most significant type of edit for partners because it is likely to change the way that partners comply with the program.

Clarification – The clarification of a program requirement, typically resulting from a partner question indicating confusion or ambiguity. Clarifications are not intended to significantly change the scope of the program guidelines, but rather to clarify the original intent of the requirement. A clarification is secondary in importance to a change; it should not significantly alter the way that most partners comply with the program. Items that are marked with an asterisk, “*”, are clarifications that did not require a change to the program documents.

Refinement – A minor change, such as an improved choice of words, a grammatical correction, or a correction to a typographical error. A refinement is the least important type of edit; it should have no impact on the way that partners comply with the program.

National Program Requirements

1. Clarification* – Definition of Conditioned Floor Area

Partners have asked EPA to define “finished” so that RESNET’s definition of conditioned floor area can be consistently applied. EPA defers to RESNET regarding the definition of Conditioned Floor Area, including the term “finished”. In defining Conditioned Floor Area, RESNET references ANSI Standard Z765-2003, which defines “finished floor area” as “an enclosed area in a house that is suitable for year-round use, embodying walls, floors, and ceilings that are similar to the rest of the house”.

2. Change – Step 1

The procedure for calculating the Benchmark Home Size and Size Adjustment Factor has been revised to reflect the policy change released by EPA on December 1, 2010. Step 1 has been updated to reflect these changes as follows:

“First, assess the eligibility to follow the Prescriptive Path by comparing the conditioned floor area (CFA) of the home to built to the CFA of the Benchmark Home as specified in Exhibit 3. For the purposes of this step, calculate the number of bedrooms and the CFA of the home to be built using RESNET standards with the following exceptions: bedrooms and floor area in basements with at least half of the gross surface area of the basement’s exterior walls below grade shall not be counted. If the CFA of the home to be built exceeds the CFA of the Benchmark Home, then the Performance Path shall be used.”

A new footnote has also been added to further clarify what is meant by below grade and to further clarify that the exclusion of basement conditioned floor area is only to be used when calculating the Size Adjustment Factor and the full conditioned floor area is to be used when rating the home and determining compliance with duct leakage requirements.

“To determine whether at least half of the basement wall area is below grade, use the gross surface area of the exterior walls from the basement floor to the bottom of the basement ceiling framing (e.g., the bottom of the joists for the floor above). Exclude the area of all common walls in the basement. If, as a result of this policy, a home has zero applicable bedrooms with regard to the Benchmark Home Size determination, then the Benchmark Home Size for one bedroom shall be used. Note that this change is only for the purpose of determining a home’s Benchmark Home Size, Size Adjustment Factor, and eligibility to use the Prescriptive Path. The full conditioned

floor area and number of bedrooms, per RESNET's standards, should be used when rating the home (e.g., determining compliance with duct leakage requirements).

3. **Clarification* – Definition of IECC Climate Zones**

Partners have indicated that “boroughs” listed on the IECC climate zone maps are confusing. IECC only defines climate zones based on county names, not borough names. While there may be some instances where a borough name is identical to a county name, Partners should always rely upon the county where the home will be built to determine the applicable climate zone.

4. **Change – Envelope, Windows, and Doors Section in Exhibit 1**

Footnotes for Exhibit 1 have been revised to better align the exceptions to the prescriptive insulation requirements with those exceptions allowed in the 2009 IECC and to better explain the process for using the equivalent U-factor and UA alternative compliance paths.

The revisions clarify that an alternative equivalent U-factor or total UA calculation may be used to demonstrate compliance in place of the prescriptive R-values; that the insulation levels of all non-fenestration components (i.e., ceilings, walls, floors, and slabs) can be traded off using the UA approach; and that regardless of the trade-offs, the ceiling and slab insulation R-value must meet or exceed the minimum values listed in items 4.1 through 4.3 of the Thermal Enclosure System Rater checklist.

The revisions also clarify that if the alternative equivalent U-factor or total UA calculations are not used, that steel-frame ceilings, walls, and floors shall meet the steel-frame insulation requirements of the 2009 IECC; that for ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves; and that for ceilings without attic spaces, R-30 shall satisfy the requirement for any required value above R-30 if the design of the roof/ceiling assembly does not provide sufficient space for the required insulation value. However, this exemption shall be limited to 500 square ft. or 20% of the total insulated ceiling area, whichever is less.

Finally, footnote 8 has been added to clarify that the top edge of slab insulation may be cut at a 45 degree angle toward the interior horizontal slab edge.

5. **Change – Water Heater Section in Exhibit 1**

The minimum required efficiency for 60 gallon electric water heaters has been corrected to 0.91 EF.

6. **Change – Thermostat & Ductwork Section in Exhibit 1**

EPA has added footnote 19 to the thermostat requirement of the Prescriptive Path requiring that, “For homes in all Climate Zones with heat pumps, the thermostat shall have ‘Adaptive Recovery’ technology to prevent the excessive use of electric back-up heating.”.

7. **Change – Lighting & Appliance Section in Exhibit 1**

EPA has changed the “Lighting & Appliances” section of the National Program Requirements from “ENERGY STAR qualified CFLs or pin-based lighting in 80% of fixtures ...” to “ENERGY STAR qualified CFLs, LEDs, or pin-based lighting in 80% of fixtures...” as new ENERGY STAR specifications for LED light bulbs went into effect in August of 2010.

8. **Change – Exhibit 4**

The implementation schedule in Exhibit 4 has been revised to reflect the policy change released by EPA on December 1, 2010, which delayed the implementation date for the v2.5 guidelines by three months. Furthermore, several of the terms and footnotes have been revised:

- The definition of single-family homes in footnote 1 of Exhibit 4 has been revised to include quadplexes. The footnote now reads, “Single-family homes include detached homes, townhomes, rowhomes, duplexes, triplexes, and quadplexes”.

- The term “Building Completion Date” has been revised to “Date of Final Inspection” and a footnote added this as “the date of the final inspection for the home (i.e., the date at which all of the field inspections are complete for the home, not necessarily the date when the label is issued)”.
- The following definition for the term “Permit Date” has been added: “The rater may define the ‘permit date’ as either the date that the permit was issued or the date of the contract on the home”.
- The extended timeline for homes financed through low-income housing agencies is now applicable to both single-family and multi-family homes. As a result, footnote 2 from Revision 01 of the program documents has been separated into two separate footnotes. The first reads, “Only condos and apartments in multi-family buildings may use this extended implementation schedule”. The second reads, “All low-income projects financed through low-income housing agencies may earn the ENERGY STAR under the last iteration of the guidelines, Version 2, until January 1, 2013 as long as the application for funding for those homes was received by the low-income housing agency before April 1, 2011 and the housing project includes at least one unit reserved for low-income tenants. If the application for funding is received between April 1, 2011 and December 31, 2011, then the homes must earn the ENERGY STAR under the Version 2.5 guidelines if completed before January 1, 2012, and under the Version 3 guidelines if completed after January 1, 2012. If the application for funding is received on or after January 1, 2012 then the homes must earn the ENERGY STAR under the Version 3 guidelines.”

9. **Change – Envelope, Windows, and Doors Section in Exhibit 1**

Footnote 9 has been added, providing an allowance to use Grade II insulation coupled with insulated sheathing for all surfaces. Therefore, insulated floors, rim joists or ceilings may use Grade II insulation if a layer of insulated sheathing is included that meets or exceeds the following levels: R-3 in Climate Zones 1 to 4; R-5 in Zones 5 to 8.

10. **Change – Thermostat & Ductwork Section in Exhibit 1**

EPA has revised several aspects of the footnotes regarding duct leakage testing.

First, footnote 20 has been revised to explicitly state that duct testing must be completed after the installation of the air handler and register grilles. While the RESNET standard allows testing to be completed without these components installed and with the use of default leakage values, EPA believes that testing under these conditions will not produce an accurate measure of the duct system leakage for the qualified home.

Second, Partners have suggested that EPA remove the exemption that it currently provides on total duct leakage testing for homes with ducts in conditioned space. EPA intended for this exemption to only apply to the measurement of duct leakage to the outside, not to the total duct leakage test, and has therefore removed this exemption. For all homes, the total duct leakage must be measured. Footnote 20 has been revised to reflect this change.

Third, Partners have suggested that EPA align its conditions for being exempted from duct testing with RESNET’s conditions. EPA has a precedence of defining the exemption based upon ducts being within the home’s air and thermal barriers and infiltration through the shell being exceptionally low. EPA intends to maintain this definition for v3.

Fourth, Partners have asked EPA to clarify for homes with multiple HVAC systems whether the leakage limits should be assessed for the overall home or for the conditioned floor area served by each system. Footnote 20 has been revised to state that “leakage limits shall be assessed on a per-system, rather than per-home, basis”. Note that this is a change from the policy for Version 2 of the guidelines.

Fifth, Partners have suggested that EPA define the duct leakage performance purely in terms of a total leakage test and a pressure-balancing test / airflow test. EPA believes that its reliance on the Rater to complete both a total leakage test and a test for leakage to the outdoors, coupled with the HVAC contractor’s responsibility to measure air flows, is the best combination of diagnostics for v3. EPA may alter the duct performance metrics in future revisions of the guidelines, as Raters become more adept at completing airflow diagnostics.

The revised footnote 20 is as follows: “Duct leakage shall be determined and documented by a Rater using a RESNET-approved testing protocol only after all components of the system have been installed (e.g., air handler and register grilles). Leakage limits shall be assessed on a per-system, rather than per-home, basis. Testing of duct leakage to the outside can be waived if all ducts & air handling equipment are located within the home’s air

and thermal barriers AND envelope leakage has been tested to be less than or equal to half of the prescriptive path infiltration limit for the Climate Zone where the home is to be built.”

ENERGY STAR County-Level Reference Design

11. Change – Step 1 of Prescriptive Path

The procedure for calculating the Benchmark Home Size and Size Adjustment Factor has been revised to reflect the policy change released by EPA on December 1, 2010. Step 1 has been updated to reflect these changes as follows:

“First, assess the eligibility to follow the Prescriptive Path by comparing the conditioned floor area (CFA) of the home to be built to the CFA of the Benchmark Home as specified in Exhibit 3. For the purposes of this step, calculate the number of bedrooms and the CFA of the home to be built using RESNET standards with the following exceptions: bedrooms and floor area in basements with at least half of the gross surface area of the basement’s exterior walls below grade shall not be counted. If the CFA of the home to be built exceeds the CFA of the Benchmark Home, then the Performance Path shall be used.”

A new footnote has also been added to further clarify what is meant by below grade and to further clarify that the exclusion of basement conditioned floor area is only to be used when calculating the Size Adjustment Factor and the full conditioned floor area is to be used when rating the home and determining compliance with duct leakage requirements.

“To determine whether at least half of the basement wall area is below grade, use the gross surface area of the exterior walls from the basement floor to the bottom of the basement ceiling framing (e.g., the bottom of the joists for the floor above). Exclude the area of all common walls in the basement. If, as a result of this policy, a home has zero applicable bedrooms with regard to the Benchmark Home Size determination, then the Benchmark Home Size for one bedroom shall be used. Note that this change is only for the purpose of determining a home’s Benchmark Home Size, Size Adjustment Factor, and eligibility to use the Prescriptive Path. The full conditioned floor area and number of bedrooms, per RESNET’s standards, should be used when rating the home (e.g., determining compliance with duct leakage requirements).

12. Change – Envelope, Windows, and Doors Section in Exhibit 3

Footnotes for Exhibit 3 have been revised to better align the exceptions to the prescriptive insulation requirements with those exceptions allowed in the 2009 IECC and to better explain the process for using the equivalent U-factor and UA alternative compliance paths.

The revisions clarify that an alternative equivalent U-factor or total UA calculation may be used to demonstrate compliance in place of the prescriptive R-values; that the insulation levels of all non-fenestration components (i.e., ceilings, walls, floors, and slabs) can be traded off using the UA approach; and that regardless of the trade-offs, the ceiling and slab insulation R-value must meet or exceed the minimum values listed in items 4.1 through 4.3 of the Thermal Enclosure System Rater checklist.

The revisions also clarify that if the alternative equivalent U-factor or total UA calculations are not used, that steel-frame ceilings, walls, and floors shall meet the steel-frame insulation requirements of the 2009 IECC; that for ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves; and that for ceilings without attic spaces, R-30 shall satisfy the requirement for any required value above R-30 if the design of the roof/ceiling assembly does not provide sufficient space for the required insulation value. However, this exemption shall be limited to 500 square ft. or 20% of the total insulated ceiling area, whichever is less.

Finally, a footnote has been added to clarify that the top edge of slab insulation may be cut at a 45 degree angle toward the interior horizontal slab edge.

13. Change – Envelope Section in Exhibit 3

A new footnote has been added providing an allowance to use Grade II insulation coupled with insulated sheathing for all surfaces. Therefore, insulated floors, rim joists or ceilings may use Grade II insulation if a layer of

insulated sheathing is included that meets or exceeds the following levels: R-3 in Climate Zones 1 to 4; R-5 in Zones 5 to 8.

14. **Change – Thermostat & Ductwork Section in Exhibit 3**

EPA has added a footnote to the thermostat requirement of the county-level reference design documents requiring that, “For homes with heat pumps, the thermostat shall have ‘Adaptive Recovery’ technology to prevent the excessive use of electric back-up heating.”.

15. **Change – Thermostat & Ductwork Section in Exhibit 3**

EPA has revised several aspects of the footnotes regarding duct leakage testing.

First, footnote 18 has been revised to explicitly state that duct testing must be completed after the installation of the air handler and register grilles. While the RESNET standard allows testing to be completed without these components installed and with the use of default leakage values, EPA believes that testing under these conditions will not produce an accurate measure of the duct system leakage for the qualified home.

Second, Partners have suggested that EPA remove the exemption that it currently provides on total duct leakage testing for homes with ducts in conditioned space. EPA intended for this exemption to only apply to the measurement of duct leakage to the outside, not to the total duct leakage test, and has therefore removed this exemption. For all homes, the total duct leakage must be measured. Footnote 18 has been revised to reflect this change.

Third, Partners have suggested that EPA align its conditions for being exempted from duct testing with RESNET’s conditions. EPA has a precedence of defining the exemption based upon ducts being within the home’s air and thermal barriers and infiltration through the shell being exceptionally low. EPA intends to maintain this definition for v3.

Fourth, Partners have asked EPA to clarify for homes with multiple HVAC systems whether the leakage limits should be assessed for the overall home or for the conditioned floor area served by each system. Footnote 18 has been revised to state that “leakage limits shall be assessed on a per-system, rather than per-home, basis”. Note that this is a change from the policy for Version 2 of the guidelines.

Fifth, Partners have suggested that EPA define the duct leakage performance purely in terms of a total leakage test and a pressure-balancing test / airflow test. EPA believes that its reliance on the Rater to complete both a total leakage test and a test for leakage to the outdoors, coupled with the HVAC contractor’s responsibility to measure air flows, is the best combination of diagnostics for v3. EPA may alter the duct performance metrics in future revisions of the guidelines, as Raters become more adept at completing airflow diagnostics.

The revised footnote 18 is as follows: “Duct leakage shall be determined and documented by a Rater using a RESNET-approved testing protocol only after all components of the system have been installed (e.g., air handler and register grilles). Leakage limits shall be assessed on a per-system, rather than per-home, basis. Testing of duct leakage to the outside can be waived if all ducts & air handling equipment are located within the home’s air and thermal barriers AND envelope leakage has been tested to be less than or equal to half of the prescriptive path infiltration limit for the Climate Zone where the home is to be built.”

General Comments on Inspection Checklists

16. **Clarification* – Home Address Field**

The Home Address field on the Inspection Checklists can be populated with the lot and block number of the home or any other identifier, so long as the Rater can reliably associate the checklist with the correct rated home if future questions arise.

17. **Refinement – Each Page of Notes throughout the Inspection Checklists**

For improved clarity, the name of the applicable checklist has been included in the header for each of the notes pages of the Inspection Checklists.

18. **Change – First Page of Inspection Checklists**

The documentation requirements have been revised by explicitly allowing either electronic or hard copies of the inspection checklists to be maintained by the Rater. The revised language is as follows: “The Rater is required to keep electronic or hard copies of the completed and signed checklists”.

19. **Clarification – First Page of Inspection Checklists**

The Rater’s role in assessing compliance with the inspection checklists has been clarified, as well as the process for resolving questions. The text has also been reorganized for clarity. The revised language emphasizes that:

- The role of the Rater is to determine whether the intent of each checklist item has been met;
- First the Provider, and then EPA, should be contacted if the Rater cannot determine whether the intent has been met;
- If EPA believes the current program guidelines are sufficiently clear to determine whether the intent has been met, then this guidance will be provided to the partner and enforced beginning with the house in question. In contrast, if EPA believes the program guidelines require revisions to make the intent clear, then this guidance will be provided to the partner but only enforced for homes permitted after a specified transition period after the release of the revised guidelines, typically 60 days in length.

The revised language is as follows:

“The Rater must review all items on the Rater checklists. Raters are expected to use their experience and discretion to verify that the overall intent of each inspection checklist item has been met (i.e., identifying major defects that undermine the intent of the checklist item versus identifying minor defects that the Rater may deem acceptable). The column titled “N/A,” which denotes items that are “not applicable,” should be used when the checklist item is not present in the home or conflicts with local requirements.

In the event that a Rater finds an item that is inconsistent with the intent of the inspection checklists, the home cannot earn the ENERGY STAR until the item is corrected. If correction of the item is not possible, the home cannot earn the ENERGY STAR. In the event that an item on a Rater checklist cannot be inspected by the Rater, the home also cannot earn the ENERGY STAR. The only exceptions to this rule are in the Thermal Enclosure System Rater Checklist, where the builder may assume responsibility for verifying a maximum of eight items. This option shall only be used at the discretion of the Rater. When exercised, the builder’s responsibility will be formally acknowledged by the builder signing off on the checklist for the item(s) that they verified.

In the event that a Rater is not able to determine whether an item is consistent with the intent (e.g., an alternative method of meeting a checklist requirement has been proposed), then the Rater shall consult their Provider. If the Provider also cannot make this determination, then the Rater or Provider shall report the issue to EPA prior to project completion at: energystarhomes@energystar.gov and will typically receive an initial response within 5 business days. If EPA believes the current program guidelines are sufficiently clear to determine whether the intent has been met, then this guidance will be provided to the Partner and enforced beginning with the house in question. In contrast, if EPA believes the program guidelines require revisions to make the intent clear, then this guidance will be provided to the Partner but only enforced for homes permitted after a specified transition period after the release of the revised guidelines, typically 60 days in length.

This process will allow EPA to make formal policy decisions as Partner questions arise and to disseminate these policy decisions through the periodic release of revised program documents to ensure consistent application of the program guidelines.”

Thermal Enclosure System Rater Checklist

20. **Clarification* – Qualification of Log Homes**

Log homes can earn the ENERGY STAR label under Version 3 of the guidelines using the Performance Path, as long as all requirements are met. Several requirements are worth discussing directly:

- To comply with section 2.1 of the Thermal Enclosure System Checklist, which requires in part that wall insulation levels meet or exceed the 2009 IECC levels, the equivalent U-factor of the log home wall assembly shall be calculated and be equal or less than that required for mass walls by the 2009 IECC for the applicable climate zone. For reference, the component R-values for mass walls are listed below, where the second value applies when more than half of the insulation is on the interior side of the mass wall:

CZ	R-Value
1	3 / 4
2	4 / 6
3	5 / 8
4	5 / 10
5 & 4M	13 / 17
6	15 / 19
7 & 8	19 / 21

Alternatively, the UA of the entire assembly may be calculated to assess compliance, per footnote 3 of the checklist. Where the thermal resistance of the wood is not documented, the Rater shall use a default value of R-1.4 per inch for softwoods and R-0.71 per inch for hardwoods.

- To comply with section 4.4 of the Thermal Enclosure System Rater Checklist, which requires reduced thermal bridging, the minimum log wall thickness must achieve the required thermal resistance or an additional wall component that meets the requirements of this section must be integrated into the assembly (e.g., an insulated wood frame wall with reduced thermal bridging, a SIP wall, an ICF wall, or a double wall may be constructed on the interior side of the wood logs or in between wood log facades).
- The Builder may check the box for “N/A” for item 2.1 of the Water Management System Builder Checklist, which typically requires flashing at the bottom of exterior walls. The same may be done for item 2.2, assuming that no exterior cladding is applied to the logs.

21. **Change – Items 1.1 and 1.2 and Footnote 2**

Section 1 and items 1.1 and 1.2 have been revised to emphasize that the requirements apply to all fenestration, not just to windows.

Footnote 2 been revised to better align the exceptions to the prescriptive fenestration requirements with those exceptions allowed in the 2009 IECC. The revisions clarify that area-weighted average values may be used to meet the U-value and SHGC requirements, that 15 square feet of fenestration is exempt from U-value and SHGC requirements, that one side-hinged opaque door assembly up to 24 square feet in area shall be exempt from the U-factor requirements, and that fenestration utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements.

Guidance has also been added to the footnote for fenestration for which the U-value or SHGC value is not known. The revised language is as follows: “If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the U-factor and SHGC value from tables 4 and 14, respectively, in 2005 ASHRAE Fundamentals, Chapter 31. Select the highest U-value and SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating).

22. **Change – Items 2.1, 4.1 through 4.3, and Footnotes 3 and 4**

Footnote 3 has been revised to better align the exceptions to the prescriptive insulation requirements with those exceptions allowed in the 2009 IECC and to better explain the process for using the equivalent U-factor and UA alternative compliance paths.

The revisions clarify that an alternative equivalent U-factor or total UA calculation may be used to demonstrate compliance in place of the prescriptive R-values; that the insulation levels of all non-fenestration components (i.e., ceilings, walls, floors, and slabs) can be traded off using the UA approach; and that regardless of the trade-offs, the ceiling and slab insulation R-value must meet or exceed the minimum values listed in items 4.1 through 4.3 of the checklist.

The revisions also clarify that if the alternative equivalent U-factor or total UA calculations are not used, that steel-frame ceilings, walls, and floors shall meet the steel-frame insulation requirements of the 2009 IECC; that for ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves; and that for ceilings without attic spaces, R-30 shall satisfy the requirement for any required value above

R-30 if the design of the roof/ceiling assembly does not provide sufficient space for the required insulation value. However, this exemption shall be limited to 500 square ft. or 20% of the total insulated ceiling area, whichever is less.

Item 4.1 of the checklist has been revised to state that for insulated ceilings with attic space above (i.e., non-cathedralized ceilings), uncompressed insulation shall extend to the inside face of the exterior wall below at the following levels: CZ 1 to 5: \geq R-21; CZ 6 to 8: \geq R-30

Item 4.2 of the checklist has been revised to state that, in climate zones 4 and higher, slab insulation of at least R-5 is required regardless of the UA calculations used.

Item 4.3 of the checklist has been revised to state that insulation beneath attic platforms (e.g., HVAC platforms, walkways) shall be \geq R-21 in CZ 1-5 and \geq R-30 in CZ 6-8.

Finally, footnote 4 has been revised to clarify that the top edge of slab insulation may be cut at a 45 degree angle toward the interior horizontal slab edge.

23. **Clarification* – Item 2.1**

EPA states in the Inspection Checklists that “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. Qualification shall only 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)”. Therefore, in cases where a REM/Rate report indicates non-compliance with the 2009 IECC UA requirements due to code-required termite inspection strips, the home may still be qualified 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.

24. **Refinement – Items 2.1 and 4.2 and Footnote 4 and 5**

Footnotes 4 and 5 have been created to address slab insulation details and have been referenced by items 2.1 and 4.2.

25. **Change – Item 2.2**

The allowance to use Grade II insulation coupled with insulated sheathing has been extended to all surfaces. Therefore, insulated floors, rim joists or ceilings may use Grade II insulation if a layer of insulated sheathing is included that is consistent with the R-values specified in item 4.4.1.

Also, the item has been revised to emphasize that all insulation shall meet these requirements, and not just wall insulation. In prior revisions of the program documents, EPA had implied, but not explicitly stated that all insulation including ceilings and floors, must achieve Grade I installation. The revised item is as follows: “All ceiling, wall, floor, and slab insulation shall achieve RESNET-defined Grade I installation or, alternatively, Grade II for surfaces with insulated sheathing (see checklist item 4.4.1 for required insulation levels)”.

26. **Clarification* – Item 2.2**

On page A-11 of the RESNET Mortgage Industry National HERS Standard, it states that “the interior sheathing/enclosure material is optional in climate zones 1-3, provided insulation is adequately supported and meets all other requirements.” Therefore, EPA’s requirements in item 2.2 are consistent with RESNET’s definition of Grade I installation.

27. **Clarification – Section 3, Footnote 6**

Footnote 6 has been revised to clarify the requirements when foam or flexible air barriers are used. Also, the references to the Building America Web site and EEBA guides have been moved to the guidebook. The revised language is as follows:

“For purposes of this checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and

seams and adequate support to resist positive and negative pressures without displacement or damage. EPA recommends, but does not require, rigid air barriers.

Open-cell or closed-cell foam shall have a finished thickness ≥ 5.5 " or 1.5", respectively, to qualify as an air barrier unless the manufacturer indicates otherwise.

If flexible air barriers, such as house wrap, are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads ≥ 1 " diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be ≥ 6 mil".

28. **Change – Section 3.1**

Footnote 8 has been added to the air barrier requirements for walls, which exempts up to 10% of the total exterior wall surface area from the thermal bridging requirements of section 3.1. Therefore, details such as uninsulated masonry fireplaces or thermal fins are permitted to be used in qualified homes as long as the total area is less than 10% of total exterior wall surface area. The new footnote reads "Up to 10% of the total exterior wall surface area is exempted from the reduced thermal bridging requirements to accommodate thermal fins, wing walls, masonry fireplaces or similar architectural details."

Also, item 3.1.3 has been revised to read, "Attic knee walls / sloped attics". Furthermore, footnote 11 has been added to clarify that "sloped attics shall meet the air barrier requirements for walls and are defined as sloped surfaces separating conditioned attics from ambient conditions. In contrast, sloped ceilings shall meet the air barrier requirements for ceilings and are defined as sloped surfaces separating conditioned house space from ambient conditions (e.g., sloped ceiling at the perimeter of a bedroom)."

29. **Change – Section 3.2**

A new allowance for complying with the requirement for fully-aligned air barriers at the interior surface of floors has been added to footnote 9, as follows: "Batts that completely fill a cavity enclosed on all six sides may be used to meet this requirement without the need for supports, even though some compression will occur due to the excess insulation, as long as the compressed value meets or exceeds the required insulation level. Specifically, the following batts may be used in six-sided floor cavities: R-19 batts in 2x6 cavities, R-30 batts in 2x8 cavities, R-38 batts in 2x10 cavities, and R-49 batts in 2x12 cavities. For example, in a home that requires R-19 floor insulation, an R-30 batt may be used in a six-sided 2x8 floor cavity".

Footnote 10 has been added to provide an additional option for meeting the fully-aligned air barrier requirement for floors. In prior revisions of the program documents, a fully-aligned air barrier was required at the interior surface of floors in all Climate Zones, including supports to ensure permanent contact and blocking at exposed edges. A new option has now been added. "Fully-aligned air barriers may be installed at the exterior surface of the floor cavity in all Climate Zones if the insulation is installed in contact with this exterior air barrier and the perimeter rim and band joists of the floor cavity are also sealed and insulated to comply with the fully-aligned air barrier requirements for walls." In effect, this new option recognizes that the thermal and air barrier can effectively be moved from the top of the floor cavity to the bottom and the walls of the floor cavity.

30. **Change –Section 3.3**

In the Section 3 heading, the bullet for ceilings has been revised to include the requirement for wind baffles in attics, which was listed in item 3.3.2 in prior revisions of the program guidelines. In addition, an allowance has been added to install a tabbed baffle in each bay with a soffit vent, rather than in every bay, as long as the tabbed baffle can prevent wind washing of insulation in adjacent bays. The additional sentence reads, "also, at interior edge of attic eave in all Climate Zones using a wind baffle that extends to the full height of the insulation. Include a baffle in every bay or a tabbed baffle in each bay with a soffit vent that will also prevent wind washing of insulation in adjacent bays." Therefore, for sloped ceilings that have an air space between the insulation and the roof decking, a baffle is required at the attic eave, but only one that extends to the height of the insulation, not the full length of the insulation.

Also, item 3.3.2 has been revised to read, "Sloped ceilings". Furthermore, footnote 11 has been added to clarify that "sloped attics shall meet the air barrier requirements for walls and are defined as sloped surfaces separating conditioned attics from ambient conditions. In contrast, sloped ceilings shall meet the air barrier requirements for

ceilings and are defined as sloped surfaces separating conditioned house space from ambient conditions (e.g., sloped ceiling at the perimeter of a bedroom).”

Finally, item 3.3.3 has been revised to encompass “all other ceilings”.

31. **Change – Item 4.1**

Item 4.1 has been revised to clarify EPA’s intent.

In the revised version, minimum R-values are designated, which must be achieved regardless of the trade-offs determined using an equivalent U-factor or UA alternative calculation. Note that if the minimum allowed values listed below are used, they must be compensated with higher values elsewhere using an equivalent U-factor or UA alternative calculation in order to meet the overall insulation requirements of the 2009 IECC. Also, note that these requirements can be met by using any available strategy, such as a raised-heel truss, alternate framing that provides adequate space, and/or high-density insulation. In climate zones one through three, one option that will work for most homes is to use 2x6 framing, an R-21 high-density batt, and a wind baffle that only requires 0.5” of clearance.

For insulated ceilings with attic space above (i.e., non-cathedralized ceilings), EPA’s intent is for the home to have uncompressed insulation extend to the inside face of the exterior wall below that meets or exceeds the following R-values:

Climate Zone	R-value of Uncompressed Insulation at Inside Face of Exterior Wall Below
1-5	R-21
6-8	R-30

Partners may use alternate details to meet the intent of this requirement. In such cases, the use of a spreadsheet calculator or similar tool would be one means to demonstrate that the intent has been met.

32. **Change – Item 4.2**

This item has been revised to emphasize EPA’s intent that the thermal break at slab edges shall align with the thermal boundary of the walls and to clarify that it only applies to slabs on grade. The revised language is as follows: “For slabs on grade in Climate Zones 4 and higher, 100% of slab edge insulated to \geq R-5 at the depth specified by the 2009 IECC and aligned with thermal boundary of the walls”. Footnote 5 has also been added to emphasize EPA’s intent: “Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the house, slab insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab. Post-tensioned slabs with integrated porch foundations are exempted from this requirement in all homes, as are post-tensioned slabs with integrated garage foundations in multi-family buildings, until feasible architectural details can be developed”.

33. **Change – Item 4.3**

This item has been revised to explicitly include walkways in the list of platforms that must allow for full-depth insulation below. In addition, rather than requiring full-depth insulation underneath platforms, EPA has defined minimum R-value requirements that shall be met or exceeded. The revised item now reads: “Insulation beneath attic platforms (e.g., HVAC platforms, walkways) \geq R-21 in CZ 1-5; \geq R-30 in CZ 6-8”.

34. **Clarification – Item 4.4**

Item 4.4 has been modified to explicitly note that rim / band joists are exempted from the requirements for reduced thermal bridging. The revised item reads: “Reduced thermal bridging at walls (rim / band joists are exempted) using one of the following options:”.

35. **Clarification – Item 4.4.1**

This item has been revised to clarify that rigid insulation may be used on the interior or exterior side of the wall. The following sentence has been added to footnote 13: “Rigid insulation, if used, may be installed on either the interior or exterior side of the wall”.

Regarding corners, footnote 13 states that if non-insulated structural sheathing is used at corners, advanced framing details listed under section 4.4.5 shall be met for those wall sections.

36. **Clarification – Item 4.4.1**

Footnote 13 for this item has been revised to clarify that insulating sheathing products that are rated for water protection may be used as a water resistant barrier. The revised footnote reads as follows: “Insulated sheathing rated for water protection can be used as a water resistant barrier if all seams are taped and sealed. If the insulated sheathing is not rated for water protection, it shall be attached directly over a water-resistive barrier and sheathing. In addition...”

37. **Refinement – Item 4.4.5**

The checkboxes have been removed from item 4.4.5 because no specific requirements are listed for this heading.

38. **Refinement – Item 4.4.5a and Footnote 16**

Footnote 16 has been updated to clarify that the intent is to construct corners that provide access for insulation installation rather than to require that a specific framing technique be used. The revised language is as follows: “All exterior corners shall be constructed to allow access for the installation of \geq R-6 insulation that extends to the exterior wall sheathing. Examples of compliance options include standard-density insulation with alternative framing techniques, such as using three studs per corner, or high-density insulation (e.g., spray foam) with standard framing techniques.”

39. **Clarification – Item 4.4.5b**

Footnote 17 has been updated to clarify that single or double headers with insulation on either side may be used to comply with this requirement. The footnote now reads: “Headers shall be minimum R-3 for Climate Zones 1 through 4 and R-5 for Climate Zones 5-8 using continuous rigid insulation sheathing, SIP headers, other prefabricated insulated headers, single-member or two-member headers with insulation either in between or on one side, or an equivalent assembly...”

Regarding the insulation of headers made from trusses, as per Footnote 17, an exception exists for instances where the structural engineered framing layout indicates that full-depth solid headers are the only acceptable option. While EPA would encourage the Partner to develop an alternate detail that will allow for continuous insulation of the header, the use of truss headers will meet the current guidelines if the open triangles are filled with insulation.

40. **Clarification – Item 4.4.5d**

This item has been revised to clarify that interior / exterior wall insulations should be insulated to the same level as the rest of the exterior wall. The revised item is as follows: “All interior / exterior wall intersections insulated to the same R-value as the rest of the exterior wall”.

41. **Change – Item 4.4.5e**

This item has been revised to allow 16” o.c. spacing for 2x6 walls in Climate Zones 1 through 4. Therefore, if a Partner elects to increase their wall insulation in these Climate Zones and to use 2x6 construction to accommodate the extra insulation, they may do so at 16” o.c. spacing and still qualify the home. The revised item is as follows: “Minimum stud spacing of 16” o.c. for 2x4 framing in all Climate Zones and, in Climate Zones 5 through 8, 24” o.c. for 2x6 framing unless construction documents specify other spacing is structurally required”.

42. **Clarification – Item 4.4.5e**

Footnote 20 for item 4.5.5e has been clarified by including framing members at the edge of pre-fabricated panels as one example of vertical framing members that have an alternative structural purpose and, therefore, do not need to achieve the 16” or 24” o.c. spacing. The revised footnote is as follows: “Vertical framing members shall either be on-center or have an alternative structural purpose (e.g., framing members at the edge of pre-fabricated panels).”.

43. **Clarification – Items 4.4.5b and 4.4.5e and Footnotes 17 and 20**

These two footnotes have been updated to clarify that a framing plan shall be provided by the builder, architect, designer, or engineer in cases where a header cannot be insulated because structural full-depth solid headers are the only acceptable option or where the rater finds that more than 5% of vertical framing members lack an apparent structural purpose. To comply with the requirement, the Rater simply needs to collect the framing plan, confirm that the detail(s) provided in the plan represent the details in question, and maintain a copy of the plan in the project file. The Rater need not evaluate the structural necessity of the details in the framing plan to qualify the home. Also, the framing plan need only encompass the details in question and not necessarily the entire home.

The revised language in footnote 17 is as follows: “..except where a framing plan provided by the builder, architect, designer, or engineer indicates that full-depth solid headers are the only acceptable option. The rater need not evaluate the structural necessity of the details in the framing plan to qualify the home. Also, the framing plan need only encompass the details in question and not necessarily the entire home”.

Footnote 20 has been updated as follows: “Vertical framing members shall either be on-center or have an alternative structural purpose (e.g., framing members at the edge of pre-fabricated panels) that is apparent to the rater or documented in a framing plan provided by the builder, architect, designer, or engineer. The rater need not evaluate the structural necessity of the details in the framing plan to qualify the home. Also, the framing plan need only encompass the details in question and not necessarily the entire home”.

44. **Change – Item 5.1.6**

An additional item has been added to section 5.1 that requires that light tube penetrations to unconditioned space be fully sealed and gasketed. Item 5.1.6 reads as follows “Light tubes adjacent to unconditioned space include lens separating unconditioned and conditioned space and are fully gasketed.” Footnote 21 has also been added to clarify that light tubes that do not have a lens are required to be insulated and sealed for the length of the light tube: “Light tubes that do not include a gasketed lens are required to be sealed and insulated \geq R-6 for the length of the tube.”

45. **Change – Item 5.1.5**

This item has been revised to clarify that only recessed lighting fixtures adjacent to unconditioned space need to be ICAT labeled and gasketed. A requirement for insulation has also been added for recessed lights installed in insulated ceilings without an attic above to minimize condensation potential. The revised language is as follows: “Recessed lighting fixtures adjacent to unconditioned space ICAT labeled and fully gasketed. Also, if in insulated ceiling without attic above, exterior surface of fixture insulated to \geq R-10 in CZ 4 and higher to minimize condensation potential”.

46. **Clarification – Item 5.2.1**

This item has been revised to clarify that sealing with caulk is required between all sill plates and the foundation or sub-floor below. A foam gasket is also required if the sill plate rests atop a concrete or masonry surface and when it is adjacent to conditioned space. The revised language is as follows: “All sill plates adjacent to conditioned space sealed to foundation or sub-floor with caulk. Foam gasket also placed beneath sill plate if resting atop concrete or masonry and adjacent to conditioned space.”

47. **Change – Items 5.2.2 and 5.2.3**

Items 5.2.2 and 5.2.3 have been revised by adding an allowance to use other types of caulk or foam in addition to silicone caulk and latex foam. The revised phrase is as follows: “using caulk, foam, or equivalent material..”

48. **Clarification – Item 5.2.2**

This item has been revised to clarify that only walls that adjoin unconditioned spaces require continuous top plates, or sealed blocking using caulk, foam, or equivalent material. The revised language is as follows: “At top of walls adjoining unconditioned spaces, continuous top plates or sealed blocking using caulk, foam, or equivalent material.”

49. **Clarification* – Item 5.2.3**

This item requires that the sheetrock be sealed to the top plate at all attic/wall interfaces. Therefore, in a two-story home, the top of the sheetrock on the first floor does not need to be sealed to the top plate because it is not adjacent to the attic.

50. **Change – Item 5.2.3**

Item 5.2.3 has been revised to make it clear that one method for achieving this requirement is to apply caulk or foam to the seam between the top plate and the sheetrock from the attic above. The revised language is as follows: “Sheetrock sealed to top plate at all attic/wall interfaces using caulk, foam, or equivalent material. Either apply sealant directly between sheetrock and top plate or to the seam between the two from the attic above. Construction adhesive shall not be used.”

EPA believes that construction adhesive will not durably seal the top plate to the drywall due to the lack of elasticity in dried adhesive. However, if evidence is presented in the future that adhesives perform as well as foam or caulk, then EPA will consider allowing this material to be used in future revisions of the guidelines.

51. **Clarification – Item 5.2.4**

An additional footnote has been added to clarify that in in Climate Zones 1 through 3, stucco over rigid insulation may be used to satisfy the requirement if it is tightly sealed to windows and doors. The new footnote reads as follows; “In Climate Zones 1-3, stucco over rigid insulation tightly sealed to windows and doors shall be considered equivalent to sealing rough openings with caulk or foam”

52. **Clarification – Item 5.2.6**

Item 5.2.6 has been revised to clarify that all seams between Structurally Insulated Panels shall be taped and/or foamed per manufacturer’s instructions. The revised language is as follows: “All seams between Structural Insulated Panels (SIPs) foamed and/or taped per manufacturer’s instructions”.

53. **Clarification* – Item 5.3.1**

Peel-and-stick weather stripping shall be permitted to be used as a means of compliance. If evidence demonstrates that peel-and-stick weather stripping has a significantly shorter life than other forms of weather stripping, then EPA will consider prohibiting its use in future revisions of the guidelines.

54. **Clarification – Item 5.3.1**

Item 5.3.1 has been revised to clarify that all doors adjacent to unconditioned space or to ambient conditions shall be gasketed or made substantially air tight. The revised language is as follows: “Doors adjacent to unconditioned space (e.g., attics, garages, basements) or ambient conditions gasketed or made substantially air-tight.”

55. **Clarification – Item 5.3.2**

Item 5.3.2 has been edited to clarify the purpose of the gasket and to ensure that caulk is not used to meet this requirement. The revised language is as follows: “Attic access panels and drop-down stairs equipped with a durable \geq R-10 insulated cover that is gasketed (i.e., not caulked) to produce continuous air seal when occupant is not accessing the attic”.

While some partners had requested that this requirement be split into two (i.e., one for attic access panels and one for drop-down stairs), this was not done due to space constraints. Other partners had suggested increasing the insulation level to the full 2009 IECC requirements. EPA defined the minimum requirement of \geq R-10 based on the availability of prefabricated covers available in the marketplace. Partners can always elect to exceed the minimum requirements.

56. **Change – Item 5.3.2 & 5.3.3**

These items have been revised to emphasize that the insulated cover must be durable, using the following phrase: “equipped with a durable \geq R-10 insulated cover..”. Footnote 23 has been added to list several options that EPA considers durable: “Examples of durable covers include, but are not limited to, pre-fabricated covers with integral insulation, rigid foam adhered to cover with adhesive, or batt insulation mechanically fastened to the cover (e.g., using bolts, metal wire, or metal strapping).”.

HVAC System QI Contractor Checklist

57. **Refinement** – Inspection Checklist Notes Pages

For clarity, the headers on the notes pages of the Inspection Checklist have been updated to include the relevant checklist name.

58. **Change** – Checklist Header and Item 2.6

A new header field has been added to allow the contractor to assign a unique descriptor for each HVAC system that is detailed in a checklist (e.g., whole-house, upper-level, lower-level) and another field has been added to allow the contractor to indicate whether that system is designed to handle temporary occupant loads.

Footnote 2 has been added to clarify that the first field shall provide a description of the HVAC system location or area served (e.g., “whole-house”, “upper level”, “lower-level”, or “supplemental for excess loads.”).

Footnote 3 has been added to provide a definition of a system that is designed to handle temporary occupant loads, as follows, “check ‘Yes’ if this system is to handle temporary occupant loads. Such a system may be required to accommodate a significant number of guests on a regular or sporadic basis and shall be handled by a supplemental cooling system (e.g., a small, single-package unit or split-coil unit) or by a system that can shift capacity from zone to zone (e.g., a variable volume system).”

Item 2.6 has been revised to require that the contractor record the number of occupants served by the system and footnote 9 has been added to define the total number of occupants that shall be modeled, as follows:

“The number of occupants among all HVAC systems in the home must be equal to the number of bedrooms, as defined below, plus one. Occupants listed for systems that are indicated in the header as a cooling system for temporary occupant loads, as described in footnote 3, shall be permitted to exceed this limit.

A bedroom is defined by RESNET as a room or space 70 sq. ft. or greater size, with egress window and closet, used or intended to be used for sleeping. A “den”, “library”, or “home office” with a closet, egress window, and 70 sq. ft. or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.

An egress window, as defined in IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:

- have a sill height of not more than 44 inches above the floor; AND
- have a minimum net clear opening of 5.7 sq. ft.; AND
- have a minimum net clear opening height of 24 in.; AND
- have a minimum net clear opening width of 20 in.; AND be operational from the inside of the room without the use of keys, tools or special knowledge”

59. **Clarification** – Entire Checklist

All references in the inspection checklist to ASHRAE 62.2-2007 have been updated to ASHRAE 62.2-2010 to reflect the latest version of this standard. However, EPA does not anticipate any significant impact on Partners as a result of this revision.

60. **Clarification*** – Entire Checklist

Partners have requested that EPA rearrange the checklist to simplify Rater verification by placing items that will be verified by the Rater next to one another. While this would be helpful to the Rater, it would result in a less intuitive layout for the HVAC contractor, who is completing the checklist. To try to accommodate both parties, EPA has instead included the number on the Rater Checklist of each item on the Contractor Checklist that must be Rater-verified.

61. **Refinement** – Verification Column Headings

For clarity, the “Cont. Verified” header on the Contractor Checklist has been revised to “Cont. / Tech. Verified”, to signify that this column is to be used by the HVAC contractor or technician, while the “Rater Verified” column is only to be used in cases where the Rater has agreed to verify and accept responsibility for one or more requirements. In addition, footnote 5 has been added to clarify the purpose of each checklist column using the

following language: “The ‘Cont. / Tech. Verified’ column shall be used to indicate items verified by the HVAC Contractor or Technician. The ‘Rater Verified’ column shall only be used to indicate items verified by the Rater, for homes in which the Rater has agreed to verify and accept responsibility for one or more requirements”.

62. **Change – Footnote 1 for Title Block of Inspection Checklist**

To further emphasize that boilers are not encompassed by the HVAC System Contractor Checklist, footnote 1 has been revised. The relevant sentences now read: “This checklist applies to ventilation systems, split air conditioners, unitary air conditioners, air-source/water-source (i.e., geothermal) heat pumps up to 65,000 Btu/h and furnaces up to 225,000 Btu/h. All other equipment, including boilers, is exempt”.

Footnote 1 has also been revised to clarify that the Rater is only responsible for the items on the checklist that are verified by the Rater, if any. The relevant revised footnote language is as follows: “This checklist shall be provided by the Rater to the HVAC contractor who shall complete one checklist for each system. Upon completion, the HVAC contractor shall return the checklist(s) to the Rater. Alternatively, at the discretion of the contractor and Rater, the Rater may verify any item on this checklist in place of the contractor. When this occurs, the Rater shall check the box of the verified items in the Rater Verified column. The Rater is only responsible for ensuring that the Contractor has completed the Contractor checklist in its entirety and for the items that are checked in the Rater Verified column (if any). The Rater is not responsible for assessing the accuracy of the items in this checklist that are not checked in the Rater Verified column. Instead, it is the contractor’s exclusive responsibility to ensure the design and installation comply with the Contractor checklist”.

63. **Clarification* – Items 1.1 and 3.13**

EPA requires that homes be designed to meet ASHRAE 62.2-2010, therefore, values that deviate from this standard shall not be used. While ventilation systems in hot-humid climates will increase the load on the home, this may be offset by other efficiency measures, such as reduced infiltration or windows with lower SHGC values. In cold climates, a similar approach can be used to reduce the sensible impact of ventilation air in the winter. In addition, properly designed HVAC systems shall account for the increased load of the ventilation air by increasing the capacity of system. With a properly designed system, the home should be able to meet the ventilation requirements of 62.2 without compromising occupant comfort, regardless of climate.

64. **Clarification – Item 1.3**

The frequency and duration of the ventilation system are intended to be documented as part of the “design rate” as outlined in Section 1.3 of the HVAC System QI Contractor Checklist. Item 1.3 has been revised to clarify this intent, as follows: “Documentation is attached with ventilation system type, location, design rate, and frequency and duration of each ventilation cycle”.

65. **Change – Item 2.4**

Item 2.4 has been clarified by adding a line to indicate the location for which the ACCA Manual J default temperatures were selected. Footnote 8 for this item has also been revised to require that the default values provided by ACCA Manual J be used unless the design conditions are dictated by a code or regulation.

The revised footnote now reads: “If the design conditions are dictated by a code or regulation, then the requirements of the lawful or controlling authority supersedes the Manual J or ASHRAE default design values. Otherwise, the default values shall be used. The values for the geographically closest location shall be selected or a justification provided for the selected location”.

66. **Clarification* - Item 2.10**

Partners have asked why EPA has suggested defaulting to “average” or “semi-loose” for cooling season infiltration rates in the footnote that accompanies item 2.10. These were selected because the values associated with these defaults, as defined by ACCA Manual J, Eighth Edition, Version Two, correspond most closely with the Prescriptive Path infiltration rates listed in the National Program Requirements for typical housing configurations.

67. **Clarification - Item 2.16**

Footnote 12 has been added to item 2.16 to provide a definition for Design Airflow, which is as follows: “Design airflow is the design value(s) for the blower in CFM, as determined by using the manufacturer’s expanded performance data to select equipment, per ACCA Manual S procedures.”

While variable speed fans are capable of operating at many different speeds, the HVAC designer will select one or more specific design speeds at which the system will operate and will record the corresponding design airflows on the contractor checklist in item 2.16. Therefore, when commissioning the system, the verifier can ensure that the actual airflow of the fan matches the actual design airflows indicated for item 2.16. Also, note that the Rater will not be responsible for verifying the airflow volume at the evaporator unless the Rater elects to verify this portion of the Contractor checklist, with the Contractor's consent.

68. **Refinement – Item 2.18**

For clarity, item 2.18 has been updated to be: “Full Load Calculations Report Attached”, rather than “Copy of Load Calculations Attached.”

69. **Clarification – Item 3.9**

The footnote for item 3.9 has been revised to provide exemptions to the fan speed type (ECM/ICM) requirement. “If whole-house ventilation system utilizes the HVAC air handler, then the fan speed type shall be ECM/ICM, variable speed and run at a reduced speed during ventilation, or include a controller (e.g., smart cyclor) that reduces the ventilation run time by accounting for hours when HVAC system is heating or cooling the home.”

70. **Change – Items 3.14 and 5.5**

Footnote 18 has been added for items 3.14 and 5.5, providing an allowance in some cases to use the orientation of a home that produces the largest load in place of the actual orientation of the home to be built. The footnote reads as follows: “Contractors shall perform a load calculation for the specific house plan and orientation of the home to be qualified or, for plans with multiple options or that may be built in more than one orientation, for every option and orientation. If the loads are calculated for multiple orientations and the loads across all orientations vary by $\leq 25\%$, then the largest load shall be permitted to be used for equipment selection for all orientations, subject to the over-sizing limits of ACCA Manual S. Otherwise, the contractor shall group the load for each orientation into a set with $\leq 25\%$ variation and equipment selection shall be completed for each set of loads. All other aspects of system design (e.g., duct static pressure, design airflow) shall be completed for the specific orientation and configuration of the home. Note that room-level design airflows determined using Manual J and Manual S may be different than the design values used for a standardized Manual D duct design for each option and orientation. Duct balancing shall be performed to meet the design airflows for each orientation and option.”

The process of selecting “the next nominal size” has also been updated to align with the latest edition of the ANSI / ACCA QI 5 protocol. Footnote 17 has been added for item 3.14 to indicate that, “for cooling systems, the next largest nominal piece of equipment may be used that is available to satisfy the latent and sensible requirements. Single-speed systems generally have OEM nominal size increments of $\frac{1}{2}$ ton. Multi-speed or multi-stage equipment may have OEM nominal size increments of one ton. Therefore, the use of these advanced system types can provide extra flexibility to meet the equipment sizing requirements.”

Footnote 19 has been added for item 5.5 to indicate that, “for warm air heating systems, the output capacity must be between 100% and 140% of calculated system load unless a larger size is dictated by the cooling equipment selection”.

71. **Clarification* – Sections 6, 7, and 8**

Partners have asked EPA whether any exemptions to the contractor checklist apply for homes in which the outside AC unit (i.e., condenser unit) is not installed at the time the home is inspected by the Rater due to cold weather conditions or concerns about theft. There are no exemptions provided on the Contractor checklist other than the option to install a TXV valve in place of completing the refrigerant charge tests if cold weather makes verification unfeasible. Therefore, the entire checklist must be completed prior to qualification of the home, even if Sections 6 through 8 are completed at a later date than the other sections due to the delayed installation of the condenser.

Note that EPA has provided two points of clarification, including one exemption, on the Rater checklist that will allow Raters to complete verification of the home without the need for an additional site visit after the condenser has been installed.

72. **Change – Section 7**

Certain equipment types (e.g., geothermal heatpumps, mini-split heatpumps, hermetically sealed factory-charged systems) or weather conditions don't lend themselves to standard sub-cooling or super-heat refrigerant charge tests. To accommodate these system types and conditions, item 7.10 has been added to the end of Section 7 for the contractor to indicate when "an OEM test procedure has been used in place of a sub-cooling or super-heat process and documentation has been attached that defines this procedure."

Note that EPA does not believe that using the weight of the refrigerant per linear foot of line set is an effective alternative to the standard sub-cool / super-heat procedure for the purpose of assessing the proper charge of an HVAC system. Therefore, this method shall not be used.

73. **Clarification – Items 9.3, 9.4, and 9.5**

These items have been reworded to emphasize that the pressure shall be measured in the duct and not in the air handler itself. The revised phrases are: "Return duct static pressure" and "Supply duct static pressure". Additionally, the location field has been clarified to state "Test hole location." Furthermore, the relevant portion from the footnotes, "Test hole locations are well-marked and accessible", has been moved into the main body of the checklist as item 9.5. Items 9.5 and 9.6 in the Revision 01 Checklist have been renumbered as 9.6 and 9.7.

74. **Clarification – Item 10.1**

Footnote 23 has been added for item 10.1 to clarify that balancing dampers are not the only available strategy for achieving proper air flow and to clarify where dampers are permitted to be installed. The footnote now reads as follows, "Ducts shall not include coiled or looped ductwork except to the extent needed for acoustical control. Balancing dampers or proper duct sizing shall be used instead of loops to limit flow to diffusers. When balancing dampers are used, they shall be located at the trunk to limit noise unless the trunk will not be accessible when the balancing process is conducted. In such cases, opposable blade dampers or dampers located in the duct boot are permitted."

75. **Clarification* – Item 12.1**

Partners have asked EPA to include a checkbox for "N/A" for item 12.1 for homes in which no drain pan is required. Note that this checkbox already exists in the checklist and it would be appropriate to select "N/A" for such situations.

76. **Clarification – Signature Block for HVAC System Quality Installation Contractor Checklist**

Footnote 25 has been updated to clarify that the HVAC technician must always sign in the signature block and the designer name and signature should be included when different from the HVAC technician. The footnote has been revised as follows, "HVAC technician signature required prior to submittal to Rater. If the HVAC system design (Sec. 1 & 2) was not completed by the HVAC technician, then the designer shall sign in addition to HVAC technician."

As noted in footnotes 1 and 25 of the Contractor Checklist, the person responsible for the heating, cooling, and ventilation design, whether it be the HVAC technician or other qualified HVAC design professional, shall be responsible for completing sections 1 and 2 of this checklist and, if the HVAC system design (Sec. 1 & 2) was not completed by the HVAC technician, then the designer shall also sign the checklist. If the design professional and technician are employed by different companies, then both companies must be accredited as a quality assured contractor.

HVAC System QI Rater Checklist

77. **Clarification* – Verification of HVAC System QI Rater Checklist**

Partners have asked whether a builder or HVAC Contractor can approve any of the items on the HVAC System Quality Installation Rater Checklist. EPA has not provided any allowances for Builder or Contractor verified items on this Rater Checklist; therefore, all items must be verified by the Rater.

78. **Clarification – Entire Checklist**

All references in the inspection checklist to ASHRAE 62.2-2007 have been updated to ASHRAE 62.2-2010 to reflect the latest version of this standard. However, EPA does not anticipate any significant impact on Partners as a result of this revision.

79. **Refinement – Item 1.1**

Item 1.1 has been revised to explicitly list the documentation that shall be collected from the Contractor by the Rater. This includes: the completed Contractor Checklist; the documentation on the ventilation system type, location, design rate, and frequency and duration of each ventilation cycle (1.3); the full load calculations report (2.18); the AHRI Certificate (3.15); and the balancing report indicating quantity of supply and return terminals per room (10.2). Item 1.1 has been revised as follows: “HVAC System Quality Installation Contractor checklist completed in its entirety and collected for records, along with documentation on ventilation system (1.3), full load calculations (2.18), AHRI certificate (3.15), and balancing report (10.2)”.

80. **Change – Item 1.2.1**

Item 1.2.1 has been revised to reflect the revision to item 2.4 on the contractor checklist, which requires the use of ACCA Manual J default design temperatures and reporting of the location for which the temperatures were selected. The revised item now states, “Outdoor design temperatures (2.4) are equal to the 1% and 99% ACCA Manual J design temperatures for contractor-designated design location.” Footnote 3 has also been added to clarify the documentation requirements for this item, as follows: “The Rater shall either confirm that the contractor selected the geographically closest available location or collect from the contractor a justification for the selected location. The Rater need not evaluate the legitimacy of the justification to qualify the home.”

81. **Clarification – Items 1.3, 2.8, 4.1., 4.2, 5.1, and Section 8**

To improve clarity, the word “measured” has been replaced with “Rater-measured” for items in this Checklist that require Raters to measure airflow, static pressure, or pressure differentials.

82. **Refinement – Entire HVAC System QI Rater Checklist**

For clarity, the verification column headings have been added to the second page of the HVAC System QI Rater Checklist.

83. **Change – Items 1.2.10, 6.2, and 6.3**

Partners have asked EPA whether any exemptions to the rater checklist apply for homes in which the outside HVAC unit (i.e., condenser unit) is not installed at the time the home is inspected by the Rater due to cold weather conditions or concerns about theft.

The entire checklist must be completed prior to qualification of the home, even if some items are completed at a later date than the other sections due to the delayed installation of the condenser. However, to minimize the burden on the Rater, item 1.2.10 has been clarified with a footnote stating that, “in cases where the condenser unit is installed after the time of inspection by the Rater, the HVAC manufacturer and model numbers on installed equipment can be documented through the use of photographs provided by the HVAC Contractor after installation is complete”. A footnote has also been added to item 6.2 and 6.3 stating that, “in cases where the condenser unit is installed after the time of inspection by the Rater, the Rater is exempt from verifying item 6.2 when the condenser is for an AC unit and also item 6.3 when the condenser is for a heatpump unit”.

With the addition of these two footnotes, EPA believes that Raters will be able to qualify the home after the installation of the condenser unit with the need for an additional site visit. Note that the Rater will still need to collect and review the final completed Contractor checklist per the requirements of the Rater checklist (e.g., verify that the calculated subcooling or superheat value equals the reported target subcooling or superheat temperature) and may only issue the label after the review is complete and all items have been verified.

84. **Refinement – Footnote 2**

For clarity, footnote 2 has been revised to emphasize that Raters are only verifying discrete objective parameters from the Contractor Checklist. The first sentence has been revised as follows: “The Rater is only responsible for ensuring that the Contractor has completed the Contractor checklist in its entirety and verifying the discrete

objective parameters referenced in Section 1 of this checklist, not for assessing the accuracy of the load calculations or field verifications included or to verify the accuracy of every input on the Contractor checklist”.

85. **Change – Item 1.2.3**

Item 1.2.3 has been revised to require that the rater verify that the correct number of occupants has been used in the load calculation, rather than the correct number of bedrooms. Footnote 4 has also been added to clarify that “the number of occupants among all HVAC systems in the home shall be equal to the number of RESNET-defined bedrooms plus one. Occupants listed for systems for which the header of the contractor checklist indicates that it is designed to handle temporary occupant loads, as defined in footnote 3 of the HVAC System Quality Installation Contractor Checklist, shall be permitted to exceed this limit.”

86. **Refinement – Items 1.2.4 and 1.2.5**

Conditioned floor area and window area verification items have been updated to state “within ±10%” rather than “within 10%”.

87. **Clarification* – Items 1.2.7 and 1.2.8**

Partners have asked EPA to clarify that items 1.2.7 and 1.2.8 are consistent with ACCA Manual S. These items and many others on the checklist are consistent with ACCA manuals, which is implied in footnote 1 through its reference to the ANSI/ACCA 5 QI-2010 protocol. The footnote states that “the HVAC System Quality Installation Rater Checklist is designed to align with the requirements of ASHRAE 62.2-2010 and published addenda and ANSI / ACCA’s 5 QI-2007 protocol...” As a result, EPA does not feel the need to further clarify the relevant references.

88. **Change – Item 1.2.9**

The process of selecting “the next nominal size” has been updated to align with the latest edition of the ANSI / ACCA QI 5 protocol.

Footnote 6 has been added for item 1.2.9 to indicate that, “for cooling systems, the next largest nominal piece of equipment may be used that is available to satisfy the latent and sensible requirements. Single-speed systems generally have OEM nominal size increments of ½ ton. Multi-speed or multi-stage equipment may have OEM nominal size increments of one ton. Therefore, the use of these advanced system types can provide extra flexibility to meet the equipment sizing requirements.”

89. **Clarification – Items 1.2.11 & 1.2.12**

Certain equipment types (e.g., geothermal heatpumps, mini-split heatpumps) don’t lend themselves to standard sub-cooling or super-heat refrigerant charge tests. To accommodate these system types, footnote 8 has been added to items 1.2.11 and 1.2.12 to explain that “if contractor has indicated that an OEM test procedure has been used in place of a sub-cooling or super-heat process and documentation has been attached that defines this procedure, then the box for “n/a” shall be checked for this item”.

90. **Clarification* – Item 1.3**

Partners have asked EPA whether non-licensed contractors can access test holes provided by the contractor for the purpose of testing duct pressure. As always, in cases where overlapping requirements conflict with a requirement of these ENERGY STAR guidelines, then the conflicting requirement within these guidelines shall not be met. Qualification shall only 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.

In locations where code prohibits raters from accessing test holes for the purposes of testing, then this test shall not be completed and the home shall still be permitted to be qualified. Note, however, that this concern has only been raised in the state of Texas to date and EPA is further investigating whether this prohibition is really in effect. EPA will provide more specific guidance to Partners as information becomes available.

91. **Clarification – Item 2.1**

For clarity, footnote 9 has been revised from "...and occur when the radius of the duct centerline is less than one diameter" to "...and occur when the radius of the turn in the duct is less than one duct diameter". Therefore, bends that are greater than 90 degrees are not likely to meet this requirement and, therefore, cannot be used.

92. **Clarification – Item 2.2**

Footnote 10 for item 2.2 has been revised to clarify that balancing dampers are not the only available strategy for achieving proper air flow and to clarify where dampers are permitted to be installed. The footnote now reads as follows, "Ducts shall not include coiled or looped ductwork except to the extent needed for acoustical control. Balancing dampers or proper duct sizing shall be used instead of loops to limit flow to diffusers. When balancing dampers are used, they shall be located at the trunk to limit noise unless the trunk will not be accessible when the balancing process is conducted. In such cases, Opposable Blade Dampers (OBD) or dampers that are located in the duct boot are permitted."

This revised footnote now addresses multi-family systems where fire dampers may be required and proper duct sizing used in place of balancing dampers.

93. **Change – Item 2.8**

The pressure differential test described in item 2.8 has been changed to be relative to the house rather than relative to the outside to align with standard practice. Also, the item has been rearranged to emphasize that any combination of strategies may be used to either provide sufficient free area openings or meet the pressure balancing limit. The revised wording is as follows, "Bedrooms pressure-balanced using any combination of transfer grills, jump ducts, dedicated return ducts, and/or undercut doors to either a) provide 1 sq. in. of free area opening per 1 CFM of supply air, as reported on the contractor-provided balancing report; or b) achieve a Rater-measured pressure differential ≤ 3 Pa (0.012 in. w.c.) with respect to the main body of the house when bedroom doors are closed and the air handler is operating". Note that for option a), the Rater shall now use the contractor-provided balancing report to determine airflow from the registers, rather than measuring it directly. Also note that when dedicated returns are used, either option a) or b) must also be met.

Finally, footnote 11 has been added to item 2.8 to clarify that for HVAC systems with multi-speed fans, the requirements of this item shall be met at the highest design speed for the fan. "For HVAC system with multi-speed fans, the highest design fan speed shall be used when verifying this requirement."

94. **Clarification – Item 3.1 and Section 3**

Item 3.1 has been revised for clarity to state: "All connections to trunk ducts in unconditioned space are insulated", rather than "All connections to trunk ducts in unconditioned space insulated."

Also, partners have asked EPA to add a requirement that the exhaust fan ducts be insulated to avoid condensation issues. Partners have also asked EPA to add a requirement that the insulation be sealed to duct boots to prevent condensation issues, particularly for vertical duct runs. Footnote 12 has been added to the section 3 header to note that, "EPA recommends, but does not require, that all metal ductwork (e.g., exhaust ducts, duct boots) be insulated and that insulation be sealed to duct boots to prevent condensation." While EPA sees value in insulating all ducts, at this time, it only intends to add new requirements to v3 checklists to address critical oversights that may impact the integrity of the overall program. EPA will consider adding this as a requirement to future versions of the guidelines.

95. **Clarification* – Item 3.3**

Partners have asked EPA to clarify whether ducts buried in cellulose meet the requirements of item 3.3, which requires a minimum of R-6 insulation on ducts. EPA's intent is to ensure that adequate thermal resistance is provided between ducts and unconditioned space. Burying ducts in cellulose that provides at least R-6 insulation achieves this intent and, therefore, may be used to meet this requirement.

96. **Clarification* – Items 4.1 and 4.2**

Partners have asked EPA to increase the duct leakage limits in items 4.1 and 4.2 for homes with multiple air handlers. Air handlers tend to be leaky; therefore, having multiple air handlers makes it more difficult for homes to meet the leakage limits. While EPA appreciates the increased difficulty associated with meeting the leakage limit in homes with multiple air handlers, it believes that it needs to ensure that all qualified homes have

reasonably leak-free duct systems. Therefore, for homes with multiple air handlers, partners may be required to reduce the leakage of the air handlers using mastic and gasketed doors to meet the leakage limit.

97. **Change – Items 4.1 and 4.2**

EPA has revised several aspects of items 4.1 and 4.2, which relate to duct leakage testing, and their accompanying footnotes.

First, footnote 13 for items 4.1 and 4.2 has been revised to explicitly state that duct testing must be completed after the installation of the air handler and register grilles. While the RESNET standard allows testing to be completed without these components installed and with the use of default leakage values, EPA believes that testing under these conditions will not produce an accurate measure of the duct system leakage for the qualified home.

Second, Partners have suggested that EPA remove the exemption that it currently provides on total duct leakage testing for homes with ducts in conditioned space. EPA intended for this exemption to only apply to the measurement of duct leakage to the outside, not to the total duct leakage test, and has therefore removed this exemption. For all homes, the total duct leakage must be measured. Footnote 13 has been revised to reflect this change.

Third, Partners have suggested that EPA align its conditions for being exempted from duct testing with RESNET's conditions. EPA has a precedence of defining the exemption based upon ducts being within the home's air and thermal barriers and infiltration through the shell being exceptionally low. EPA intends to maintain this definition for v3.

Fourth, Partners have asked EPA to clarify for homes with multiple HVAC systems whether the leakage limits should be assessed for the overall home or for the conditioned floor area served by each system. Footnote 13 has been revised to state that "leakage limits shall be assessed on a per-system, rather than per-home, basis". Note that this is a change from the policy for Version 2 of the guidelines.

Fifth, Partners have suggested that EPA define the duct leakage performance purely in terms of a total leakage test and a pressure-balancing test / airflow test. EPA believes that its reliance on the Rater to complete both a total leakage test and a test for leakage to the outdoors, coupled with the HVAC contractor's responsibility to measure air flows, is the best combination of diagnostics for v3. EPA may alter the duct performance metrics in future revisions of the guidelines, as Raters become more adept at completing airflow diagnostics.

The revised footnote 13 is as follows: "Duct leakage shall be determined and documented by a Rater using a RESNET-approved testing protocol only after all components of the system have been installed (e.g., air handler and register grilles). Leakage limits shall be assessed on a per-system, rather than per-home, basis. Testing of duct leakage to the outside can be waived if all ducts & air handling equipment are located within the home's air and thermal barriers AND envelope leakage has been tested to be less than or equal to half of the prescriptive path infiltration limit for the Climate Zone where the home is to be built."

98. **Refinement – Footnote 14 and 15**

For clarity, EPA has separated the footnotes regarding the duct testing waiver and the increased leakage allowance for small homes into separate footnotes – 14 and 15.

99. **Clarification* – Item 4.2**

Partners have asked EPA to consider dropping the requirement to measure air handler leakage to the outside due to the difficulty of accurately conducting this test due to wind interference. Since v1 of the guidelines, EPA has required duct leakage to the outside to be measured, inclusive of the air handler. While wind may complicate the test procedure, EPA expects raters to continue to utilize industry-standard test procedures to accurately complete this test.

100. **Clarification* – Item 4.3**

Partners have asked EPA to clarify what types of materials are acceptable for sealing duct boots to the floor, wall, or ceiling. Per item 4.3, this requirement shall be met "using caulk, foam, mastic tape, or mastic paste". EPA does not impose any restrictions on the type of foam that may be used; therefore, both open and closed cell foam may be used.

101. **Clarification* – Section 5**

Partners have asked EPA to define Whole Building Delivered Ventilation. Per ASHRAE 62.2-2010, ventilation air is “outdoor air delivered to a space that is intended to dilute airborne contaminants”. Therefore, Whole Building Delivered Ventilation is the ventilation air that is delivered to the whole building. Note that this term is only the heading for Section 5 and that the actual requirements of this section do not directly reference this term.

102. **Change – Items 5.2 and 5.3**

Items 5.2 and 5.3 have been deleted from the checklist because EPA’s understanding is that they will be removed from ASHRAE 62.2-2010 in the near future through an addendum to the standard. Therefore, Partner questions related to these two items are no longer relevant. Note that if these limits are not formally removed from ASHRAE 62.2, then EPA may elect to add them back into the v3 guidelines in a future revision.

103. **Clarification* – Item 5.1**

Intermittently operating ventilation systems can comply with ASHRAE 62.2. Therefore, it may be possible to use a sensible or latent sensor to shift the hours of operation of the ventilation system during periods of high humidity and still comply with the requirements of an intermittently operating system. However, a sensible or latent sensor cannot be used to simply override the ventilation strategy during periods of high humidity or temperature. Instead, properly designed HVAC systems shall account for the sensible and latent load of the ventilation air by increasing the capacity of system.

104. **Clarification – Item 5.1**

Item 5.1 requires that the Rater compare the measured ventilation rated to the Contractor design value. This item has been clarified by including the item from the Contractor checklist that specifies the design value that should be used in the comparison (2.11). The revised item now states, “Measured ventilation rate is within 100-120% of HVAC contractor design value (2.11)”.

105. **Clarification* – Items 6.1 through 6.3**

Partners have asked EPA to clarify that items 6.1 through 6.3, which require verification of the HVAC controls, are not required when the such controls are not present. For example, if a cooling cycle is not present, then the functionality of the cooling cycle does not need to be verified. As with any requirement in the checklists that is not applicable to the rated home, the verifier shall check the box for “N/A” for this item.

The intent of these items is to ensure that the controls are activated for the correct mode of operation, and not that air is being delivered at a specific temperature. A “hand” measurement may be used to determine if the temperature of the air is correct for the selected mode of operation.

106. **Clarification – Section 7**

To clarify that Section 7 only applies to ventilation air inlets, the word has “ventilation” has been added to the beginning of the Section 7 heading and items 7.1 through 7.3.

107. **Change – Item 7.1**

Item 7.1 has been revised to clarify the minimum allowed distances between ventilation air inlets and contamination sources, in alignment with ASHRAE 62.2-2010. “All ventilation air inlets located ≥ 10 ft. of stretched-string distance from known contamination sources such as stack, vent, exhaust hood, or vehicle exhaust. Exception: ventilation air inlets in the wall ≥ 3 ft. from dryer exhausts and contamination sources exiting through the roof”.

Footnote 18 has also been added to this item that provides an exemption to the distance requirement for balanced ventilation systems (e.g., ERV, HRV systems) in cases where manufacturer instructions permit the outlet and inlet to be installed at a distance smaller than that required by ASHRAE 62.2-2010. The footnote reads as follows: “The outlet and inlet of balanced ventilation systems shall meet these spacing requirements unless manufacturer instructions indicate that a smaller distance may be used. However, if this occurs the manufacturer’s instructions shall be collected for documentation purposes.”

108. **Clarification* – Item 7.1**

Partners have asked EPA to clarify whether a bath fan exhaust is considered a known source of contamination such as a stack, vent, or exhaust hood. The answer is yes.

109. **Clarification – Item 7.2**

To further clarify the types of obstructions that should be avoided in front of ventilation air inlets, condensing units have been added to item 7.2. The revised language reads as follows: "...and not obstructed by snow, plantings, condensing units, or other material at time of inspection."

110. **Clarification* – Item 7.2**

Partners have asked EPA to provide an exemption regarding the minimum allowed ventilation inlet height for HRV's and ERV's installed in basements. EPA has previously considered this request from Partners but has not provided any exemptions because it believes that the minimum height must be achieved to help ensure that the system operates as intended. Therefore, Partners may need to use interior chases, closets, or exterior risers to meet the minimum height requirement.

111. **Refinement – Item 7.3**

This item has been revised for clarity to state: "Air inlets provided with rodent / insect screen with \leq 0.5 inch mesh."

Item 7.3 requires that ventilation air inlets be provided with a rodent/insect screen. Without proper maintenance, these screens often become filled with debris. Therefore, while EPA does not intend to allow the screen to be at locations other than the ventilation inlet at this time, EPA has added a footnote that recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the owner. Footnote 19 reads as follows: "Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the owner".

112. **Clarification – Item 7.4**

Partners have asked EPA to clarify that ventilation air shall not come from crawlspaces and attics, regardless of whether or not they are conditioned. Item 7.4 has been revised as follows to align with this intent: "Ventilation air comes directly from outdoors and not from adjacent dwelling units, garages, crawlspaces, or attics."

113. **Change – Item 8.1**

Footnote 24 has been edited to clarify the type of intermittent exhaust fan required when the fan flow rate is less than 5 air changes per hour, based on kitchen volume. Also, a testing exemption has been added for intermittent exhaust fans that are integrated with microwaves if the rated flow rate of the fan is \geq 200 CFM. The language for the exemption is as follows: "If the flow rate of the selected exhaust fan is less than 5 ACH, based on kitchen volume, then a vented range hood or appliance-range hood combination is required rather than a remote fan that is not integral to the range. Also, for intermittent kitchen exhaust fans that are integrated with microwaves, a rated air flow rate that is \geq 200 CFM may be used in lieu of measuring the actual air flow rate".

114. **Clarification – Item 8.1**

Footnote 23 has been added, which defines the process for calculating kitchen volume: "Kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, and peninsulas and multiplying by the average ceiling height for this area. Cabinet volume shall be included in the kitchen volume calculation."

115. **Change – Item 8.1 and 8.2**

Items 8.1 and 8.2 have been revised to indicate that fans are permitted to either meet or exceed the listed flow rates, rather than being required to exceed them.

Footnote 16 currently states that the whole-house ventilation air flow and local exhaust air flows shall be measured by the Rater using a flow hood, flow grid, anemometer (in accordance with AABC, NEBB or ASHRAE

procedures), or substantially equivalent method. Partners have asked EPA to provide additional guidance on the test procedures to be used to measure the local mechanical exhaust fan flow rate. RESNET is currently working to create a new chapter that will define a test procedure for measuring air flow rates through exhaust fans. EPA will reference this test procedure in future revisions to the guidelines once the procedure is adopted.

116. **Clarification* – Items 9.1 and 9.2**

In developing the v3 guidelines, EPA elected to align the sound rating requirements with ASHRAE Standard 62.2-2010, rather than the requirements of EPA's ENERGY STAR ventilating fans program. ASHRAE defines equal or less stringent sound requirements than EPA for intermittent bath fans, depending on flow rate, and more stringent sound requirements than EPA for continuous bath fans. Therefore, Partners may use any ENERGY STAR qualified intermittent fan to meet the ASHRAE sound requirements and may be able to use some of the qualified products to meet the ASHRAE requirements for continuous fans.

117. **Clarification* – Item 9.3**

Partners have suggested that the flow rate listed in item 9.3, which requires that bathroom fans used as part of a whole-house mechanical ventilation system be ENERGY STAR qualified unless the rated flow rate ≥ 500 CFM, is too high. This 500 CFM limit was selected to align with the ventilation fan products covered by the ENERGY STAR ventilating fan program (i.e., intermittent bath fans up to 500 CFM may participate in the program). Therefore, this limit will not be changed.

118. **Change – Item 10.1**

Item 10.1 has been revised to allow either BPI's or RESNET's combustion safety test protocol to be used as long as the verifier is BPI-certified or RESNET-accredited to follow the protocol.

The revised item reads, "For atmospherically vented furnaces, boilers, and water heaters, the Rater has conducted BPI's or RESNET's combustion safety test procedure and determined that the CO test results are less than 25 ppm and the combustion appliance zone depressurization limit is not exceeded."

Footnote 29, which accompanies item 10.1, has also been added to include a reference to RESNET's test procedure, as follows: "Raters shall use either the Building Performance Institute's (BPI's) Combustion Safety Test Procedure for Vented Appliances or RESNET's Interim Guidelines for Combustion Appliance Testing and Writing Work Scope and be BPI-certified or RESNET-accredited to follow the protocol."

119. **Change – Item 10.2**

Item 10.2 has been revised to provide an alternate procedure for assessing the combustion safety of fireplaces, in alignment with the LEED for Homes program, and to clarify which fireplaces must be tested. The revised item is as follows: "For fireplaces that are not mechanically drafted or direct-vented to outdoors, total net rated exhaust flow of the two largest exhaust fans (excluding summer cooling fans) is ≤ 15 CFM per 100 sq. ft. of occupiable space when at full capacity or the Rater has verified that the pressure differential is ≤ 5 Pa using BPI's or RESNET's combustion safety test procedure."

120. **Clarification* – Item 10.2**

Partners have asked EPA to revise item 10.2 to define the total net rated exhaust flow limit relative to the conditioned floor area instead of the occupiable space. In developing the v3 guidelines, EPA defined this requirement relative to occupiable space to align with the requirements of ASHRAE 62.2-2010. Unless Partners present EPA with a compelling reason to deviate from this standard, EPA will maintain the current definition.

121. **Clarification – Item 10.2**

The requirements for item 10.2 have been clarified by revising footnote 20 to include ASHRAE's definition of an exhaust system and providing examples. The additional sentence is as follows: "Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope. Examples include bath exhaust fans, range hoods, and clothes dryers".

122. **Change – Item 10.3**

A new item, 10.3, has been added to address installation and combustion safety testing requirements for ventless combustion appliances. As with the prior revisions of the v3 guidelines, ventless combustion appliances are not prohibited from use. However, EPA will require that the Rater conduct RESNET's or BPI's combustion safety test procedure and determine that the ambient CO test results are less than 35 ppm. This change removes an oversight in the prior revisions of the v3 guidelines, which permitted less stringent combustion safety tests for ventless combustion appliances than for atmospherically vented appliances. EPA has also added a footnote for this new requirement to emphasize that the minimum volume of combustion air required by code and/or manufacturers shall be met or exceeded and that ventless combustion appliances shall not be installed in bedrooms or bathrooms.

The new item is phrased as follows: "If unvented combustion appliances other than cooking ranges are located inside the home's pressure boundary, the Rater has conducted RESNET's or BPI's combustion safety test procedure and determined that the ambient CO test results are less than 35 ppm".

The accompanying footnote is phrased as follows: "The minimum volume of combustion air required for safe operation by the manufacturer and/or code shall be met or exceeded. Also, in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA54, unvented room heaters shall not be installed in bathrooms or bedrooms".

123. **Clarification** – Items 11.1 and 11.4

The language related to manufacturer filter media boxes for item 11.1 has been moved to a new footnote for item 11.4 and revised to improve clarity. The new footnote reads as follows: "The filter media box (i.e., the component in the HVAC system that houses the filter) may be either site-fabricated by the installer or pre-fabricated by the manufacturer to meet this requirement".

124. **Clarification*** – Item 11.1

Per item 11.1, the filter must have a MERV rating of 6 or higher. The MERV rating metric was selected because it is based upon a consensus standard. Non-standard efficiency ratings, (e.g., those developed by 3M) and systems that do not have a MERV rating (e.g., electrostatic filters) may not be used to meet the filter requirement at this time.

125. **Refinement** – Item 11.1

Item 11.1 has been revised to state "MERV 6 or higher filter" rather than "MERV 6 or better filter" for clarity.

126. **Clarification** – Item 11.1

Item 11.1 has been edited to clarify which filters must meet the MERV 6 rating. Specifically, the item now makes clear that only one filter must meet this requirement in each ducted mechanical system. Furthermore, the accompanying footnote explicitly exempts mini-split systems from this requirement. The revised item is as follows: "At least one MERV 6 or higher filter installed in each ducted mechanical system". The revised accompanying footnote is as follows: "Per ASHRAE 62.2-2010, ducted mechanical systems are those that supply air to an occupiable space through ductwork exceeding 10 ft in length and through a thermal conditioning component, except for evaporative coolers. Systems that do not meet this definition are exempt from this requirement. Also, mini-split systems typically do not have MERV-rated filters available for use and are, therefore, also exempted under this version of the guidelines."

127. **Clarification** – Item 11.3

Footnote 34 has been added for item 11.3 to clarify how HVAC filters are defined as being accessible to owner. "HVAC filters located in the attic shall be considered accessible to the owner if drop-down stairs provide access to attic and a permanently installed walkway has been provided between the attic access location and the filter."

128. **Clarification** – Item 11.4

Footnote 35 has been added to this item to clarify that the filter access panel requirements do not apply when the filter is installed flush with the return grill. The footnote reads as follows: "These requirements only apply when the filter is installed in a filter media box located in the HVAC system, not when the filter is installed flush with the return grill."

Water Management System Builder Checklist

129. **Change** – Checklist, Signature Block, & Footnote 2

An additional column was added to the checklist that includes checkboxes for items verified by the Rater. To further clarify when the new column shall be used, footnote 2 has also been updated with the following sentence: “When this occurs, the Rater shall check the box of the verified items in the Rater Verified column”.

EPA has also revised the signature block for the Rater and combined footnote 2 and footnote 15 from the Revision 01 program documents to clarify that the Rater is only responsible for the items on the checklist that are verified by the Rater, if any. The revised language in the signature block is as follows: “Builder has completed Builder checklist in its entirety, except for items that are checked in the Rater Verified column (if any).” The revised footnote language is as follows: “The Rater is only responsible for ensuring that the Builder has completed the Builder checklist in its entirety and for the items that are checked in the Rater Verified column (if any). The Rater is not responsible for assessing the accuracy of the field verifications for items in this checklist that are not checked in the Rater Verified column. Instead, it is the builder’s exclusive responsibility to ensure the design and installation comply with the Builder checklist”.

130. **Clarification*** – Entire Checklist

Partners have asked EPA whether Providers are liable for checking any of the checklist items as part of the quality assurance and oversight process, or if they are simply required to verify that the checklist was completed. The Provider is only responsible for the actions of the Rater as they relate to the Rater requirements for the program. Therefore, the Provider must simply verify that the checklist was collected from the Builder and that the checklist was completed in its entirety, not for assessing the accuracy of the field verifications included. If the Rater elects to verify any item on the checklist at the discretion of the Builder, then the Rater does so above and beyond the minimum requirements for a Rater and, therefore, this does not fall within the scope of the Provider’s oversight process.

131. **Clarification** – Item 1.1

Item 1.1 has been updated to include porch slabs as one of the surfaces that shall be sloped away from the home. The revised item is as follows: “Patio slabs, porch slabs, walks, and driveways sloped...”

132. **Clarification** – Item 1.3

Item 1.3 has been revised to clarify that all concrete slabs except crawlspace slabs must meet the requirements of item 1.3 and not just slabs that are on-grade. The revised item is as follows: “Capillary break beneath all concrete slabs (e.g., slab on grade, basement slab) except crawlspace slabs using either...”

133. **Clarification*** – Item 1.3

For item 1.3, the clean aggregate, geotextile matting, and polyethylene sheeting all act as capillary breaks. However, polyethylene sheeting is required to be paired with one of the other two materials because the sheeting also serves as a soil-gas-retarder by bridging any cracks that develop in the floor assembly and prevents concrete from entering the void spaces in the aggregate or matting below. Per the Indoor airPLUS program, from which this item was developed, a vapor retarder installed beneath a floor slab also allows low-vapor-permeability floorings such as vinyl tile or sheet goods to be applied over the slab. Without a vapor retarder beneath the slab, water vapor that migrates through a concrete slab can accumulate under low-perm floorings until the flooring adhesive fails.

134. **Change & Clarification** – Item 1.4.2

Item 1.4.2 has been revised to clarify that polyethylene sheeting in crawlspaces only needs to be lapped high enough on perimeter walls or piers to allow for fastening with furring strips or equivalent. The same item has also been changed to allow the use of stakes in place of furring strips to secure the edge of polyethylene sheeting in crawlspaces. The revised language is as follows: “...and either a) lapped up each wall or pier far enough to be fastened with furring strips or equivalent, or b) secured in the ground at the perimeter using stakes”.

135. **Clarification** – Items 1.6 and 4.3

Items 1.6 and 4.3 and the accompanying footnote 6 have been expanded to provide better guidance on materials that can and cannot be used to meet these requirements. Note that EPA's overall intent is to prevent vapor impermeable materials from being installed in locations that are likely to cause long-term durability problems. These two items cover the minimum requirements that must be met to qualify the home and do not address all aspects of vapor control in wall assemblies.

The revised item 1.6 states, "Class 1 vapor retarders not installed on the interior side of air permeable insulation in exterior below-grade walls", and the revised item 4.3 states, "In Warm-Humid climates, Class 1 vapor retarders not installed on the interior side of air permeable insulation in above-grade walls, except at shower and tub walls."

The revised footnote is as follows:

"The 2009 IRC defines Class I vapor retarders as a material or assembly with a rating of ≤ 0.1 perm, as defined using the desiccant method with Procedure A of ASTM E 96. The following materials are typically rated at ≤ 0.1 perm and therefore shall not be used on the interior side of air permeable insulation in above-grade exterior walls in warm-humid climates or below-grade exterior walls in any climate: rubber membranes, polyethylene film, glass, aluminum foil, sheet metal, foil-faced insulating sheathings, and foil-faced non-insulating sheathings. These materials can be used on the interior side of walls if air permeable insulation is not present (e.g., foil-faced extruded polystyrene rigid insulation board adjacent to a below-grade concrete foundation wall is permitted).

Note that this list is not comprehensive and other materials with a perm rating ≤ 0.1 also shall not be used. Also, if manufacturer specifications for a specific product indicate a perm rating above 0.1, then the material may be used, even if it is in this list. Also note that open-cell and closed-cell foam generally have perm ratings above this limit and may be used unless manufacturer specifications indicate a perm rating ≤ 0.1 .

Several exemptions to these requirements apply:

- Class I vapor retarders, such as ceramic tile, may be used at shower and tub walls;
- Class I vapor retarders, such as mirrors, may be used if they are mounted with clips or other spacers that allow air to circulate behind them.

136. **Clarification* - Item 1.8**

Partners have asked EPA whether the drain tile required by item 1.8 should be next to the footings. Per footnote 7, the "protected drain tile shall be installed at the footings of basement and crawlspace walls, level or sloped to discharge to outside grade (daylight) or to a sump pump. The top of each drain tile pipe shall always be below the bottom of the concrete slab or crawlspace floor".

137. **Clarification - Item 1.8**

Footnote 7 for item 1.8 has been revised to include an additional option of a pre-wrapped drain tile wrapped with a fabric filter. The revised footnote reads as follows: "...Each pipe shall be surrounded with at least 6 inches of $\frac{1}{2}$ to $\frac{3}{4}$ inch washed or clean gravel. The gravel layer shall be fully wrapped with fabric cloth or drain tile pre-wrapped with a fabric filter to prevent clogging of the drain tile with sediment."

138. **Clarification* - Section 2**

Partners have asked EPA whether zip walls can be used to fulfill the requirements of Section 2. As with any design, proper installation per the manufacturer's instructions or architectural plan is essential to produce a water-managed wall assembly. Zip walls are no exception. EPA neither endorses nor prohibits the use of this wall technology.

139. **Clarification – Item 2.2**

The term "stone veneer wall assemblies" in item 2.2 has been revised to "non-structural masonry cladding" to better describe the types of materials that require an additional bond-break drainage plane layer.

140. **Change – Item 3.2**

Due to significant partner feedback about the difficulty of integrating gutters and downspouts into every home and ensuring that the water is deposited at least 5 ft from the foundation, this requirement has been relaxed by

aligning with the requirements of section R801.3 of the 2009 IRC, which requires gutters and downspouts for homes that don't have a slab on grade foundation and do have expansive or collapsible soils. The revised language is as follows:

“For homes that don't have a slab-on-grade foundation and do have expansive or collapsible soils, gutters & downspouts provided that empty to lateral piping that deposits water on sloping finish grade \geq 5 ft. from foundation or to underground catchment system \geq 10 ft. from foundation”.

The footnote accompanying this item has also been revised, as follows:

“The assessment of whether the soil is expansive or collapsible shall be completed by a certified hydrologist, soil scientist, or engineer. Gutters shall be not required in dry climates as shown in 2009 IECC Figure 301.1 and Table 301.1. A roof design without gutters is also acceptable if it deposits rainwater to a grade-level rock bed with a waterproof liner and a drain pipe that deposits water on a sloping finish grade \geq 5 ft. from foundation. Rainwater harvesting systems may also be used to meet this requirement when designed to properly drain overflow, meeting the discharge-distance requirements above”.

EPA will consider expanding the requirement for gutters to all homes, except those in dry climates, in future revisions to the guidelines.

141. **Clarification* – Item 3.3**

Partners have asked whether self-sealing bituminous membranes need to be applied to chimney penetrations. Per item 3.3, a self-sealing bituminous membrane or equivalent must be included at all valleys & roof deck penetrations. Therefore, if a self-sealing membrane is not appropriate at the chimney penetration, than an equivalent material (i.e., a secondary layer of material that provides additional protection against moisture intrusion at roof penetrations) shall be used to meet the intent of this requirement.

142. **Clarification – Item 3.4**

Item 3.4 has been revised to clarify the intent. The revised item reads as follows: “In 2009 IECC Climate Zones 5 and higher, self-sealing bituminous membrane or equivalent over sheathing at eaves from the edge of the roof line to $>$ 2 ft. up roof deck from the interior plane of the exterior wall.”¹²

143. **Clarification – Item 4.2**

Footnote 13 for item 4.2 has been updated to identify the ASTM standards noted, as follows: “Paper-faced backerboard may only be used behind monolithic enclosures and only if it meets ASTM mold-resistant standards ASTM D3273 or ASTM D6329.

144. **Clarification – Item 4.2**

Item 4.2 has been revised to clarify that cement board or equivalent moisture-resistant backing material is to be installed on all walls behind tub and shower enclosures composed of tile or panel assemblies with caulked joints. The revised language is as follows: “Cement board or equivalent moisture-resistant backing material installed on all walls behind tub and shower enclosures composed of tile or panel assemblies with caulked joints”.

145. **Clarification – Item 4.3**

Item 4.3 has been revised to clarify that this requirement applies to above-grade walls. A similar requirement applicable to all below-grade exterior walls is already addressed in item 1.6 of the checklist. The revised language for item 4.3 is as follows: “In Warm-Humid climates, Class 1 vapor retarders not installed on the interior side of air permeable insulation in above-grade walls, except at shower and tub walls”.

146. **Clarification – Item 4.4**

A footnote has been added to item 4.4 clarifying that materials with signs of mold may be used if they are remediated and all signs of mold are removed from the material.

The new footnote reads as follows, “If mold is present, effort should be made to remove all visible signs of mold using detergent or other method. If removal methods are not effective, then the material shall be replaced.”

Partners should coordinate with suppliers to ensure that products are not delivered to the site with visible signs of mold and then protect the materials to prevent mold growth during the construction process.

ENERGY STAR HERS Index Target Procedure

1. Change – Step 2

The procedure for calculating the Benchmark Home Size and Size Adjustment Factor has been revised to reflect the policy change released by EPA on December 1, 2010. Step 2 has been updated to reflect these changes as follows:

“For the purposes of this step, calculate the number of bedrooms and the CFA of the home to be built using RESNET standards with the following exceptions: bedrooms and floor area in basements with at least half of the gross surface area of the basement’s exterior walls below grade shall not be counted. If the CFA of the home to be built exceeds the CFA of the Benchmark Home, then the Performance Path shall be used.”

A new footnote has also been added to further clarify what is meant by below grade and to further clarify that the exclusion of basement conditioned floor area is only to be used when calculating the Size Adjustment Factor and the full conditioned floor area is to be used when rating the home and determining compliance with duct leakage requirements:

“To determine whether at least half of the basement wall area is below grade, use the gross surface area of the exterior walls from the basement floor to the bottom of the basement ceiling framing (e.g., the bottom of the joists for the floor above). Exclude the area of all common walls in the basement. If, as a result of this policy, a home has zero applicable bedrooms with regard to the Benchmark Home Size determination, then the Benchmark Home Size for one bedroom shall be used. Note that this change is only for the purpose of determining a home’s Benchmark Home Size, Size Adjustment Factor, and eligibility to use the Prescriptive Path. The full conditioned floor area and number of bedrooms, per RESNET’s standards, should be used when rating the home (e.g., determining compliance with duct leakage requirements).”

2. Clarification – Step 2

The definition of single-family homes in Step 2 has been revised to include quadplexes. It now reads, “For all single-family detached homes, townhomes, rowhomes, duplexes, triplexes, and quadplexes”.

3. Change – Service Water Heating Systems Section in Exhibit 2

The minimum required efficiency for 60 gallon electric water heaters has been corrected to 0.91 EF.

4. Clarification* – Footnote 8

Partners have asked EPA whether RESNET’s definition of conditioned floor area also defines the thermal boundary of the home. The definition of “thermal boundary wall” included in footnote 8 is consistent with RESNET’s definition and is as follows: “Any wall that separates directly or indirectly conditioned space from unconditioned space or ambient conditions”.

5. Clarification – Footnote 8

This footnote has been revised to state more clearly that all attached homes and not only multi-family attached homes shall utilize the formula to calculate the total window area of the ENERGY STAR Reference Design. “When determining the ENERGY STAR HERS Index Target for homes with conditioned basements and for attached homes under the Performance Path, the following formula shall be used to determine total window area of the ENERGY STAR Reference Design...”