Indoor airPLUS & Quality Assurance
Designed & Verified for Healthy, High Performance Housing

September 2017
Learning Objectives

• Gain an understanding of Indoor airPLUS’ alignment with PHIUS+ certification.
• Identify resources to help you successfully achieve the Indoor airPLUS label.
• Hear what’s emerging at EPA with regard to Indoor airPLUS verification.
• Explore successful implementation of Indoor airPLUS quality assurance activities.
• Learn about Indoor airPLUS’ alignment with other high-performance programs.
Indoor airPLUS Overview & Alignment with PHIUS+
Indoor airPLUS is an EPA label that adds health protections to your ENERGY STAR value proposition.
ENERGY STAR + Indoor airPLUS

• Both programs are based on building science principles that use a systems approach to improve home performance issues.
• Both programs require completion of verification checklists by a certified Home Energy Rater.
• Visual inspection items can be verified during the same onsite visits by a certified Home Energy Rater.
• Reporting to EPA follows the same schedule and is completed using the same online program.
High-Performance Home Staircase

Indoor Air Quality (IAQ)
Indoor airPLUS qualification can help ensure that tight passive homes do not contribute to unhealthy living environments.

Compatible program values and certification processes:

• Both programs are based on building science principles that use a systems approach to improve home performance issues.

• Both programs require completion of verification checklists by a qualified Home Energy Rater (additional training required for PHIUS).

• Visual inspection items can be verified during the same on-site visit.
Ensuring Multi-Certification Success

• Get started early—integrate IAP features at the pre-planning and design phases.

• Identify a Home Energy Rater who has training/experience with both IAP and PHIUS+.
  • PHIUS consultants are encouraged to participate in IAP webinars and review online resources to learn more about the program. www.epa.gov/indoorairplus

• Reach out to Rater, Provider, or EPA (Indoor_airPLUS@epa.gov) with technical and programmatic questions.

• Recognize that reporting processes differ across programs!
Indoor airPLUS Revision 3

• Released October 2015.
• Further alignment with ENERGY STAR Rev. 8.
• Clarified multiple requirements.
• Provided additional advisories (e.g. adhesives & sealants)
• Updated list of compliant products for Section 6 and developed a new resource, How to Find Indoor airPLUS Compliant Low Emission Products.

Revision 4 coming soon!
Indoor airPLUS Construction Specifications

- Relevant ENERGY STAR checklist items are summarized and referenced at the beginning of each measure.
- Additional Indoor airPLUS requirements are listed separately. These include:
  - Items that provide additional indoor air quality protections.
  - Requirements that exclude an ENERGY STAR exception.
- Advisories, notes and exceptions listed where applicable.

https://www.epa.gov/indoorairplus/indoor-airplus-program-documents
Indoor airPLUS Checklist Located within PHIUS+ Workbook

- Track IAP and PHIUS+ requirements side-by-side
- Extract worksheets when ready to submit for certification

Tips for success:
1. Confirm that the latest checklist version is being utilized.
2. Cross-check Checklist content with Construction Specification for Advisories, Notes, and Exemptions.
What About Multifamily Dwellings?

- Multifamily dwellings that meet the ENERGY STAR Certified Homes, Version 3 National Program Requirements can pursue Indoor airPLUS.
  - Buildings that would only be eligible for the ENERGY STAR Multifamily High Rise Program are not eligible for Indoor airPLUS at this time.
- Multifamily requirements are the same as single family, with the additions of:
  - Compartmentalization
  - Non-smoking policies
How to Build and Verify Indoor airPLUS Homes
Indoor airPLUS Home

- Moisture Control
- Pest Barriers
- Radon Control
- Ventilation & Filtration
- Materials
- Combustion Safety
Indoor airPLUS Quality Assurance - Update
Indoor airPLUS Quality Assurance - Update

Indoor airPLUS Version 1 (Rev. 03) Rater Quality Assurance Checklist

QA Designe:
QA Designee RTIN:
Date of QA Inspection:
Status of home at time of inspection (e.g., under construction, occupied):

Rater Company Name:
Builder Company Name:
Rater Name:
Rater RTIN #:
Rater Pre-Drywall Inspection Date:
Rater Final Inspection Date:

Note: The Rev. 03 checklist has been modified to reflect only the additional indoor airPLUS requirements and their corresponding section numbers that must be met after completing the ENERGY STAR requirements. ENERGY STAR remains a prerequisite for indoor airPLUS qualification.

Home Address:          City:          State:          Zip Code:

Action Items / Summary of QA

For any item marked “Must Correct,” an action summary document shall be attached.

Indoor airPLUS Version 1 (Rev. 03) Verification Checklist

Requirements (Refer to full Indoor airPLUS Construction Specifications for details)

ENERGY STAR Version 3 Program Requirements must be followed and the home shall be ENERGY STAR certified in conjunction with Indoor airPLUS qualification.

1. Moisture Control
   1.1 Drain or sump pump installed in basements and crawlspace (Exception: free-draining soils). In EPA Radon Zone 1, check valve also installed.
   1.2 Layer of aggregate or sand (4 in.) with geotextile matting installed below slabs (Exceptions: see spec) AND
### 6. Materials *(Photo documentation for each product type must be provided)*

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>6.1</td>
<td>All composite wood products certified low-emission. See spec.</td>
</tr>
<tr>
<td>6.2</td>
<td>Interior paints and finishes certified low-emission. See spec.</td>
</tr>
<tr>
<td>6.3</td>
<td>Carpet, carpet adhesives, and carpet cushion certified low-emission. See spec.</td>
</tr>
</tbody>
</table>
2.1 Radon Control

Air seal all sump covers.

• Construct homes built in EPA Radon Zone 1 with radon-resistant features.

• Advisory:
  • Passive Systems recommended in Zones 2-3.
  • Educate homeowners.

For more on radon-resistant construction, see:
https://www.epa.gov/radon/radon-resistant-construction-basics-and-techniques
Note: These maps indicate average risk by county. However, high levels of radon can be found in any home. See: [www.epa.gov/radon/zonemap.html](http://www.epa.gov/radon/zonemap.html) or for an interactive map, see: [http://www.wxplushealth.org/geoexplorer](http://www.wxplushealth.org/geoexplorer).
Radon Zones

For an easy to use map: Weatherization plus Health GeoExplorer  www.wxplushealth.org/geoexplorer
2.1 Radon Resistant Construction - Verification

• Can be builder or Rater verified.
• **Verify documentation before the start of construction** of an approved radon mitigation system.
• The aggregate layer, connected to a vent pipe under overlapped polyethylene sheeting, should be **visually verified before pouring the slab**.
• The fully connected vent pipe, fan/electrical receptacle, and foundation air sealing should be **visually verified at pre-drywall inspection**.

<table>
<thead>
<tr>
<th>Section</th>
<th>Requirements (Refer to full Indoor airPLUS Construction Specifications for details)</th>
<th>Must Correct</th>
<th>Builder Verified</th>
<th>Rater Verified</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radon</td>
<td>2.1 Radon-resistant features installed in Radon Zone 1 homes in accordance with Construction Specification 2.1.</td>
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Radon & Passive Construction

• Radon is an important concern for all home types:
  • Existing & new construction
  • Tightly-sealed & leaky homes

• Research has not yet been performed to evaluate whether passive construction affects radon mitigation

• Labeling programs take precautionary approach toward radon mitigation

• IAP specification only stipulates radon controls for homes within Zone 1
  • Passive radon controls are sufficient; active systems not required
  • Passive controls will not decrease the energy efficiency of the home
Homes with Vaulted or Sealed/Conditioned Attics

2 options:
1. Radon fan installed in an approved exterior location (active system)
2. Electrical receptacle installed in an accessible attic or other exterior location near the radon vent pipe

Resource: ANSI/AARST CCAH-2013 Reducing Radon in New Construction of One & Two Family Dwellings and Townhomes
Technical Resource and Tools: Building America Solution Center

https://basc.pnnl.gov/checklists/epa-indoor-airplus
How to Find Indoor airPLUS Compliant Low Emission Products

- Guidance on identifying compliant low-emission products and 3rd party labels.
- https://www.epa.gov/indoorairplus/indoor-airplus-compliant-low-emission-products
- RESNET 2016 in-depth presentation: Plain Speak on How to Find the Right Products
Indoor airPLUS

A new opportunity for leading builders to create better environments inside and out.

Learn more at:
www.epa.gov/indoorairplus

OR contact the Indoor airPLUS Team at indoor_airPLUS@epa.gov
Partnership and Promotion
Becoming an Indoor airPLUS Partner

Note: Builders and Raters must also be active ENERGY STAR partners to report Indoor airPLUS homes

- For *new* ENERGY STAR and Indoor airPLUS Partners, visit: www.energystar.gov/newhomesPA
Becoming an Indoor airPLUS Partner

• For current ENERGY STAR Partners:
  • Log into your My ENERGY STAR Account (MESA)
    www.energystar.gov/mesa
  • Username and password can be recovered if forgotten
Becoming and Indoor airPLUS Partner

• After accessing your account, select “Join Indoor airPLUS”.

You are invited to navigate directly to other ENERGY STAR tools and sites, change your password for your password-protected ENERGY STAR tools, or update contact information for you, your organization, and your colleagues.

<table>
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<tr>
<th>To-Do List:</th>
<th>My ENERGY STAR Tools:</th>
</tr>
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<tbody>
<tr>
<td>New Homes Builder Training</td>
<td>• Logo Downloads</td>
</tr>
<tr>
<td>Andrew Fonowich completed the training on 10/23/2014. The builder training was updated in November 2014. We encourage you to review the updated Builder Training.</td>
<td>• EPA Policies for Responding to Misuse of the ENERGY STAR Brand Now</td>
</tr>
</tbody>
</table>

(Internet Explorer or Firefox are the preferred browsers for this training. Please turn off your browser pop-up blocker.)

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<tr>
<th>ENERGY STAR Certified Homes Resources:</th>
<th>Indoor airPLUS Resources:</th>
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<td>• Linking Opportunities</td>
<td>• Join Indoor airPLUS</td>
</tr>
<tr>
<td>• Consumer Videos</td>
<td>• Sales Training Kit</td>
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<tr>
<td>• Co-brandable Consumer Brochure</td>
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<td>• Co-brandable Banners</td>
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<tr>
<td>• Co-brandable Yard Signs</td>
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<td>• Sales Training Kit</td>
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Becoming an Indoor airPLUS Partner

When your partnership is activated, you’ll have access to Indoor airPLUS logos, customizable sales training, and marketing materials.

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<td>- Discover Indoor airPLUS Homes Customizable Booklet</td>
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<td>- Sales Training Kit</td>
<td>Brand New</td>
<td>Review Training</td>
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Becoming an Indoor airPLUS Partner

- Use the logos to promote your partnership and commitment to offering safer, healthier, more durable homes.
5. Combustion Pollutants
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- Accidental carbon monoxide (CO) poisoning kills an average of 439 persons annually.
- (CDC; MMWR; 12/21/2007)
- Carbon monoxide, an odorless, colorless gas, which can cause sudden illness and death, is produced any time a fossil fuel is burned.
5.4 Attached Garages

1. **Isolated** from conditioned spaces:
   - Common walls and ceilings are **air-sealed**.
   - No HVAC equipment or ducts in garage.
   - Weather stripping and an automatic door closer is installed on connecting doors between living space and garage.

2. Appropriate ventilation strategy or **pressure testing** ensures separation from living space.
5.4 Attached Garages

- Isolate attached garages from conditioned spaces:
  - Air-seal common walls and ceilings.
  - Use weather stripping on all doors between living spaces and attached garages.

- Install an automatic door closer on all connecting doors between living spaces and attached garages.

- In homes with exhaust-only whole-house ventilation either:
  - Equip the attached garage with an exhaust fan with a minimum installed capacity of 70 cfm that is vented directly outdoors; OR
  - Conduct a pressure test to verify the effectiveness of the garage-to-house air barrier.
Self-Closing Door Mechanisms

- Not expected for overhead door, just door between garage and living space
- Self-closing/spring hinge is sufficient
- Many low costs options available
5.4 Attached Garages - Verification

- Must be Rater verified.
- Rater should verify proper functioning of the automatic door closer at final inspection.
- In homes with exhaust only ventilation system, at final inspection Rater should:
  - Visually verify at final inspection that an appropriate garage fan has been installed.
  - If the garage is ventilated by a ducted fan, a Rater should perform a flow test to confirm the required CFM is being met.
  OR
  - Conduct 45 Pascal pressure test with all garage openings closed to verify the garage-to-house air barrier.
    - Test can be performed during required ENERGY STAR blower door test.
    - If garage-to-house air barrier does not pass pressure test, additional air sealing or a garage fan required.

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<td>5.1</td>
<td>Emissions standards met for fuel-burning and space-heating appliances.</td>
</tr>
<tr>
<td>5.2</td>
<td>CO alarms installed in each sleeping zone (e.g., common hallway) according to NFPA 720.</td>
</tr>
<tr>
<td>5.3</td>
<td>Multifamily buildings: Smoking restrictions implemented AND ETS transfer pathways minimized.</td>
</tr>
<tr>
<td>5.4</td>
<td>Attached garages: Door closer installed on all connecting doors AND in homes with exhaust-only whole-house ventilation EITHER a 70 cfm exhaust fan installed in garage OR a pressure test conducted to verify the effectiveness of the garage-to-house air barrier. See spec for details.</td>
</tr>
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6. Low Emission Materials
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Potential Issues:

• Indoor levels of many chemical pollutants can be **2-5 times higher than outdoor levels**.

• Volatile Organic Compounds (VOCs) include a variety of chemicals, some of which may have short- and long-term adverse health effects, including eye, nose and throat irritation, headaches, loss of coordination, nausea, damage to liver, kidney, and central nervous system.
What are the Requirements?

6.1 – Composite Wood
Structural panels, cabinetry, shelving, trim, doors, stair treads, flooring, etc.

6.2 – Interior Paints and Finishes
Site-applied coatings only, but not simply “low-VOC”.

6.3 – Carpet and Carpet Adhesives
CRI Green Label

6.4 – Adhesives and Sealants
Recommended but not yet required.

Indoor AirPLUS – Section 6
Low-emission Materials
Resources and Tools

- Builder and consumer resources
- Partner locator
- Website widgets
- Construction requirements
- Technical guidance
Indoor airPLUS

A new opportunity for leading builders to create better environments inside and out.

Learn more at:
www.epa.gov/indoorairplus

OR contact the Indoor airPLUS Team at
indoor_airPLUS@epa.gov