

## Current Indoor airPLUS Policy Record

12/04/2019

### Purpose

EPA regularly receives partner questions and comments regarding various aspects of the Indoor airPLUS program requirements. This Policy Record format will be used to provide regular updates on the resolution of future issues, including changes to program requirements and clarifications or refinements to the specifications. The primary purpose of this document is to allow stakeholders equal access to the latest policy issues and resolutions. This document also serves as an official program update.

### How to Use this Document

Included in the table below are questions and issues that have arisen since the release of the Indoor airPLUS Construction Specifications, along with associated resolutions. Each entry in the policy record is presented in the order that the issue appears in the Indoor airPLUS Construction Specifications, with entries organized first by section, and then by item number. Entries are logged according to the date they are added to the Policy Record. See the appendix at the end of this document to find entries listed in order of ID number.

Please submit any comments on the Policy Record via email to [Indoor\\_airPLUS@epa.gov](mailto:Indoor_airPLUS@epa.gov).

### Issue Classifications

Each issue listed here is classified as a Change, a Clarification, a Refinement, a Comment or an Issue Under Review. 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 or from changes in relevant standards. 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.

*Refinement* – A minor revision, 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.

*Comment* – A comment provided by EPA in response to a question, which results in no change to the program documents. This may occur, for example, if the question can be answered by referring to already established policy. Aside from the partner asking the question, such comments will typically have no impact on the way that partners comply with the program.

*Issue Under Review* – An issue that has been submitted and that EPA is still evaluating. Once EPA has evaluated the issue, it will offer a resolution and re-classify the issue using one of the four categories above.

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### Guidance for Completion of Verification Checklist & General Topics

ID	Log Date	Classification	Topic
0003	07/25/2013  Resolved: 11/18/2013	Clarification	<b>Separate verification checklist for each unit in multifamily buildings</b>
			<b>Issue:</b> Partners have inquired as to whether a separate Verification Checklist needs to be completed for each unit in multifamily buildings, or if a single checklist can include more than one unit if an approved sampling method is used.
			<p><b>Resolution:</b> Policy Record Entry 0031 contains the most recent resolution of this issue. This issue (ID 0003) is only being retained to maintain a complete Policy Record.</p> <p>Indoor airPLUS requires the same field verification requirements for multifamily units as it does for single-family homes. These requirements include field inspection and testing of each individual unit for builder-verified checklist items, and the option to use the RESNET Sampling Protocol for Rater-verified items only*. As with single-family homes, all units batched into a RESNET Sample set must still have an address-specific certificate attached to the home or unit. In the case of Indoor airPLUS, the certificate, label and Indoor airPLUS Verification Checklist (see Specification 7.3) or comparable information must be provided to each owner. Thus, a separate checklist must be filled out for each unit address.</p> <p>*Raters who operate under a Sampling Provider are permitted to use the RESNET-approved sampling protocol for homes located outside California, and the CEC-approved sampling protocol for homes located in CA, to verify the Minimum Rated Features of the home. Raters who do not operate under a Sampling Provider must verify these requirements in each certified home.</p>
0004	07/25/2013  Resolved: 11/18/2013	Clarification	<b>ENERGY STAR Multi-family High Rise Program buildings not eligible for Indoor airPLUS</b>
			<b>Issue:</b> Partners have inquired whether multifamily units in buildings that are certified through the ENERGY STAR Multifamily High Rise Program are eligible for Indoor airPLUS.
			<p><b>Resolution:</b> Multifamily units in buildings that are certified through the ENERGY STAR Multifamily High Rise Program are ineligible for Indoor airPLUS certification at this time. Because the Indoor airPLUS Program works in concert with the ENERGY STAR Certified Homes Program (low rise), only multifamily units that are eligible to participate in the Certified Homes Program are eligible for Indoor airPLUS Certification. In general, this includes all buildings with 1-3 stories and some buildings with 4-5 stories (depending on heating and cooling systems and percentage of residential space). For more information about the ENERGY STAR eligibility requirements for multifamily buildings, please see the Multifamily High Rise website. <a href="http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_multifamily_highrise">http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_multifamily_highrise</a></p>
0006	07/25/2013	Refinement	<b>Verification checklist signature block</b>

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	<b>Resolved:</b> 11/18/2013		<p><b>Issue:</b> The Indoor airPLUS Revision 1 Construction Specifications Verification Checklist provides space for initials from Raters for the pre-drywall inspection and final verification and a space for builder initials for builder-verified items. A full signature block is not currently provided although the instructions require the Builder and Rater to sign the verification checklist.</p> <p><b>Resolution:</b> EPA will revise the Verification Checklist to include signature lines for builders and Raters to sign the Verification Checklist once it is completed. The Revision 1 Verification Checklist may continue to be used, but builders and Raters should provide a signature in the initials block.</p>
0023	07/01/2015 <b>Resolved:</b> 10/01/2015	Refinement	<p><b>Checklist – Moisture Control Verification Option</b></p> <p><b>Issue:</b> Partners have requested the option for builders to verify Items 1.7 and 1.11 depending on construction timelines, as moisture control items are largely under the purview of the builder with ENERGY STAR Revision 8.</p> <p><b>Resolution:</b> Because the installation of proper gutters, downspouts, site drainage, and moisture-resistant materials are relatively simple items to inspect, Indoor airPLUS will allow builders to verify Items 1.7 and 1.11 to facilitate streamlined verification requirements. EPA recommends, but does not require, that builders or Raters document the installation of any materials installed to meet these requirements for future reference.</p>
0031	11/18/2015 <b>Resolved:</b> 10/31/2016	Clarification	<p><b>Guidance for Completing the Indoor airPLUS Verification Checklist</b></p> <p><b>Issue:</b> Partners have requested clarification on what Indoor airPLUS documentation needs to be retained and filed with a HERS Provider or with EPA. Additionally, Rater partners have inquired if only one checklist per building is sufficient for multifamily projects where materials and IAQ protections are the same across all units.</p> <p><b>Resolution:</b> Verification and documentation procedures for the Indoor airPLUS Program are aligned with those of the ENERGY STAR Certified Homes Program. Rating documentation and checklists do not need to be submitted to EPA. Instead, the Home Energy Rater maintains a copy of the HERS rating documentation, the required ENERGY STAR documentation, and the completed and signed Indoor airPLUS Verification Checklist (electronic or hard copy) while also filing these with their HERS Provider. The HERS Provider coordinates with the Rater and/or builder to provide an Indoor airPLUS label and certificate for each qualified home. Providing a copy of the Indoor airPLUS Verification Checklist to the homeowner is optional at the builder's discretion, but providing a label and certificate for each home is a requirement of the Indoor airPLUS partnership terms and commitments.</p> <p>Item 4 in the Guidance Section will be revised as follows:</p> <p style="padding-left: 40px;">The HERS Rater shall retain the HERS documentation, all required ENERGY STAR Certified Homes documentation and the Indoor airPLUS Verification Checklist for the home. The HERS Rater shall coordinate with the Provider and/or builder to provide an Indoor airPLUS label and certificate for each qualified home.</p> <p>EPA additionally recognizes the needs of partners to reduce paperwork while maintaining complete and accurate documentation. As such, a refinement is being made allowing Raters to maintain a singular copy of a completed and signed checklist for an entire multifamily building or a group of units in lieu of individual unit checklists, with the condition that all units within the building or group utilize: 1) the same HVAC system type (i.e. ductless mini-split, forced air, hydronic); 2) the same combustion appliances and combustion pollutant controls; and 3) the</p>

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			<p>same low-emission materials certification/standard for all products (within their respective categories) verified in Section 6 of the Indoor airPLUS Construction Specifications.</p> <p>With regard to verification of multifamily units and utilization of sampling protocols, no additional changes are being implemented. However, with Revision 3 of the Construction Specifications, EPA has clarified that the builder must provide the Rater with a signed copy of the Indoor airPLUS Verification Checklist for each home or unit with builder-verified items. This requirement will also be modified to permit a single checklist signed by the builder for an entire building or group of units that are identical with regard to low-emission materials, HVAC system type, combustion appliances, and combustion pollutant controls.</p> <p>Item 5 in the Guidance Section will be updated as follows:</p> <p>Raters who operate under a Sampling Provider are permitted to use a RESNET-approved sampling protocol for Indoor airPLUS homes located outside California, and a sampling protocol approved by the California Energy Commission for homes located in California, to verify any item designated "Rater Verified." For example, if the approved sampling protocol requires rating one in seven homes, then the checklist will be completed for the one home that was rated. Only Raters are permitted to use sampling. All items verified by the builder shall be verified for <u>each</u> qualified home or unit within a multifamily building. For example, if a Rater verifies 10 items on the Indoor airPLUS Checklist and the builder verifies the remaining checklist items, then an approved sampling protocol is permitted to be used only on the 10 Rater-verified items.</p> <p>However, the builder may provide the Rater with a single signed copy of the checklist for an entire building or group of units with builder-verified items with the condition that all units within the building or group utilize: 1) the same HVAC system type (i.e. ductless mini-split, forced air, hydronic); 2) the same combustion appliances and combustion pollutant controls; and 3) the same low-emission materials certification/standard for all products (within their respective categories) verified in Section 6 of the Indoor airPLUS Construction Specifications. If there are no builder-verified items, the Rater may also utilize one checklist per group of units if the above criteria are met. Groups of units with any of the following conditions will require a separate and unique checklist to be completed and signed by the Rater and builder:</p> <ul style="list-style-type: none"> <li>• Any units with differing HVAC system type (i.e., ductless mini-split, forced air, hydronic);</li> <li>• Any units with differing combustion appliances or combustion pollutant controls;</li> <li>• Any units/groups with low-emission materials or finishes addressed in Section 6 that are compliant based on different certifications/standards within their product category.</li> </ul> <p>Exception: Builders and Raters may use a single checklist for units utilizing low-emission materials certified to different labels or standards, provided that documentation of the certifications for those materials are retained by the builder and available for inspection upon request.</p>
0039	1/1/2018  Resolved: 2/22/2018	Clarification	<p><b>Verification Checklist Item 4.3</b></p> <p><b>Issue:</b> Verification checklist language included "AND continuous air barrier in adjacent assemblies" which was determined to be redundant per the requirements in the Construction Specifications.</p>

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			<p><b>Resolution:</b> Text in the Verification Checklist will be shortened to reduce redundancy. The checklist item will be revised as follows:</p> <p>“No air-handling equipment or ductwork installed in garage.”</p>
0040	1/1/2018  Resolved: 2/22/2018	Clarification	<p><b>Verification Checklist Item 5.1</b></p>
			<p><b>Issue:</b> Checklist did not record the type of fuel burning and space-heating appliances in the home, making quality assurance more difficult.</p>
			<p><b>Resolution:</b> For added clarity, this checklist item will be expanded to include the identification of types of fuel-burning and space-heating appliances installed. The checklist item will be revised as follows:</p> <p>Identify appliance type:</p> <p><input type="checkbox"/> masonry heaters    <input type="checkbox"/> factory-built wood-burning fireplace    <input type="checkbox"/> wood stove  <input type="checkbox"/> pellet stove    <input type="checkbox"/> natural gas/propane fireplace</p> <p>Appliance model name/number: _____</p>
0045	1/1/2018  Resolved: 2/22/2018	Refinement	<p><b>Verification Checklist Exception Boxes</b></p>
			<p><b>Issue:</b> The Indoor airPLUS Construction Specification Checklist did not provide opportunity for Raters to note relevant geographic details (e.g. climate zone, radon zone) or when exceptions to Items were being applied.</p>
			<p><b>Resolution:</b> For added clarity, the checklist has been expanded to include check boxes for those exceptions that are outlined within the Construction Specifications. Additionally, the checklist has been refined to include the climate zone and the radon zone for the home being constructed.</p>
0047	1/1/2018  Resolved: 2/22/2018	Clarification	<p><b>Guidance for Completing the Indoor airPLUS Verification Checklist</b></p>
			<p><b>Issue:</b> Item 4 in the Guidance for Completing the Indoor airPLUS Verification Checklist section was not specific in regards to the amount of time that the completed checklist must be retained. Additionally, Item 5 in this section did not provide sufficient explanation as to the number of Verification Checklists required when an approved sampling method is used.</p>
			<p><b>Resolution:</b> To provide additional clarification, Item 4 and 5 of the Guidance for Completing the Indoor airPLUS Verification Checklist section will be revised as follows:</p> <p>4. The Rater shall retain the rating documentation, all required ENERGY STAR Certified Homes documentation, and the Indoor airPLUS Verification Checklist for the home for a minimum of 2 years from final verification. The Rater shall coordinate with the Provider and/or builder to provide an Indoor airPLUS label and certificate for each qualified home.</p> <p>5. Raters who operate under a Sampling Provider are permitted to use a RESNET-approved sampling protocol for Indoor airPLUS homes located outside California, and a sampling protocol approved by the California Energy Commission for homes located in California, to verify any item designated “Rater Verified.” For example, if the approved sampling protocol requires rating one in seven homes, then the checklist will be completed for the one home that was rated. Only Raters are permitted to use sampling. All</p>

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			<p>items verified by the builder shall be verified for each qualified home or unit within a multifamily building. For example, if a Rater verifies 10 items on the Indoor airPLUS Checklist and the builder verifies the remaining checklist items, then an approved sampling protocol is permitted to be used only on the 10 Rater-verified items.</p> <p>However, the builder may provide the Rater with a single signed copy of the checklist for an entire building or group of units with builder-verified items under the condition that all units within the building or group utilize: 1) the same HVAC system type (i.e. ductless mini-split, forced air, hydronic); 2) the same combustion appliances and combustion pollutant controls; and 3) the same low-emission materials certification/standard for all products (within their respective categories) verified in Section 6 of the Indoor airPLUS Construction Specifications. If there are no builder-verified items, the Rater may also utilize one checklist per group of units if the above criteria are met. Groups of units with any of the following conditions will require a separate and unique checklist to be completed and signed by the Rater and builder:</p> <ul style="list-style-type: none"> <li>• Any units with differing HVAC system type (i.e., ductless mini-split, forced air, hydronic);</li> <li>• Any units with differing combustion appliance types (e.g., masonry heater, pellet stove, wood-burning fireplace) stove, factory-built, etc.) or combustion pollutant controls; or</li> <li>• Any units/groups with low-emission materials or finishes addressed in Section 6 that are compliant based on different certifications/standards within their product category.</li> <li>• Exception: Builders and Raters may use a single checklist for units utilizing low-emission materials certified to different labels or standards, provided that documentation of the certifications for those materials are retained by the builder and available for inspection upon request.</li> </ul>
0051	9/23/2019  Resolved: 12/04/2019	Change	<p><b>Eligibility and Verification Requirements</b></p> <p><b>Issue:</b> The Indoor airPLUS Construction Specifications originally were developed as an addition to the ENERGY STAR Certified Homes label, previously for homes 3 stories or below and some multifamily properties in buildings of 4–5 stories. Multifamily units that earned the ENERGY STAR label through the ENERGY STAR Multifamily High Rise Program (generally 6 stories and above, as well as some 4- and 5-story buildings with centralized mechanical systems) have not been eligible to earn the Indoor airPLUS label. Certification under ENERGY STAR Certified Homes has been maintained as the only prerequisite to Indoor airPLUS.</p> <p>Under the new ENERGY STAR Multifamily New Construction Program, homes and apartments in multifamily buildings of any height can earn the ENERGY STAR label. Some of these homes and apartments (e.g., townhouses and some units in 3-, 4- or 5-story buildings that were eligible for ENERGY STAR Certified Homes) previously would have been eligible to earn the Indoor airPLUS label, as well.</p> <p>EPA's Indoor airPLUS team recognizes that high-rise buildings often are quite different from low- and mid-rise multifamily properties, particularly with regard to heating and cooling systems, mechanical ventilation, and water management components on the building shell. EPA continues to consider these elements and building science best practices for further technical development of the Indoor airPLUS Construction Specifications and expansion</p>

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		<p>of program eligibility to include high-rise buildings. Until such specifications for high-rise buildings are developed, Indoor airPLUS is proposing to incrementally expand eligibility to projects that earn the ENERGY STAR label under the Multifamily New Construction Program for buildings 5 stories or below.</p> <hr/> <p><b>Resolution:</b> EPA will update the Eligibility and Verification Requirements of the Indoor airPLUS Construction Specifications as follows:</p> <p><i>The following site-built or modular homes are eligible to earn the Indoor airPLUS label:</i></p> <p><i>Detached dwelling units<sup>1</sup> (e.g., single-family homes); OR</i></p> <p><i>Townhouses<sup>2</sup>; OR</i></p> <p><i>Dwelling units in multifamily or mixed-use buildings with five (5) stories or fewer above grade.<sup>3</sup></i></p> <p><i>Homes and dwelling units in single-family, multifamily or mixed-use buildings that are five (5) stories or below and are newly built or undergoing a gut-rehabilitation must utilize the Indoor airPLUS Construction Specifications and must be certified under either ENERGY STAR Certified Homes or ENERGY STAR Multifamily New Construction (MFNC) to earn the Indoor airPLUS label.</i></p> <p><i>Residential units in ENERGY STAR MFNC projects are eligible to earn the Indoor airPLUS label in buildings up to five (5) stories in height, including mixed-use buildings, where dwelling units and common space exceed 50% of the building square footage. Residential-associated common spaces, as defined by the ENERGY STAR MFNC National Program Requirements, must also meet the Indoor airPLUS Construction Specifications to earn the Indoor airPLUS label.</i></p> <p><i>Requirements for both ENERGY STAR and Indoor airPLUS homes/units can be verified and reported simultaneously. Verification can be completed during the ENERGY STAR inspection process and must be conducted by a certified Home Energy Rater, Rating Field Inspector, or an equivalent designation as determined by an ENERGY STAR Verification Oversight Organization or Multifamily Review Organization. The homes/units must also comply with all applicable state and local codes and standards.</i></p> <p><sup>1</sup> <i>A dwelling unit, as defined by the 2018 IRC, is a single unit that provides complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.</i></p> <p><sup>2</sup> <i>The term “townhouse” refers to a single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides.</i></p> <p><sup>3</sup> <i>Any above-grade story with 20% or more occupiable space, including commercial space, shall be counted toward the total number of stories for the purpose of determining eligibility to participate in the program. The</i></p>
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			<i>definition of an “above-grade story” is one for which more than half of the gross surface area of the exterior walls is above grade. All below-grade stories, regardless of type, shall not be included when evaluating eligibility.</i>
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## Section 1. Moisture Control

ID	Log Date	Classification	Topic
0002	07/25/2013	Change	<b>Item 1.2 - Aggregate or sand drainage layer</b>
	Resolved: 11/18/2013		<p><b>Issue:</b> Partners have questioned whether the requirement of an aggregate or sand drainage layer under slabs improves moisture control sufficiently to warrant the increased cost. The question was specifically raised for homes built in areas with free draining soils.</p> <p><b>Resolution:</b> Indoor airPLUS requires a drainage plane beneath slabs in order to prevent liquid water, moisture and, in EPA Radon Zone 1, soil gas infiltration into the home. Rough aggregate is the preferred method to achieve this intent, as it eliminates the ability of water to wick towards the slab. However, since aggregate is not readily available in all areas, the option to use sand has been provided.</p> <p>EPA recognizes that there are situations in which wicking of moisture through the slab is of minimal concern, such as in dry climates, and has previously provided an exemption from this sub-slab drainage layer for dry climates as defined by 2009 IECC Figure 301.1, not including EPA Radon Zone 1 areas. EPA recognizes that homes in areas with free-draining soils and slab-on-grade foundations are also situations in which water accumulation under the slab is a less significant concern. As such, additional exceptions for homes in non-Radon Zone 1 areas with free-draining soils and slab-on-grade foundations will be added to the Indoor airPLUS Construction Specifications. Section 1.2 will be revised as follows:</p> <ul style="list-style-type: none"> <li>• Under the polyethylene sheeting or extruded polystyrene (XPS) insulation installed to meet ENERGY STAR Water Management System Builder Checklist Item 1.3: <ul style="list-style-type: none"> <li>○ Install a 4 in. layer of 1/2 in. diameter or greater clean aggregate; OR</li> <li>○ Install a 4 in. uniform layer of sand, overlain with either a layer of geotextile drainage matting throughout or strips of geotextile drainage matting along the perimeter installed according to the manufacturer’s instructions.</li> <li>○ <b>Exceptions</b> (Not applicable in EPA Radon Zone 1): <ul style="list-style-type: none"> <li>▪ Dry climates, as defined by 2009 IECC Figure 301.1.</li> <li>▪ Areas with free-draining soils – identified as Group 1 (Table R405.1, 2009 IRC) by a certified hydrologist, soil scientist or engineer through a site visit.</li> <li>▪ Slab-on-grade foundations.</li> </ul> </li> </ul> </li> </ul>
0005	07/25/2013	Clarification	<b>Item 1.2 - Allowance for XPS Insulation under slab in conjunction with polyethylene sheeting</b>

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	<p><b>Resolved:</b> 11/18/2013</p>		<p><b>Issue:</b> The Note following Section 1.2 (Capillary Break Installation), which applies to slab-on-grade construction in EPA Radon Zone 1, includes a bullet stating “Do not use extruded polystyrene (XPS) insulation beneath concrete slabs, including basement floors.” Partners have requested clarification of the reasoning behind this prohibition, given the significant insulation benefits from using XPS under the slab.</p> <p><b>Resolution:</b> In EPA Radon Zone 1, EPA requires the installation of a 6 mil polyethylene vapor barrier to prevent entry of radon gas into the home through cracks or other penetrations of the slab. The bullet precluding use of XPS insulation was meant to indicate that XPS could not be used <i>in lieu of</i> polyethylene sheeting under the slab because XPS does not serve as an adequate vapor barrier to protect against radon infiltration. However, EPA does not intend to preclude the use of XPS under the slab <i>in addition to</i> the 6 mil polyethylene sheeting.</p> <p>Since polyethylene sheeting is specifically required in EPA Radon Zone 1, the bullet precluding the use of XPS insulation creates unnecessary confusion and will be removed from the Indoor airPLUS Construction Specifications. Builders may use XPS under slabs in EPA Radon Zone 1, provided it is used in addition to the required 6 mil polyethylene sheeting. The note accompanying Section 1.2 will now read:</p> <p><b>Note:</b> In EPA Radon Zone 1 (see Specification 2.1):</p> <ul style="list-style-type: none"> <li>• Polyethylene sheeting must be installed and overlapped by 6 to 12 in. at the seams.</li> <li>• ENERGY STAR staking method for crawlspaces with no slab is not allowed.</li> </ul>
0010	<p>07/01/2015</p> <p><b>Resolved:</b> 10/01/2015</p>	Change	<p><b>Item 1.2 - Capillary Break</b></p> <p><b>Issue:</b> The installation of an additional drainage layer is impractical in gut rehabs because it would require the removal of an existing slab. (The current scope calls for installing a new slab with vapor barrier over the existing slab.) If a home is able to meet ENERGY STAR’s alternate slab treatment requirements for gut rehabs, would the project be allowed to proceed with IAP?</p> <p><b>Resolution:</b> For an existing slab (e.g. in a home undergoing a gut rehabilitation) in Radon Zones 2 and 3, the alternate slab treatment in the ENERGY STAR Water Management System Builder Checklist, footnote 5, shall apply as follows:</p> <p style="padding-left: 40px;">For an existing slab (e.g., in a home undergoing a gut rehabilitation), in lieu of a capillary break beneath the slab, a continuous and sealed Class I or Class II Vapor Retarder (per Footnote 8) is permitted to be installed on top of the entire slab. In such cases, up to 10% of the slab surface is permitted to be exempted from this requirement (e.g., for sill plates). In addition, for existing slabs in occupiable space, the Vapor Retarder shall be, or shall be protected by, a durable floor surface. If Class I Vapor Retarders are installed, they shall not be installed on the interior side of air permeable insulation or materials prone to moisture damage.</p> <p>However, for homes in Radon Zone 1, an active radon system utilizing sub-slab depressurization must be installed in addition to the alternate slab treatment, and radon levels shall be verified upon final inspection to be below the EPA action level (4pCi/l) to receive Indoor airPLUS qualification.</p> <p>Item 1.2 will be revised with the following alternative path for gut-rehabs:</p>

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			<ul style="list-style-type: none"> <li>For an existing slab in a home undergoing a gut rehabilitation in Radon Zones 2 and 3, the alternate slab treatment in the ENERGY STAR Water Management System Builder Checklist, footnote 5, shall apply as an alternative to polyethylene and aggregate or sand under the slab. Homes undergoing gut rehabilitation in Radon Zone 1 must also install an active radon system utilizing sub-slab depressurization, and radon levels shall be verified upon final inspection to be below the EPA action level (4pCi/l) to receive qualification.</li> </ul>
0029	09/18/2015  Resolved: 10/01/2015	Clarification	<p><b>Item 1.2 - Capillary Break</b></p> <p><b>Issue:</b> Partners have inquired as to whether the ENERGY STAR exception to a capillary break under slabs in dry climates is applicable to Indoor airPLUS homes in Radon Zone 1.</p> <p><b>Resolution:</b> Although capillary breaks under slabs are not required by ENERGY STAR in dry climates, polyethylene sheeting is an integral aspect of radon-resistant new construction techniques to control sub-slab vapor transmission. As such, Indoor airPLUS will continue to require polyethylene sheeting in Radon Zone 1. A note in Item 1.2 will be added as such:</p> <p>Note: In EPA Radon Zone 1 (see Specification 2.1):</p> <ul style="list-style-type: none"> <li>ENERGY STAR exceptions for capillary break (polyethylene) under slabs do not apply. Poly is required in Radon Zone 1.</li> </ul>
0011	07/01/2015  Resolved: 10/01/2015	Clarification	<p><b>Item 1.4 - Basement and Crawlspace Insulation and Conditioned Air</b></p> <p><b>Issue:</b> Indoor airPLUS Rev. 2 had previously noted this requirement was satisfied by completion of the ENERGY STAR checklists. However, “All floors above unconditioned spaces shall be insulated to the 2009 IECC and sealed to prevent air infiltration (TES 2 and 3)”, was never explicitly stated as an Indoor airPLUS requirement in 2009. Additionally, the first bulleted Indoor airPLUS requirement, “Insulate crawlspace and basement perimeter walls according to 2009 IRC Table N1102.1 or 2009 IECC Table 402.1.1 (also see Specification 1.12)”, is unclear and does not address whether trade-offs in performance-based insulation approaches are permissible.</p> <p><b>Resolution:</b> The requirement, “All floors above unconditioned spaces shall be insulated to the 2009 IECC and sealed to prevent air infiltration (TES 2 and 3)” was included in prior revisions to clarify the contrasting Indoor airPLUS requirement for a sealed and conditioned crawlspace. However, EPA agrees that including it among the ENERGY STAR requirements creates unnecessary confusion, and it will be removed.</p> <p>Clarification has been added to the first bulleted requirement to ensure that a sealed and fully-insulated crawlspace is installed per prescriptive values, and that crawlspace or basement insulation cannot be traded for other improvements.</p> <p>Item 1.4 will be revised as follows:</p> <ul style="list-style-type: none"> <li>Insulate crawlspace and basement perimeter walls according to the prescriptive values of the 2009 IRC Table N1102.1 or 2009 IECC Table 402.1.1 (also see Specification 1.12).</li> </ul>
0016	07/01/2015	Clarification	<p><b>Item 1.4 - Basement and Crawlspace Insulation and Conditioned Air</b></p>

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	<b>Resolved:</b> <b>10/01/2015</b>		<p><b>Issue:</b> Language was previously unclear in regard to the requirement prohibiting the installation of exhaust ventilation if radon-resistant features are required. Partners have questioned what type of exhaust ventilation was being discussed.</p> <p><b>Resolution:</b> The reference to IRC section R408.3.2.1 in Item 1.4 is intended to prohibit the use of exhaust ventilation in the crawlspace as a means to provide conditioned air to the crawlspace only if radon-resistant features are required. Whole-house ventilation can still be accomplished by means of either exhaust, supply, or balanced ventilation in these circumstances. Additional clarification is provided in this Item referencing the crawlspace.</p> <p>Item 1.4 will be revised as follows:</p> <ul style="list-style-type: none"> <li>○ Provide conditioned air at a rate not less than 1 cfm per 50 sq. ft. of horizontal floor area. This can be achieved by a dedicated supply (2009 IRC section R408.3.2.2) or through crawl-space exhaust (2009 IRC section R408.3.2.1). However, if radon-resistant features are required (see Specification 2.1), do not use the crawlspace exhaust method.</li> </ul>
0033	<b>12/11/2015</b>  <b>Resolved:</b> <b>10/31/2016</b>	Refinement	<p><b>Item 1.4 - Basement and Crawlspace Insulation and Conditioned Air – Dehumidification Exception</b></p> <p><b>Issue:</b> Partners have inquired if all crawl spaces in high-performance homes require conditioned air and insulated crawl space walls.</p> <p><b>Resolution:</b> Providing conditioned air to an insulated and air-sealed crawlspace is the preferred method for ensuring that humidity and potential durability issues are adequately addressed in these areas. However, active dehumidification of the crawlspace, along with proper air-sealing and vapor control strategies, can also help to address long-term durability issues and moisture concerns in well-sealed crawlspaces. As such, Indoor airPLUS will allow for mechanical dehumidification along with moisture vapor control strategies for homes that do not utilize active conditioning of closed crawlspaces.</p> <p>An additional exception will be added to Item 1.4 as follows:</p> <ul style="list-style-type: none"> <li>○ In lieu of perimeter wall insulation and conditioned air, crawlspaces that utilize a capillary break on the floor and that are well-sealed to prevent outside air infiltration are permitted to utilize active dehumidification with sufficient latent capacity to maintain relative humidity (RH) at or below 60 percent. The dehumidifier shall be drained to the outside or to a sump pump. With this exception, ENERGY STAR Certified Homes Water Management System Builder Requirements Item 1.4.3 staking method for poly sheeting may not be used in crawlspaces with no slab.</li> </ul>
0037	<b>11/28/2016</b>  <b>Resolved:</b> <b>2/22/2018</b>	Clarification	<p><b>Item 1.4 – Basement and Crawlspace Insulation and Conditioned Air – Exceptions</b></p> <p><b>Issue:</b> Existing text in the Construction Specifications was not specific with the regard to the classification of “flood zone,” prompting partners to inquire about the exception.</p> <p><b>Resolution:</b> Indoor airPLUS will add specificity to the Construction Specification to recognize “100-year flood zone.” FEMA’s “Special Flood Hazard Areas,” commonly referred to as the 100-year flood zone, have a 1 percent</p>

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			<p>chance of being flooded in any given year. These flood zone areas are addressed by federal and state/local floodplain management programs.</p> <p>The language of Item 1.4 will be updated as follows:</p> <p>Exceptions:</p> <ul style="list-style-type: none"> <li>○ Homes built in areas designated as 100-year flood zones. (Conditioned crawl spaces are not recommended for use in flood zones. For more information on designated 100-year flood zones, see FEMA's definition of Special Flood Hazard Areas: <a href="https://www.fema.gov/flood-zones">https://www.fema.gov/flood-zones</a>).</li> </ul>
0050	1/1/2018  <b>Resolved:</b> <b>2/22/2018</b>	Change	<p><b>Item 1.4 – Basement and Crawlspace Insulation and Conditioned Air</b></p> <p><b>Issue:</b> Updating the reference of the 2009 IRC Table N1102.1.2 and the 2009 IECC Table 402.1.2 to the 2015 versions would be requiring a prescriptive increase in R-value for Climate Zones 5-9 and Marine 4 which could negatively impact Indoor airPLUS adoption.</p> <p><b>Resolution:</b> The Indoor airPLUS Program is more concerned with the durability and indoor air quality benefits of the practice rather than the R-value of the insulation used. To eliminate any confusion, the specific code references will be eliminated entirely and the language of Item 1.4 will be updated as follows:</p> <ul style="list-style-type: none"> <li>○ Insulate crawlspace and basement perimeter walls according to the prescriptive values determined by local code at minimum or R-5, whichever is greater.</li> </ul>
0009	07/01/2015  <b>Resolved:</b> <b>10/01/2015</b>	Clarification	<p><b>Item 1.7 - Use cladding material that can tolerate regular wetting and install a well-sealed, continuous drainage plane that extends at least 16 in. above final grade</b></p> <p><b>Issue:</b> Partners have inquired about the acceptability of certain cladding materials to meet the intent of Item 1.7 to provide extra protection for water splash damage on homes meeting one of the specified ENERGY STAR exceptions for gutters and downspouts. The intent of the specification is to protect the foundation and lower portion of exterior walls from water splash-back damage resulting from the absence of gutters and downspouts. Specified alternatives include extending the foundation 16" above final grade, utilizing overhangs extending 16" away from foundation wall, or using cladding material that can tolerate regular wetting that extends 16" above final grade.</p> <p><b>Resolution:</b> Exterior wall cladding materials used to meet the latter compliance option should protect the drainage plane from bulk exterior moisture and be durable enough to withstand regular wetting from water splash. These materials should be decay and rot resistant, and new cladding products should be evaluated by the Rater to meet the above intent.</p> <p>Additionally, wall assemblies in mixed heating/cooling climates should be allowed to dry to the exterior, and vapor permeable materials should comprise the primary drainage plane behind exterior claddings. While limited use of self-adhering moisture control membranes is generally not a durability concern, in mixed heating/cooling climates, drying to the exterior may be inhibited by a complete self-adhering moisture control membrane covering the wall 16" above grade. As such, the former language suggesting the use of self-adhering moisture control membranes behind stone cladding has been removed. It is recommended that self-adhering moisture control membranes</p>

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			<p>applied directly to wood sheathing on wall assemblies should only be used limitedly in these applications to avoid moisture damage to the sheathing.</p> <p>Compliance options in Item 1.7 will be revised as follows:</p> <ul style="list-style-type: none"> <li>○ Extend the foundation walls at least 16 in. above final grade; OR</li> <li>○ Provide a drip line at eaves that is horizontally 16 in. away from the edge of the foundation wall; OR</li> <li>○ Use cladding materials that are decay and rot resistant and can tolerate regular wetting extending at least 16 in. above final grade and install a well-sealed, continuous drainage plane per manufacturer's instructions. <ul style="list-style-type: none"> <li>● Advisory: The use of self-adhering moisture membranes directly on exterior sheathing should be limited in these applications to encourage drying potential of moisture vapor through the wall assembly. A moisture resistant, non-perforated, and vapor permeable housewrap is preferred. (However, this may not be true for all wall assemblies where 50% or more of the insulation is outboard the structural assembly.)</li> </ul> </li> </ul>
0038	1/1/2018  Resolved: 2/22/2018	Clarification	<p><b>Item 1.11 – Moisture- Resistant Materials and Moisture- Protective Systems</b></p> <p><b>Issue:</b> Partners inquired about the need to insulate water supply pipes in exterior walls in dry climates where risk of freezing and/or condensation is not a high risk.</p> <p><b>Resolution:</b> Climate zones 1-3 located in dry climates, as defined by the 2015 IECC Figure301.1 will be exempt from this requirement, as the risk of freezing and condensation is lower in these regions. Additionally, an exception is being provided when insulation that qualifies as an air barrier is utilized, and pipes are installed within the interior 50% of the wall cavity.</p> <p>An advisory will also be included to encourage the installation of pipes adjacent to conditioned space to further reduce the risk of freezing and/or condensation.</p> <p>Item 1.11 will be revised as follows:</p> <p>Additional Indoor airPLUS Requirements:</p> <ul style="list-style-type: none"> <li>● Insulate water supply pipes in exterior walls with pipe wrap.</li> </ul> <p><b>Exceptions:</b></p> <ul style="list-style-type: none"> <li>● Climate zones 1-3 located in dry climates, as defined by 2015 IECC Figure 301.1.</li> <li>● When insulation in the wall cavity qualifies as an air barrier and pipes are located within the interior 50% of the wall cavity.</li> </ul>

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			<ul style="list-style-type: none"> <li>○ <b>Advisory:</b> Pipes should be installed as close as possible to conditioned space while maintaining Grade 1 installation to reduce risk of freezing and/or condensation.</li> </ul>
0046	1/1/2018  <b>Resolved:</b> 2/22/2018	Change	<b>Item 1.14 – Moisture-Resistant Materials</b>
			<b>Issue:</b> The requirement for installation of only water-resistant hard surface flooring in kitchens, bathrooms, entryways, laundry areas, and utility rooms was included in the Specification sectionItem that required insulating water supply pipes in exterior walls with pipe wrap. This grouping of requirements had the potential to cause confusion in verification, as exceptions might be applied to the pipe wrap requirement.
			<p><b>Resolution:</b> To provide additional clarity, the requirements of Item 1.11 Moisture- Resistant Materials and Moisture- Protective Systems will be separated into two individual Items (1.11 and 1.14), with an additional note clarifying the applicability of wood flooring and site-applied finish.</p> <p>Items 1.11 and 1.14 will include the following changes:</p> <p>Item 1.11 Moisture-Protective Systems</p> <p>Additional Indoor airPLUS Requirements:</p> <ul style="list-style-type: none"> <li>• Insulate water supply pipes in exterior walls with pipe wrap.</li> </ul> <p>Item 1.14. Moisture-Resistant Materials</p> <p>Indoor airPLUS Requirements:</p> <ul style="list-style-type: none"> <li>• Install only water-resistant hard-surface flooring in kitchens, bathrooms, entryways, laundry areas and utility rooms.</li> </ul> <p><b>Note:</b> Wood flooring, either pre-finished or site-finished, can be utilized in these areas, as long as any composite wood material andor site-applied finish comply with Items 6.1 and 6.2, respectively.</p>

## Section 2. Radon

ID	Log Date	Classification	Topic
0019	07/01/2015  <b>Resolved:</b> 10/01/2015	Clarification	<b>Item 2.1 – Radon-Resistant Construction</b>
			<b>Issue:</b> The requirement for capillary break installed according to Specification 1.2 does not clearly address the ENERGY STAR exception for dry climates and whether polyethylene under the slab is required in Radon Zone 1 homes if they are also in a dry climate.
			<b>Resolution:</b> <i>Policy Record Entry 0041 contains the most recent resolution of this issue. This issue (ID 0019) is only being retained to maintain a complete Policy Record.</i>

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			<p>Radon-resistant new construction techniques are required for all Indoor airPLUS homes located in Radon Zone 1. In general, when Indoor airPLUS specifications reference current ENERGY STAR requirements, the ENERGY STAR footnotes and exceptions are also applicable unless otherwise noted. This is true in the case of Indoor airPLUS Item 1.2 which references the ENERGY STAR capillary break requirements for polyethylene under the slab, with the exception of dry climates.</p> <p>However, for homes in Radon Zone 1, there is increased risk of radon migration through cracks and imperfections in the slab which may only appear months or years after construction. As such, best practice for radon-resistant new construction techniques is to include a polyethylene vapor barrier beneath the slab to decrease the potential for radon migration, irrespective of climate zone. As such, the Indoor airPLUS specifications will continue to require polyethylene as a vapor barrier in all homes built in Radon Zone 1.</p> <p>Item 2.1 will be revised as follows:</p> <p>Visually verify the following requirements:</p> <ul style="list-style-type: none"> <li>• Capillary break installed according to Specification 1.2, irrespective of climate zone.</li> </ul>
0032	12/11/2015  Resolved: 10/31/2016	Refinement	<p><b>Item 2.1 – Radon-Resistant Construction in Homes with Raised Pier Foundations</b></p> <p><b>Issue:</b> Partners have inquired about how to apply the requirement for radon-resistant new construction techniques in Radon Zone 1 for homes with raised pier foundations.</p> <p><b>Resolution:</b> Homes built largely on raised pier foundations without a solid, air-sealed perimeter foundation wall have much less risk of radon migration into the home than those with a basement or crawl space and a solid perimeter foundation wall. Additionally, homes that utilize ventilated skirting around raised pier foundations and that have well air-sealed floor systems (e.g. high performance manufactured homes) also have less risk for radon accumulation in the conditioned area of the home. As such, Indoor airPLUS will include an exception for homes in Radon Zone 1 with these types of foundations.</p> <p>The exceptions to Item 2.1 will be revised as follows:</p> <p><b>Exceptions:</b></p> <ul style="list-style-type: none"> <li>○ Manufactured homes with raised-pier foundations (i.e. no solid perimeter foundation wall).</li> </ul>
0035	07/06/2016  Resolved: 2/22/2018	Clarification	<p><b>Item 2.1 – Radon-Resistant Construction in Homes With Sealed and Conditioned Attics</b></p> <p><b>Issue:</b> Partners have inquired about how to apply the requirement for radon-resistant new construction techniques in Radon Zone 1 for homes without an attic.</p> <p><b>Resolution:</b> <i>Policy Record Entry 0041 contains the most recent resolution of this issue. This issue (ID 0035) is only being retained to maintain a complete Policy Record.</i></p> <p>This issue has raised two related but separate points that EPA is considering.</p>

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			<p>First, most radon-resistant new construction standards require passive vent piping to be located in conditioned space to maximize stack effect, while requiring the fan and all positively-pressurized vent pipes (if the system is made active) to be located outside or above conditioned space. As a result, homes built with vaulted ceilings or sealed and conditioned attics may pose challenges in the installation of a passive radon system that could be later equipped with a fan to make it an active system. One option in these situations, per ASTM E1465-08a, is to allow for mounting of a future radon fan outdoors when an approved rooftop electrical supply is provided, as long as it is possible to mount the fan above the roof and still have a compliant discharge point. Nonetheless, homes that cannot comply with existing radon standards using a passive system, due to limited locations for an approved electrical receptacle, may need to have an active system installed external to the thermal envelope to comply with Indoor airPLUS. EPA recommends contacting a local radon mitigation expert for consultation on these requirements and standards if the design of a passive system presents challenges based on the potential for future fan installation.</p> <p>Secondly, EPA recognizes that radon-resistant construction standards have continued to evolve, and the previously referenced standards may not all have sufficient clarity regarding passive system installation techniques. Additionally, when one looks at the current standards in the context of the issue above, one finds that some standards (e.g. NFPA 5000 and IRC Appendix F) do not specifically address alternative fan mounting locations in such situations where unconditioned attics are not included in the home design. The most current new construction radon standard is ANSI/AARST standard "Reducing Radon in New Construction of 1 &amp; 2 Family Dwellings and Townhouses", also known as RRNC 2.0. Both RRNC 2.0 and ASTM E1465 provide more rigorous requirements and discussion of passive and active systems including fan placement. However, RRNC 2.0 does not appear to address new home designs utilizing a vaulted ceiling with no attic. Consequently, the current standards would preclude installation of passive system or would require installation of a fan in an outdoor space.</p> <p>One suggestion that EPA has received is to allow a fan to be placed within conditioned space or in an unconditioned crawlspace if a pressure test is done on the positively pressurized portions of the radon vent plumbing to ensure there are no leaks in the vent system at the time of installation. However, radon poses some unique concerns that cannot be eliminated by a single test at installation. Radon is the 2nd leading cause of lung cancer after smoking and is odorless and colorless, making it very likely that potential future penetrations or failures would likely go undetected, potentially for years. Any leak in a positively pressurized system could result in extremely high levels of radon gas being pumped into the home.</p> <p>EPA is aware that many new high-performance homes on the market are being built with sealed, conditioned attics that provide very few options for installation of a passive system that could be upgraded to an active system per current radon standards. However, EPA is unable to provide for exceptions to the current Indoor airPLUS criteria for radon-resistant construction techniques in these homes until additional research and/or consensus is built in the radon community surrounding the risks of including a radon fan and positively pressurized piping within the building envelope for homes with no unconditioned attic space.</p>
0041	1/1/2018	Change	<p><b>Item 2.1 – Radon-Resistant Construction</b></p> <p><b>Issue:</b> Industry standards for radon-resistant construction have continued to evolve, providing more specific guidance for design and installation techniques, including best practices for larger multifamily properties. Some of</p>

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	<p><b>Resolved:</b> 2/22/2018</p>		<p>the previous standards referenced as a requirement pathway in Item 2.1 are no longer being maintained or do not include the same level of specificity as newer, consensus-based standards.</p> <p><b>Resolution:</b></p> <p>To address the continued improvement in consensus-based standards for radon-resistant construction, Indoor airPLUS will no longer include a requirement for adherence to one of the previously referenced codes and standards. Instead, Indoor airPLUS will require certain design and installation practices that are consistent with previous revisions of the Construction Specifications, but provide more specificity and flexibility in some instances. Additionally, EPA recommends, but does not yet require, radon-resistant features and practices that meet the provisions outlined in the ANSI/AARST CCAH and ANSI/AARST CC-1000 standards, depending on building type. Larger structures with foundation areas greater than 2500 square feet may require multiple systems for optimal function, and electric metering in multifamily buildings should also be considered. The ANSI/AARST standards referenced herein provide recommendations for these factors, including the sizing of soil gas collection plenums and associated piping to improve performance in radon-reduction systems for both small and large foundations.</p> <p>EPA is also clarifying the minimum space requirements for a radon fan location (consistent with the ANSI/AARST standards) to address questions about a passive radon system in homes with no attics (<i>Policy Record ID 0035</i>). Although Indoor airPLUS does not require a radon fan (or “active” system), it is particularly important for homes with encapsulated attics or predominantly vaulted ceilings to design for a space outside the thermal envelope and not below any conditioned space in which a radon fan can be located in the future, if needed. Designing for the fan to be located outside or in a vented attic space is best practice to reduce the potentially catastrophic risk of undetected radon and soil gas intrusion, should the fan and/or positively pressurized radon pipe become disconnected without the knowledge of the occupants.</p> <p>Additionally, an exception has been provided for the requirement of aggregate under the slab in dry climates where a “pipe loop” is installed as a soil gas collection plenum, as outlined in ANSI/AARST CCAH. This approach may provide savings in material costs, while still meeting industry accepted standards for effective design.</p> <p>Finally, an alternative path for gut-rehabs in Radon Zone 1 has also been included to minimize costs associated with demolition of an existing slab.</p> <p>Item 2.1 will now read as follows:</p> <p><b>Additional Indoor airPLUS Requirements:</b></p> <ul style="list-style-type: none"> <li>• Construct homes in EPA Radon Zone 1 (see <a href="http://www.epa.gov/radon/zonemap.html">www.epa.gov/radon/zonemap.html</a>) with radon-resistant features (a passive system at minimum). EPA recommends that radon-resistant features are installed according to ANSI/AARST CCAH for 1-2 family dwellings and townhouses (max. total foundation area of 2500 sq. ft.) OR ANSI/AARST CC-1000 for larger foundations.</li> </ul> <p>Visually verify the following requirements:</p> <ul style="list-style-type: none"> <li>○ Capillary break installed according to Specification 1.2, irrespective of climate zone.</li> </ul>

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			<p><b>Exception:</b></p> <p>In dry climates as defined by 2015 IECC Figure 301.1, a “pipe loop” in a trench of clean aggregate along the entire inside perimeter of the foundation (installed according to ANSI/AARST CCAH 403.1.1) can be used in lieu of a uniform layer of aggregate under the entire slab.</p> <ul style="list-style-type: none"> <li>○ A 3 or 4 in. diameter gas-tight vertical vent pipe, clearly labeled as a component of a radon reduction system. The vent pipe shall be connected to an open T-fitting in the aggregate layer (or connected to geotextile drainage matting according to the manufacturer’s instructions) beneath the polyethylene sheeting, extending up through the conditioned spaces and terminating a minimum of 12 in. above the roof opening. At least 10 ft. of horizontal perforated drain tile is to be attached to the T-fitting beneath the polyethylene sheeting placed over earthen crawlspaces and below concrete slabs. Note: suction points are not permitted on sump lids.</li> <li>○ Radon fan (i.e., an active system) OR an electrical receptacle installed in an accessible attic location near the radon vent pipe (i.e., a passive system) to facilitate future fan installation if needed. A space surrounding the radon pipe, having a vertical height of not less than 48 inches and a diameter of not less than 21 inches, shall be provided in the attic area where the radon fan can be installed, if required.</li> <li>○ Homes with no accessible attic location for a fan must utilize another exterior location or a garage that is not below conditioned space per ANSI/AARST CCAH. The branch circuit supply shall be labeled at the electrical panel indicating its intended use.</li> <li>○ Foundation air sealing with polyurethane caulk or the equivalent at all slab openings, penetrations and control or expansion joints.</li> </ul> <p><b>Exception to Item 2.1:</b> Manufactured homes with raised-pier foundations (i.e. no solid perimeter foundation wall).</p> <p><b>Alternative path for gut-rehabs:</b></p> <ul style="list-style-type: none"> <li>▪ For homes with an existing slab undergoing gut rehabilitation in Radon Zone 1, an active radon system utilizing sub-slab depressurization must be installed, and radon levels shall be verified upon final inspection to be below the EPA action level (4pCi/l) to receive qualification. The alternate slab treatment in the ENERGY STAR Water Management System Builder Checklist, footnote 5, shall apply as an alternative to polyethylene and aggregate or sand under the slab.</li> </ul> <p><b>Note:</b> Larger buildings and multifamily properties may share mitigation systems across multiple units or may require multiple soil gas vent systems to accommodate large building footprints. See ANSI/AARST CC-1000 for electric metering requirements in shared (collateral) mitigation systems, as well as for maximum nominal sizes of soil gas collection plenums and corresponding pipe sizes.</p> <p><b>Note:</b> Consult local building codes to determine whether additional radon requirements apply. Also consult EPA's "Building Radon Out" (EPA 402-K-01-002) for general guidance on installing radon-resistant features.</p>

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### Section 3. Pest Barriers

### Section 4. HVAC Systems

ID	Log Date	Classification	Topic
0025	09/18/2015  Resolved: 10/01/2015	Refinement	<b>Item 4.1 – HVAC Sizing and Design</b>
			<b>Issue:</b> Per ENERGY STAR Certified Homes Version 3 Revision 08, the requirements now satisfied by completion of the ENERGY STAR checklists needs to be expanded.
			<p><b>Resolution:</b> Revise the note for Item 4.1 to reflect the changes made in ENERGY STAR Certified Homes Version 3 Revision 08.</p> <p>Item 4.1 will be revised as follows:</p> <p><i>Note: Completion of the ENERGY STAR requirements now satisfies the following Indoor airPLUS requirements:</i></p> <ul style="list-style-type: none"> <li>✓ Calculate room-by-room heating and cooling design loads using Unabridged ACCA Manual J, 2013 ASHRAE Fundamentals, or other methodology per the Authority Having Jurisdiction (HVAC-D 3).</li> <li>✓ Select all heating and cooling equipment to accommodate the calculated heating and cooling design loads using ACCA Manual S and ENERGY STAR allowances, inclusive of the pressure drop from all specified filters (HVAC-D 4).</li> </ul>
0042	1/1/2018  Resolved: 2/22/2018	Clarification	<b>Item 4.5 - Mechanical Whole-House Ventilation</b>
			<b>Issue:</b> Research on indoor air quality and particulates is indicating potential health benefits with particulate reduction indoors, and higher levels of MERV-rated filters are increasingly available in the market.
			<p><b>Resolution:</b> In recognizing that the Indoor airPLUS Construction Specifications will continue to increase in stringency as new technologies are adopted in the market and health-based research continues to emerge, EPA is adding an advisory for builders to include filtration at air inlets providing whole-building ventilation. EPA recommends, but does not yet require, filters to be MERV 13 or higher. EPA encourages builders to search for improved filtration options that reduce particulate exposure for the occupants while maintaining industry best practices for HVAC design.</p> <p>Item 4.5 will be revised as follows:</p> <p><b>Advisory:</b> Outdoor air ducts connected to the return side of an air handler should be used as supply ventilation only if the manufacturers' requirements for return air temperature are met (e.g., most manufacturers recommend a minimum of 60 degrees Fahrenheit air flow across furnace heat exchangers). EPA also recommends filtering air inlets with a filter rated at MERV 13 or higher to minimize outdoor particles entering the home.</p>
0049	1/1/2018	Refinement	<b>Item 4.5 - Mechanical Whole-Dwelling Ventilation</b>

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	<b>Resolved:</b> 2/22/2018		<p><b>Issue:</b> Current versions of ASHRAE standards reference “whole-dwelling” ventilation rather than “whole-house” ventilation in an effort to reduce confusion between ventilation requirements and ventilation products identified as “whole-house fans.”</p> <p><b>Resolution:</b> Instances of “whole-house” have been changed to “whole-dwelling” throughout the entirety of the Construction Specifications.</p>
0012	07/01/2015 <b>Resolved:</b> 10/01/2015	Change	<p><b>Item 4.6 - Local Exhaust for Known Pollutant Sources</b></p> <p><b>Issue:</b> The requirement to vent all conventional clothes dryers directly to the outdoors from ENERGY STAR Checklist HVAC – R Section 8.5 has been removed in ENERGY STAR Rev. 08.</p> <p><b>Resolution:</b> The intent of Item 4.6 in the Indoor airPLUS Construction Specifications is to ensure that local exhaust ventilation is included in locations with potential pollutant sources including those with excessive moisture. As such, the requirement to vent conventional clothes dryers or to plumb electric condensing dryers to a drain will be reincorporated into the additional Indoor airPLUS requirements and verification checklist.</p> <p>Item 4.6 will be revised as follows:</p> <ul style="list-style-type: none"> <li>Conventional clothes dryers shall be vented to the outdoors. Electric condensing dryers shall be plumbed to a drain according to manufacturer’s instructions.</li> </ul>
0015	07/01/2015	Issue Under Review	<p><b>Item 4.7 - Filtration for Central Forced-Air HVAC Systems</b></p> <p><b>Issue:</b> Partners have questioned whether electronic air cleaners can substitute as an equivalent filtration method for MERV 8 filters.</p> <p><b>Resolution:</b> Issue under review.</p>
0020	07/01/2015 <b>Resolved:</b> 10/01/2015	Change	<p><b>Item 4.7 - Filtration for Central Forced-Air HVAC Systems</b></p> <p><b>Issue:</b> Partners have commented that Home Energy Raters are often not equipped to inspect an air handler or coil to confirm that it is free of dust, as previously required by Item 7.1. This can create an issue of liability for the Rater and can lead to inconsistent verification across homes.</p> <p><b>Resolution:</b> Indoor airPLUS will remove the requirement for final inspection and verification of the coil in Item 7.1, but replace it with the requirement in Item 4.7 to install a temporary filter upon installation of the air handling unit which is to remain in place throughout construction. Verification of a clean filter will still be required upon completion of construction activities, and an advisory to limit the use of the HVAC system during high-dust activities will be recommended to further protect the equipment from contaminants.</p> <p>Item 4.7 will be revised as follows:</p>

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			<ul style="list-style-type: none"> <li>• Upon installation of the air handling unit, include a filter for the remainder of construction activity to protect the unit and/or coil from construction debris and dust. Filter should be clean upon final inspection following construction (see Specification 7.1).               <ul style="list-style-type: none"> <li>○ Advisory: To reduce the likelihood of construction dust contaminating the ducts and air handler, limit use of the HVAC system during activities with increased dust (e.g. drywall sanding, floor sanding).</li> </ul> </li> </ul>
0048	1/1/2018  Resolved: 2/22/2018	Refinement	<p data-bbox="611 459 1335 488"><b>Item 4.7 – Filtration for Central Forced-Air HVAC Systems</b></p> <p data-bbox="611 509 1860 570"><b>Issue:</b> Research on indoor air quality and particulates is indicating potential health benefits with particulate reduction indoors, and higher levels of MERV-rated filters are increasingly available in the market.</p> <p data-bbox="611 591 1934 740"><b>Resolution:</b> In recognizing that the Indoor airPLUS Construction Specifications will continue to increase in stringency as new technologies are adopted in the market and health-based research continues to emerge, EPA is adding advisory language that recommends, but does not require, filters to be MERV 13 or higher. EPA encourages builders to search for improved filtration options that reduce particulate exposure for the occupants while maintaining industry best practices for HVAC design.</p> <p data-bbox="611 761 1014 784">Item 4.7 will be revised as follows:</p> <p data-bbox="659 805 1934 891"><b>Advisory:</b> EPA recommends, but does not require, filters rated at MERV 13 or higher to reduce exposure to fine particles. Filters perform best when the filter rack design includes the following features, which are also included in some manufacturers' filter media boxes: ...</p>

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### Section 5. Combustion Pollutant Control

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0022	07/01/2015  Resolved: 10/01/2015	Refinement	<b>Item 5.1 – Combustion Equipment Located in Conditioned Spaces – Natural gas and propane fireplaces</b>
			<b>Issue:</b> The previous reference to NFPA 54, section 3.3.108, is no longer current.
			<p><b>Resolution:</b> ANSI Z21.88, also previously referenced in this Item, includes appropriate definitions for “power vented” (i.e. mechanically vented) and “direct vented” appliances to meet the intent of this requirement. Item 5.1 will be refined as follows:</p> <ul style="list-style-type: none"> <li>Natural gas and propane fireplaces shall have a permanently affixed glass front or gasketed door and be power vented or direct vented in accordance with ANSI Z21.88/CSA 2.33.</li> </ul>
0008	07/25/2013  Resolved: 10/01/2015	Refinement	<b>Item 5.1 – Combustion Equipment Located in Conditioned Spaces – Decorative gas logs</b>
			<b>Issue:</b> Partners have questioned the technical rationale for excluding all decorative gas logs, as defined in K.1.11 of NFPA 54 (National Fuel Gas Code), from the Indoor airPLUS program because the design features of certain decorative gas log installations may sufficiently protect occupants from the health hazards associated with this type of combustion appliance. Specifically, the use of a fixed or gasketed glass door in conjunction with a direct vent to the exterior of the home has been suggested as an acceptable combination of health risk protections for homes with decorative gas logs.
			<b>Resolution:</b> The blanket prohibition of decorative gas logs under Section 5.1 was based in part on concern that these devices are often installed in traditional masonry solid-fuel burning fireplaces, which are not permitted in Indoor airPLUS qualified homes because of the potential for significant indoor air quality issues. These installations could be more susceptible to future re-conversion to an open wood-burning fireplace and EPA will continue to prohibit their use in Indoor airPLUS qualified homes. This item will be revised to include the updated standard ANSI Z21.84/CSA 2.33.
0017	07/01/2015  Resolved: 10/01/2015	Refinement	<b>Item 5.1 – Combustion Equipment Located in Conditioned Spaces – ENERGY STAR Requirements</b>
			<b>Issue:</b> ENERGY STAR program requirements specify mechanically drafted or direct-vented combustion appliances, with exceptions for naturally drafted equipment in Climate Zones 1-3 if the Rater has followed RESNET’s standards for combustion safety testing. This requirement is largely redundant with the additional Indoor airPLUS requirements in Item 5.1.
			<p><b>Resolution:</b> To eliminate redundancy between ENERGY STAR requirements and the Indoor airPLUS Constructions Specifications, the requirement in Item 5.1 for combustion safety testing of naturally drafted fuel burning appliances will be reincorporated into the ENERGY STAR checklist section.</p> <p>Item 5.1 will be revised as follows:</p> <p><i>Note: Completion of the ENERGY STAR requirements now satisfies the following Indoor airPLUS requirements:</i></p>

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			<p>✓ <i>Mechanically draft or direct vent all gas- and oil-fired furnaces, boilers and water heaters located in conditioned spaces. Naturally drafted equipment is allowed in Climate Zones 1-3 if the Rater has followed the combustion safety test procedures in Section 805 of RESNET's standards. (Rater-F 10.1).</i></p>
0018	07/01/2015  Resolved: 10/01/2015	Clarification	<p><b>Item 5.1 – Combustion Equipment Located in Conditioned Spaces – Factory-built wood-burning fireplaces</b></p> <p><b>Issue:</b> EPA's updated New Source Performance Standard for New Residential Wood Heaters do not cover new factory-built wood burning fireplaces.</p> <p><b>Resolution:</b> The Additional Indoor airPLUS Requirements will be revised to reflect that the EPA Standard for New Residential Wood Heaters are not applicable to new factory-built wood burning fireplaces and that reference will be removed. Factory-built wood burning fireplaces are qualified under EPA's wood-burning fireplace program and an Advisory will be added to recommend that EPA qualified factory-built wood burning fireplaces be selected when wood burning fireplaces are installed.</p> <p>In addition, to reduce the potential for backdrafting and spillage of combustion pollutants into occupied space, Section 5.1 will be revised to clarify that factory-built wood-burning fireplaces must be equipped with tight-fitting gasketed doors and a dedicated outside air supply.</p> <p>To view the updated Air Emissions Requirements for New Residential Wood Heaters, visit:  <a href="http://www2.epa.gov/residential-wood-heaters/fact-sheet-overview-final-updates-air-emissions-requirements-new">http://www2.epa.gov/residential-wood-heaters/fact-sheet-overview-final-updates-air-emissions-requirements-new</a>.</p> <p>Item 5.1 concerning factory-built wood-burning fireplaces will be revised as follows:</p> <ul style="list-style-type: none"> <li>• Factory-built wood-burning fireplaces shall meet the certification requirements of UL 127 and shall have tight-fitting, gasketed glass doors and a dedicated outside air supply. <ul style="list-style-type: none"> <li>• Advisory: Factory-built wood burning fireplaces qualified under EPA's wood-burning fireplace program are recommended. See: <a href="http://www.epa.gov/burnwise/participation.html">http://www.epa.gov/burnwise/participation.html</a>.</li> </ul> </li> </ul>
0036	07/20/2016  Resolved: 10/31/2016	Clarification	<p><b>Item 5.1 – Combustion Equipment Located in Conditioned Spaces – Unvented Combustion Appliances</b></p> <p><b>Issue:</b> A partner inquired whether an unvented ethanol fireplace could be installed in an Indoor airPLUS home.</p> <p><b>Resolution:</b> Indoor airPLUS Item 5.1 prohibits the use of any unvented combustion space-heating appliances, and while some combustion appliances may be used more in a decorative application rather than strictly for "space heating", these unvented appliances may still pose a risk to indoor air quality in the home. However, decorative or other fuel-burning appliances may be installed outdoors while maintaining compliance with Indoor airPLUS, and EPA will clarify that this prohibition only applies to such appliances within conditioned space. While EPA is open to considering emergent technologies and alternative fuels as development and research on these products continues to grow, Indoor airPLUS does not currently allow for unvented combustion appliances, whether for decoration or space heating, within conditioned space.</p> <p>The first bullet in Item 5.1 will be revised as follows:</p>

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			<ul style="list-style-type: none"> <li>Do not install any unvented combustion space-heating or decorative appliances within conditioned space.</li> </ul>
0026	09/18/2015  Resolved: 10/01/2015	Clarification	<p><b>Item 5.3 – Multi-Family Environmental Tobacco Smoke Protections</b></p> <p><b>Issue:</b> Stakeholders have inquired if a compartmentalization requirement would be helpful to include in order to reduce potential exposure to Environmental Tobacco Smoke (ETS) in multifamily properties.</p> <p><b>Resolution:</b> Indoor airPLUS will include an advisory to Item 5.3, encouraging air-tightness testing of each unit according to RESNET standards.</p> <p>Item 5.3 will be revised as follows:</p> <p><b>Advisory:</b> To ensure that air sealing will effectively prevent migration of ETS, other air pollutants and odors between units in multifamily structures, conduct air-tightness testing of each unit in accordance with Section 802 of RESNET’s Mortgage Industry National Home Energy Rating Systems Standards. The maximum air leakage rate should not exceed 0.3 CFM per square foot of the dwelling unit’s enclosure area, at an induced pressure difference of 50 Pascals, where the enclosure area includes the floor area, the ceiling area, and the demising and exterior wall areas.</p>
0001	07/25/2013  Resolved: 11/18/2013	Change	<p><b>Item 5.4 - Garage exhaust fan</b></p> <p><b>Issue:</b> Since the inception of the Indoor airPLUS Program, EPA has received extensive feedback from prospective and active Indoor airPLUS partners questioning the technical rationale for requiring installation of exhaust fans in attached garages, per Section 5.4 and expressing concern about the cost associated with the requirement in the absence of data demonstrating the benefits to homebuyers. Partner observations fall into two categories: 1) The ENERGY STAR and Indoor airPLUS air sealing requirements provide adequate protection against the infiltration of garage pollutants into the home; and 2) an exhaust fan in the garage is not needed because the typical attached garage is outside of the conditioned space, not routinely used as living space, and there is already substantial air leakage between the garage and the outdoors.</p> <p><b>Resolution:</b> Indoor airPLUS previously required mechanical exhaust ventilation in attached garages as part of an integrated five-part strategy intended to limit occupant exposure to garage pollutants, including automobile exhaust and off-gassing of chemicals from products commonly stored in garages. Both leakage into adjacent living spaces as well as exposure during occupant use of the garage for extended periods for hobbies, work, or recreation, drove this requirement.</p> <p>First, the Indoor airPLUS Construction Specifications, Section 4.3, prohibit HVAC equipment from being located in garage spaces in order to avoid potential entrainment of garage contaminants into the HVAC system. The requirements also prohibit ducts and HVAC equipment from being located in framing spaces or cavities adjacent to garage walls or ceilings unless separated by a complete air barrier, such as drywall.</p> <p>Second, the ENERGY STAR Certified Homes program includes extensive requirements for air sealing of the garage-to-house interface, including walls, floors of rooms above the garage, and all wall penetrations (e.g.,</p>

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			<p>plumbing and electrical). These requirements provide an important level of protection to reduce the likelihood that potentially harmful pollutants from the garage might enter the living space.</p> <p>Third, access doors between the house and garage must be weather-stripped or gasketed and are required to have an automatic door closer, also referred to as a spring loaded hinge.</p> <p>Fourth, mechanical exhaust ventilation (i.e., a garage fan) is required to supplement these strategies and to reduce contaminant levels in the garage during periods of garage occupancy. The current requirement allows either a 70 cfm through-the-wall or ducted fan wired for continuous operation (recommended option) or, alternatively, wired to a motion sensor or other control that will ensure that the fan runs during, and for at least 10 minutes after, occupancy.</p> <p>Finally, carbon monoxide alarms are required as a backup to the above strategies in all Indoor airPLUS homes with attached garages or combustion equipment.</p> <p>In reviewing the state of the science concerning garage contaminants and infiltration into the home, it is evident that preventing garage contaminants from entering the living area is an important health protection; yet only limited field data exists on key questions surrounding the effectiveness of various prevention and mitigation strategies under diverse design, ventilation, climate, weather and occupant behavior and use conditions and patterns.<sup>1, 2</sup></p> <p>One of the largest and most recent studies<sup>3</sup> by the Canada Mortgage and Housing Corporation (CMHC) of 67 existing homes in Canada confirmed the importance of keeping mechanical equipment and duct work out of attached garages and effectively sealing the garage-to-house interface. The CMHC study also examined three intervention strategies in a small subset of homes, including air sealing the garage-to-house interface, installation of transfer grilles in the garage, and installation of a garage exhaust fan. The study found that all three strategies reduced the peak concentrations of contaminants in both the garages and the houses where they were tested but that transfer grilles alone did not sufficiently reduce indoor pollutant levels. For new homes, the study concluded that air sealing the garage-to-house interface was the preferred method to avoid pollutant entry into the home.</p> <p>It is not yet clear, in the absence of additional field tests under varying conditions, whether and under what circumstances a garage fan adds needed additional protection to the current requirements (i.e., no HVAC equipment in the garage; rigorous attention to air sealing the garage-to-house interface as required by ENERGY STAR, and weather-stripped, automatically closing entry doors from the garage to the house).</p> <p>Recent as-yet-unpublished testing sponsored by DOE in a single home suggests that air sealing is effective at preventing significant infiltration into the living space from the garage under supply-only and balanced-ventilation scenarios. Upcoming research sponsored by ASHRAE should also help to address these data needs. In the</p>

<sup>1</sup> Emmerich, S.J., Gorfain, J.E., & Howard-Reed, C. (2004). Air and Pollutant Transport from Attached Garages to Residential Living Spaces – Literature Review and Field Tests. International Journal of Ventilation, Vol 2 No 3, 265-276. Available: <http://fire.nist.gov/bfrlpubs/build03/PDF/b03067.pdf>

<sup>2</sup> Murphy, J.D., Beebe, J., Kennedy, D. (1999). Building Code Amendment Justification Research: Poor Indoor Air Quality Mitigation Relative to Attached Garages On Single Family Residences. Journal of Construction Education. Vol 3, No 2, 215-221. Available: [http://www.dec.state.ak.us/air/anpms/doc-anpms/Poor\\_AQ-attach\\_garage-ASC33.pdf](http://www.dec.state.ak.us/air/anpms/doc-anpms/Poor_AQ-attach_garage-ASC33.pdf)

<sup>3</sup> Canada Mortgage and Housing Corporation. (2004, revised 2010). Garage Performance Testing. Research Highlights. Technical Series 04-108. Available: <http://www.cmhc-schl.gc.ca/odpub/pdf/63542.pdf>

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			<p>meantime, EPA believes that revising the current garage fan requirement will result in more widespread adoption of the full suite of indoor air quality protections offered by Indoor airPLUS—with commensurate public health benefit—without significantly lowering the health protections offered by the multi-faceted Indoor airPLUS strategy for controlling garage pollutants.</p> <p>Therefore, EPA will revise Section 5.4 such that homes with a <b>supply-only or balanced whole-house ventilation system</b>, designed to maintain the living space under a positive or neutral pressure relative to the garage, will not be required to install a garage exhaust fan or perform a garage-to-house pressure differential test.</p> <p>Homes that utilize an exhaust-only ventilation strategy to meet the mechanical whole-house ventilation requirements of ENERGY STAR and Indoor airPLUS raise additional concerns because homes with these systems will typically operate under negative pressure with respect to the garage, drawing makeup air from any unsealed openings or penetrations. EPA recognizes that exposure risks may be higher in homes that use exhaust-only ventilation systems and has concluded that a test to evaluate garage-to-house air leakage in these homes will provide added assurance of effective air sealing of the garage-to-house interface.</p> <p>Therefore, homes with an <b>exhaust-only ventilation system</b> will not be required to install a garage exhaust fan if a certified Home Energy Rater can:</p> <ul style="list-style-type: none"> <li>• Verify that the garage-to-house air barrier can maintain a pressure difference of greater than 45 Pascals while the home maintains a 50 Pascal pressure difference with respect to the outdoors. All operable garage openings shall be closed during this test.</li> </ul> <p>As an alternative, or in the event that a home with an exhaust-only ventilation system is unable to be verified as meeting the garage-to-house 45 Pascal pressure difference, install either a 70 cfm through-the-wall or ducted fan wired for continuous operation (recommended option) or, alternatively, wired to a motion sensor or other control that will ensure that the fan runs during, and for at least one hour after, occupancy. While Revision 1 lowered the time a fan must run from 1 hour to 10 minutes, this revision re-institutes a minimum 1 hour period of operation. This longer run-time following occupancy is appropriate in cases where the house is under negative pressure relative to the garage to reduce the potential for infiltration of contaminants into the living space.</p> <p>A second concern addressed by the original garage fan requirement is the potential exposure of people to garage contaminants during periods of extended use of the garage for hobbies, recreation, work or other purposes. EPA is not aware of any data regarding such uses and potential associated exposures and recognizes that individual lifestyle choices are the major determinant of the frequency and duration of residential garage usage for these kinds of activities. EPA has concluded that these potential exposures are best addressed through occupant education. EPA will add an advisory that occupants be provided, as part of the Buyer Information Kit (Section 7.3), educational materials on the importance and methods for ventilating the garage during extended periods of continuous use.</p> <p>EPA believes this approach, in concert with the other four strategies for controlling garage pollutants described above, provide appropriate protections according to the most current research on garage pollutants. EPA recognizes that arguments can also be made for retaining, or even increasing, garage ventilation requirements.</p>

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			<p>EPA will continue to monitor and evaluate new data as they become available and will consider future modifications to the garage ventilation requirements, as appropriate.</p> <p>To reflect this change, Indoor airPLUS Construction Specification for Attached Garages Section 5.4 will be revised as follows:</p> <p><b>5.4 Attached Garages</b></p> <p><i>NOTE: Completion of the <a href="#">ENERGY STAR checklists</a> now satisfies the following Indoor airPLUS requirement:</i></p> <ul style="list-style-type: none"> <li>• <i>Isolate attached garages from conditioned spaces as follows:</i> <ul style="list-style-type: none"> <li>○ <i>Air-seal common walls and ceilings between attached garages and living spaces before installing insulation (Thermal Enclosure System Rater Checklist (TES) 3 and 5).</i></li> <li>○ <i>Use weather stripping or equivalent gasket to ensure all doors between living spaces and attached garages are substantially air-tight (TES 5.3.1).</i></li> </ul> </li> </ul> <p><b>Additional Indoor airPLUS Requirements:</b></p> <ul style="list-style-type: none"> <li>• Install an automatic door closer on all connecting doors between living spaces and attached garages.</li> <li>• In homes with exhaust-only whole house ventilation meet one of the following two requirements: <ul style="list-style-type: none"> <li>○ Equip the attached garage with an exhaust fan with a minimum installed capacity of 70 CFM that is vented directly outdoors. The fan shall be wired for continuous operation or with automatic fan controls (e.g., a motion detector) that activate the fan whenever the garage is occupied and operate for at least 1 hour after the garage has been vacated. If a ducted fan (not through-the-wall) is used, test and verify minimum capacity of 70 cfm.</li> </ul> </li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>○ Verify that the garage-to-house air barrier can maintain a pressure difference of greater than 45 Pascals while the home maintains a 50 Pascal pressure difference with respect to the outdoors. All operable garage openings shall be closed during this test.</li> </ul> <p><b>Advisories:</b></p> <ol style="list-style-type: none"> <li>1. EPA recommends installing a garage exhaust fan if the homebuyer is expected to occupy the garage for work or recreational activities over extended periods of time.</li> <li>2. ENERGY STAR certified fans are highly recommended.</li> <li>3. Provide occupants with information in the Buyer Information Kit (see Section 7.3) on the importance of and methods for ensuring adequate ventilation in the garage while occupied for extended periods of time.</li> </ol>

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### Section 6. Low-Emission Materials

ID	Log Date	Classification	Topic
0013	07/01/2015  Resolved: 10/01/2015	Change	<p data-bbox="611 302 957 329"><b>Item 6.1 - Composite Wood</b></p> <p data-bbox="611 350 1898 410"><b>Issue:</b> EPPS CPA 3 08 by the CPA Grademark certification program is no longer in use, and additional clarity has been requested by partners with regard to referenced standards and how to find compliant products.</p> <p data-bbox="611 431 1940 670"><b>Resolution:</b> The Environmentally Preferable Product (EPP) specification was sunset in March 2012. The Eco-Certified Composite (ECC) Sustainability Standards is its successor and was updated and reissued as CPA Eco-Certified™ Composite (ECC) Sustainability Standard CPA 4-11. This standard will be included for particleboard and MDF products in Item 6.1. Additionally, GREENGUARD or GREENGUARD GOLD certified products will be listed as compliant, U.S HUD Title 24, Part 3280 will be removed as duplicative, and CA Title 17 will be updated to reference the California ATCM to Reduce Formaldehyde Emissions from Composite Wood Products. Item 6.1 will also note that products specifically exempted from the California ATCM as “No added formaldehyde” (NAF) or “Ultra-low emitting formaldehyde” (ULEF) are also compliant with Indoor airPLUS.</p> <p data-bbox="611 691 1014 719">Item 6.1 will be revised as follows:</p> <ul data-bbox="659 740 1940 1401" style="list-style-type: none"> <li data-bbox="659 740 1478 768">• Hardwood plywood: Use only products certified as compliant with: <ul data-bbox="753 789 1906 886" style="list-style-type: none"> <li data-bbox="753 789 1629 816">○ Formaldehyde emissions requirements of ANSI/HPVA HP-1-2009; <b>OR</b></li> <li data-bbox="753 833 1906 886">○ California Airborne Toxics Control Measure (ATCM) to Reduce Formaldehyde Emissions from Composite Wood Products.</li> </ul> </li> <li data-bbox="659 914 1394 941">• Particleboard and MDF products: Certified compliant with: <ul data-bbox="753 963 1871 1125" style="list-style-type: none"> <li data-bbox="753 963 1871 990">○ California ATCM to Reduce Formaldehyde Emissions from Composite Wood Products; <b>OR</b></li> <li data-bbox="753 1006 1803 1034">○ Formaldehyde emissions requirements of ANSI A208.1 and A208.2, respectively; <b>OR</b></li> <li data-bbox="753 1050 1625 1078">○ ECC Sustainability Standard by the Composite Panel Association; <b>OR</b></li> <li data-bbox="753 1094 1457 1122">○ GREENGUARD or GREENGUARD GOLD Certification.</li> </ul> </li> <li data-bbox="659 1146 1892 1206">• Cabinetry: Made with component materials (plywood, particleboard, MDF) that are certified to comply with: <ul data-bbox="753 1227 1940 1401" style="list-style-type: none"> <li data-bbox="753 1227 1247 1255">○ The appropriate standards above; <b>OR</b></li> <li data-bbox="753 1271 1940 1357">○ Registered brands or products produced in plants certified under the Kitchen Cabinet Manufacturers Association’s (KCMA) Environmental Stewardship Certification Program (ESP 05-12); <b>OR</b></li> <li data-bbox="753 1373 1619 1401">○ GREENGUARD or GREENGUARD GOLD Certification for Cabinetry.</li> </ul> </li> </ul>

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			<p>Note: "No added formaldehyde" (NAF) or "Ultra-low emitting formaldehyde" (ULEF) products that are specifically exempted from the California ATCM to Reduce Formaldehyde Emissions from Composite Wood Products are compliant with Indoor airPLUS.</p>
0043	<p>1/1/2018</p> <p><b>Resolved:</b> 2/22/2018</p>	Refinement	<p><b>Item 6.1 – Composite Wood</b></p> <p><b>Issue:</b> ANSI standard HPVA HP-1 has been updated and EPA has established mandatory formaldehyde emission standards aligned with the CARB ATCM Phase II.</p> <p><b>Resolution:</b> To maintain consistency with the development of referenced standards, ANSI/HPVA HP-1-2009 will be updated to the 2016 version of the standard, ANSI/HPVA HP-1-2016. Additionally, the EPA Toxic Substances Control Act (TSCA) Title VI will be added to this Item as a new compliance option. TSCA Title VI establishes mandatory formaldehyde emission standards identical to those established by the California Air Resources Board (CARB) and applies to hardwood plywood, medium-density fiberboard, particleboard, and finished goods containing these products, that are sold, supplied, offered for sale, or manufactured (including imported) in the United States. Compliant composite wood products will become available in the market as manufacturers begin to meet TSCA Title VI and will be required to be labeled as such, pending final implementation dates as determined by EPA. For more detailed information about TSCA Title VI, see <a href="https://www.epa.gov/formaldehyde/webinars-small-entity-compliance-formaldehyde-emission-standards-composite-wood">https://www.epa.gov/formaldehyde/webinars-small-entity-compliance-formaldehyde-emission-standards-composite-wood</a>.</p> <p>EPA worked with the California Air Resources Board (CARB) to help ensure the final national rule is consistent with California's requirements for composite wood products. CARB Phase II and TSCA Title VI also provide exemptions for exterior windows and doors that were not previously addressed in the Indoor airPLUS program requirements. These will be included as exceptions to this requirement.</p> <p>Item 6.1 will be revised as follows:</p> <p><b>Indoor airPLUS Requirements:</b></p> <ul style="list-style-type: none"> <li>• Structural plywood and oriented strand board (OSB): Use only products certified compliant with: <ul style="list-style-type: none"> <li>○ PS1 or PS2, as appropriate, and made with moisture-resistant adhesives as indicated by "Exposure 1" or "Exterior" on the American Plywood Association (APA) trademark.</li> </ul> </li> <li>• Hardwood plywood: Use only products certified compliant with: <ul style="list-style-type: none"> <li>○ Formaldehyde emissions requirements of ANSI/HPVA HP-1-2016; <b>OR</b></li> <li>○ California Air Resources Board (CARB) Airborne Toxics Control Measure (ATCM) Phase II to Reduce Formaldehyde Emissions from Composite Wood Products; <b>OR</b></li> <li>○ EPA Toxic Substances Control Act (TSCA) Title VI certified.</li> </ul> </li> <li>• Particleboard and MDF products: Use only products certified compliant with: <ul style="list-style-type: none"> <li>○ CARB ATCM Phase II to Reduce Formaldehyde Emissions from Composite Wood Products; <b>OR</b></li> </ul> </li> </ul>

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			<ul style="list-style-type: none"> <li>○ EPA Toxic Substances Control Act (TSCA) Title VI certified; <b>OR</b></li> <li>○ Formaldehyde emissions requirements of ANSI A208.1 (particleboard) and A208.2 (MDF); <b>OR</b></li> <li>○ ECC Sustainability Standard by the Composite Panel Association; <b>OR</b></li> <li>○ GREENGUARD or GREENGUARD GOLD Certification.</li> </ul> <ul style="list-style-type: none"> <li>● Cabinetry: Made with component materials (plywood, particleboard, MDF) that are certified to comply with: <ul style="list-style-type: none"> <li>○ The appropriate standards above; <b>OR</b></li> <li>○ Registered brands or products produced in plants certified under the Kitchen Cabinet Manufacturers Association's (KCMA) Environmental Stewardship Certification Program (ESP 05-12); <b>OR</b></li> <li>○ GREENGUARD or GREENGUARD GOLD Certification for Cabinetry.</li> </ul> </li> </ul> <p><b>Exceptions to Item 6.1 per the CA ATCM and EPA's TSCA Title VI:</b></p> <ul style="list-style-type: none"> <li>▪ Windows that contain composite wood products are exempt from the requirements of this section if the window product contains less than five percent by volume of HWPW, PB, or MDF combined in relation to the total volume of the finished window product.</li> <li>▪ Exterior doors and garage doors that contain composite wood products are exempt from the requirements of this section if either: (A) the doors are made from composite wood products manufactured with no added formaldehyde based resins or ULEF resins; or (B) the doors contain less than three percent by volume of HWPW, PB, or MDF combined in relation to the total volume of the finished exterior door or garage door.</li> </ul> <p><b>Note:</b> "No added formaldehyde" (NAF) or "Ultra-low emitting formaldehyde" (ULEF) products that are specifically manufactured under a limited exemption from the CARB ATCM to Reduce Formaldehyde Emissions from Composite Wood Products or EPA's TSCA Title VI rule are compliant with Indoor airPLUS.</p>
0024	09/10/2015  Resolved: 10/01/2015	Refinement	<p><b>Item 6.2 – Interior Paints and Finishes</b></p> <p><b>Issue:</b> Partners have requested clarification if factory or manufacturer applied paints and finishes are required to comply with the requirements of Section 6.2.</p> <p><b>Resolution:</b> The intent of Item 6.2 is to require that specifically field-applied or site-applied paints and coatings are low-VOC and certified by a third-party, as not all manufactured products include details on finish specifications</p> <p>Item 6.2 will be revised as follows:</p> <ul style="list-style-type: none"> <li>○ At least 90 percent of the interior surface area covered by site applied paints and coating shall use low-VOC or no-VOC products certified by one of the following third-party standards or certifications:</li> </ul>
0027	09/18/2015	Clarification	<p><b>Item 6.2 – Interior Paints and Finishes</b></p>

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ID	Log Date	Classification	Topic
	<b>Resolved:</b> 10/01/2015		<p><b>Issue:</b> Partners have inquired about the use of other third-party standards for paints and finishes.</p> <p><b>Resolution:</b> Indoor airPLUS will now include Green Wise, Green Wise Gold, and GREENGUARD GOLD as compliant 3<sup>rd</sup>-party certifications.</p>
0007	<b>07/25/2013</b>  <b>Resolved:</b> 11/18/2013	Clarification	<p><b>Item 6.3 - Carpeted area requiring CRI Green Label certification</b></p> <p><b>Issue:</b> A partner has asked whether a builder can avoid Carpet and Rug Institute (CRI) certification on carpets and adhesives if &lt; 90 percent of the finished floor area is carpeted.</p> <p><b>Resolution:</b> The current requirement states that carpets and carpet adhesives composing 90 percent or more of the finished surface area covered by such product use only products labeled with, or otherwise documented as meeting, the Carpet and Rug Institute's (CRI) Green Label Plus testing program criteria. The intent of this requirement is to ensure that the vast majority of carpet used on a project is certified low emission while allowing for small applications for which CRI certified products are not available. EPA is refining the language to read as follows:</p> <p>At least 90 percent of the surface area covered by carpet and carpet adhesives must use products labeled with, or otherwise documented as meeting, the Carpet and Rug Institute's (CRI) Green Label PLUS testing program criteria.</p>
0028	<b>09/18/2015</b>  <b>Resolved:</b> 10/01/2015	Change	<p><b>Item 6.4 – Adhesives and Sealants</b></p> <p><b>Issue:</b> When the Indoor airPLUS Construction Specifications were conceived, requirements for low-emission adhesives and sealants were omitted due to limited availability in the market. In recent years, more low-VOC options have become available for these products, and EPA strongly recommends their use in both new construction and renovation.</p> <p><b>Resolution:</b> EPA will recommend, but not require, the use of low-emission adhesives and sealants in Indoor airPLUS homes. A new item will be added to Section 6 which consists of an advisory encouraging transition to these products.</p> <p>Item 6.4 will be added as follows:</p> <p>Advisory: While not currently required by Indoor airPLUS, EPA recommends that at least 90 percent of site-applied interior adhesives and sealants be low-VOC or no-VOC products certified by one of the following third-party standards or certifications:</p> <ul style="list-style-type: none"> <li>○ A third-party low-emitting product list based on CA Section 01350 (CDPH Standard Method V1.1-2010), <b>OR</b></li> <li>○ Green Seal GS-36, <b>OR</b></li> <li>○ GREENGUARD or GREENGUARD Gold certification for adhesives and sealants.</li> </ul>

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ID	Log Date	Classification	Topic
0034	4/20/2016  Resolved: 10/31/2016	Change	<b>Item 6.5 – Hard Surface Flooring</b>
			<b>Issue:</b> As the Indoor airPLUS Construction Specifications continue to evolve in tandem with industry growth, more low-emission certifications for varied products are becoming available, Hard surface flooring beyond composite wood applications have not previously been addressed in the Indoor airPLUS Construction Specifications. EPA strongly recommends the use of low-VOC flooring products in both new construction and renovation.
			<p><b>Resolution:</b> EPA will recommend, but not require, the use of low-emission hard surface flooring in Indoor airPLUS qualified homes. Hard surface flooring includes but is not limited to hard surface flooring materials, adhesives, and underlayments. A new item will be added to Section 6 which consists of an advisory encouraging transition to these products.</p> <p>Item 6.5 will be added as follows:</p> <p>6.5 Hard Surface Flooring</p> <p>Advisory: While not currently required by Indoor airPLUS, EPA recommends that at least 90 percent of the interior hard surface flooring materials, adhesives, and underlayments be low-VOC or no-VOC emitting as certified by one of the following third-party standards or certifications:</p> <ul style="list-style-type: none"> <li>• FloorScore®; OR</li> <li>• GREENGUARD or GREENGUARD Gold; OR</li> <li>• SCS Indoor Advantage Gold; OR</li> <li>• A third party low-emitting product list based on CA Section 01350 (CDPH Standard Method v1.1-2010); OR</li> <li>• CRI Green Label Plus (adhesives)</li> </ul>

## Section 7. Home Commissioning

ID	Log Date	Classification	Topic
0014	07/01/2015  Resolved: 10/01/2015	Clarification	<b>Item 7.1 - HVAC and Ductwork Verification</b>
			<b>Issue:</b> Completion of the ENERGY STAR checklists previously included requirements for air balancing of supply registers and return grilles. This has been modified as a recommendation rather than a requirement in ENERGY STAR Revision 8.
			<p><b>Resolution:</b> Indoor airPLUS strongly recommends measurement of supply and return airflow to ensure HVAC systems are operating as designed and that they provide sufficient airflow throughout the home. As such, Item 7.1 will include an advisory recommending air balancing as a best practice.</p> <p>Item 7.1 will be revised as follows:</p>

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ID	Log Date	Classification	Topic
			<ul style="list-style-type: none"> <li>• <b>Advisory:</b> Air balancing of supply registers and return grilles is highly recommended to improve the performance of the HVAC system and comfort of the occupants, but is not required at this time for Indoor airPLUS qualification.</li> </ul>
0021	07/01/2015  Resolved: 10/01/2015	Change	<p><b>Item 7.1 - HVAC and Ductwork Verification</b></p> <p><b>Issue:</b> Partners have commented that Home Energy Raters are often not equipped to inspect an air handler or coil to confirm that it is free of dust, as previously required by Item 7.1. This can create an issue of liability for the Rater and can lead to inconsistent verification across homes.</p> <p><b>Resolution:</b> Indoor airPLUS will remove the requirement for final inspection and verification of the coil in Item 7.1, but replace it with the requirement in Item 4.7 to install a temporary filter upon installation of the air handling unit which shall remain in place throughout construction. Verification of a clean filter will still be required upon completion of construction activities, and an advisory to limit the use of the HVAC system during high-dust activities will be recommended in Item 4.7 to further protect the equipment from contaminants.</p> <p>Item 7.1 will be revised as follows:</p> <ul style="list-style-type: none"> <li>○ After all dust-producing construction activities are complete (e.g., drywall, trim carpentry, floor sanding), verify the filter is new, clean and meets specified MERV rating (see Specification 4.7).</li> </ul>
0030	09/18/2015  Resolved: 10/01/2015	Change	<p><b>Item 7.3 – Buyer Information Kit</b></p> <p><b>Issue:</b> Partners have questioned the value of including both an Indoor airPLUS Verification Checklist, as well as HVAC design documentation in the Buyer Information Kit.</p> <p><b>Resolution:</b> EPA recognizes that the most valuable pieces of information for a new Indoor airPLUS homebuyer are generally the Indoor airPLUS label on the home, the Indoor airPLUS certificate confirming that the home was verified by a Home Energy Rater, and an instruction manual recommending operations and maintenance procedures or schedules for the home’s mechanical equipment. As such, these items will continue to be required, while a Verification Checklist and HVAC design documentation will be optional.</p> <p>Item 7.3 will be revised as follows:</p> <ul style="list-style-type: none"> <li>• Provide buyers with information and documentation of the home’s IAQ protections, including: <ul style="list-style-type: none"> <li>○ An Indoor airPLUS label and certificate</li> <li>○ Operations and maintenance instruction manuals for all installed equipment and systems addressed by Indoor airPLUS and ENERGY STAR requirements, including HVAC systems and accessories, combustion appliances and any radon system.</li> </ul> </li> </ul>
0044	1/1/2018  Resolved: 2/22/2018	Refinement	<p><b>Item 7.3 – Owner and Resident Information Kit</b></p> <p><b>Issue:</b> The previous title of this Item, Buyer Information Kit, inferred that all occupants of Indoor airPLUS qualified homes were owner-occupants, which may not be the case in some multifamily properties and rental units.</p>

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ID	Log Date	Classification	Topic
			<p><b>Resolution:</b> To be inclusive of property managers, residents, and building owners, the Item will be renamed and the requirements will be revised as following:</p> <p>7.3 Owner and Resident Information Kit</p> <p>Indoor airPLUS Requirements:</p> <ul style="list-style-type: none"> <li>○ Provide resident(s), property manager, and/or building owner(s) with information and documentation of the home's IAQ protections, including: <ul style="list-style-type: none"> <li>○ An Indoor airPLUS label and certificate.</li> <li>○ Operations and maintenance instruction manuals for all installed equipment and systems addressed by Indoor airPLUS and ENERGY STAR requirements, including HVAC systems and accessories, dehumidifiers, combustion appliances and any radon system.</li> </ul> </li> </ul>

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### APPENDIX – Policy Record Log by ID Number

ID	Log Date	Classification	Title
0001	07/25/2013	Change	Item 5.4 – Garage Fan Exhaust
0002	07/25/2015	Change	Item 1.2 – Aggregate or sand drainage layer
0003	07/25/2013	Clarification	Separate verification checklist for each unit in multifamily buildings
0004	07/25/2013	Clarification	ENERGY STAR Multi-family High Rise Program buildings not eligible for Indoor airPLUS
0005	07/25/2013	Clarification	Item 1.2 – Allowance for XPS Insulation under slab in conjunction with polyethylene sheeting
0006	07/25/2013	Refinement	Verification checklist signature block
0007	07/25/2013	Clarification	Item 6.3 – Carpeted are requiring CRI Green Label certification
0008	07/25/2013	Change	Item 5.1 – Combustion Equipment Located in Conditioned Spaces – Decorative Gas Logs
0009	07/01/2015	Clarification	Item 1.7 – Use cladding material that can tolerate regular wetting and install a well-sealed, continuous drainage plane that extends at least 16 in. above final grade
0010	07/01/2015	Change	Item 1.2 – Capillary Break
0011	07/01/2015	Clarification	Item 1.4 – Basement and Crawlspace Insulation and Conditioned Air
0012	07/01/2015	Change	Item 4.6 – Local Exhaust for Known Pollutant Source
0013	07/01/2015	Clarification	Item 6.1 – Composite Wood
0014	07/01/2015	Clarification	Item 7.1 – HVAC and Ductwork Verification
0015	07/01/2015	Under Review	Item 4.7 – Filtration for Central Forced-Air HVAC Systems
0016	07/01/2015	Clarification	Item 1.4 – Basement and Crawlspace Insulation and Conditioned Air
0017	07/01/2015	Refinement	Item 5.1 – Combustion Equipment Located in Conditioned Spaces – ENERGY STAR Requirements
0018	07/01/2015	Clarification	Item 5.1 – Combustion Equipment Located in Conditioned Spaces – Factory-built wood-burning fireplaces
0019	07/01/2015	Clarification	Item 2.1 – Radon-Resistant Construction
0020	07/01/2015	Change	Item 4.7 – Filtration for Central Forced-Air HVAC Systems
0021	07/01/2015	Change	Item 7.1 – HVAC and Ductwork Verification
0022	07/01/2015	Refinement	Item 5.1 – Combustion Equipment Located in Conditioned Spaces – Natural gas and propane fireplaces
0023	07/01/2015	Refinement	Checklist – Moisture Control Verification Option
0024	09/10/2015	Refinement	Item 6.2 – Interior Paints and Finishes

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0025	09/18/2015	Refinement	Item 4.1 – HVAC Sizing and Design
0026	09/18/2015	Clarification	Item 5.3 – Multi-family Environmental Tobacco Smoke Protections
0027	09/18/2015	Clarification	Item 6.2 – Interior Paints and Finishes
0028	09/18/2015	Change	Item 6.4 – Adhesives and Sealants
0029	09/18/2015	Clarification	Item 1.2 – Capillary Break
0030	09/18/2015	Change	Item 7.3 – Buyer Information Kit
0031	11/18/2015	Clarification	Guidance for Completing the Indoor airPLUS Verification Checklist
0032	12/11/2015	Refinement	Item 2.1 – Radon-Resistant Construction in Homes With Raised Pier Foundations
0033	12/11/2015	Refinement	Item 1.4 – Basement and Crawlspace Insulation and Conditioned Air – Dehumidification Exception
0034	04/20/2016	Change	Item 6.5 – Hard Surface Flooring
0035	07/06/2016	Under Review	Item 2.1 – Radon-Resistant Construction in Homes With Sealed and Conditioned Attics
0036	07/20/2016	Clarification	Item 5.1 – Combustion Equipment Located in Conditioned Spaces – Unvented Combustion Appliances
0037	11/28/2016	Clarification	Item 1.4 – Basement and Crawlspace Insulation and Conditioned Air – Exceptions
0038	1/1/2018	Change	Item 1.11 – Moisture-Resistant Materials and Moisture-Protective Systems
0039	1/1/2018	Clarification	Verification Checklist Item 4.3
0040	1/1/2018	Clarification	Verification Checklist Item 5.1
0041	1/1/2018	Change	Item 2.1 – Radon-Resistant Construction
0042	1/1/2018	Clarification	Item 4.5 – Mechanical Whole-House Ventilation
0043	1/1/2018	Refinement	Item 6.1 – Composite Wood
0044	1/1/2018	Refinement	Item 7.3 – Owner and Resident Information Kit
0045	1/1/2018	Refinement	Verification Checklist Exception Boxes
0046	1/1/2018	Change	Item 1.14 – Moisture-Resistant Materials
0047	1/1/2018	Clarification	Guidance for Completing the Indoor airPLUS Verification Checklist
0048	1/1/2018	Refinement	Item 4.7 – Filtration for Central Forced-Air HVAC Systems
0049	1/1/2018	Refinement	Item 4.5 – Mechanical Whole-Dwelling Ventilation
0050	1/1/2018	Change	Item 1.4 – Basement and Crawlspace Insulation and Conditioned Air
0051	9/23/2019	Change	Eligibility and Verification Requirements