Case Studies in Building Healthier Homes with EPA’s Indoor airPLUS

VERSION 1 (REV. 02)

2014 EEBA Conference
-Visit booth 11 for more info

September 24, 2014
Contents

• Indoor airPLUS in Context

• Building and Selling Indoor airPLUS
  – The How’s and Why’s of indoor air quality
  – The importance of HVAC design & installation

• Indoor airPLUS regional successes
  – St. Louis
  – Metro DC

• Recent Awards

• New Resources for Builders & Raters
Indoor airPLUS Background
Indoor airPLUS is an EPA label that adds health protections to your ENERGY STAR value proposition.
Grow Your Market

What more can I bring to the builder and consumer?

More than 25 million people, including 7.1 million children, have asthma and there is a 20-50% increased risk of asthma in damp houses.
ENERGY STAR + Indoor airPLUS

- Envelope
- HVAC
- Moisture
- CO

+ look for

- Radon
- Pests
- Materials
- CO +
- HVAC +
- Moisture +

= Comprehensive Indoor Air Quality Protection
Revision 2

- Released November 2013
- Revised requirements for attached garages (garage fan no longer required for most homes)
- New exception from aggregate or sand requirement for slab-on-grade foundations (non-Radon Zone 1 homes only)
How to use the 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.
What About Existing Homes?

- Indoor airPLUS is not designed for existing homes.
- Under certain conditions, (e.g., gut rehabs) if ENERGY STAR requirements and Indoor airPLUS requirements are met.
- For most renovation and energy upgrade work, see EPA’s Healthy Indoor Environment Protocols for Home Energy Upgrades.

http://www.epa.gov/iaq/homes/retrofits.html
What does Indoor airPLUS cost?

- No fee to participate in the EPA program.
- Raters may charge a verification fee.
- Cost of additional Indoor airPLUS features will vary based on:
  - Local code requirements and typical building practices
  - Climate Zone (e.g., moist versus dry)
  - Radon Zone
  - Availability of suppliers and cost of materials
  - Type of construction (e.g., below grade foundation or slab on grade)
- Cost of additional features could be a few hundred dollars in dry, non-Radon Zone 1 areas or up to a few thousand dollars in moist climates in Radon Zone 1.
Building and Selling Indoor airPLUS

The How’s and Why’s of indoor air quality for the builder and consumer
Indoor airPLUS

http://www.youtube.com/watch?v=vKME1djdIUA

Moisture Control

Pest Barriers

Materials

Radon Control

Combustion Safety

Ventilation & Filtration

Indoor Air Quality (IAQ)
1. Moisture Control

- Moisture is a leading cause of health, comfort and durability concerns in homes.
- 19% of U.S. households have at least one person with Asthma.
- There is a 20-50% increased risk of asthma in damp houses.
- The economic cost of asthma amounts to more than $56 billion annually.
- Mold grows where there is moisture.
- Molds produce allergens, irritants, and in some cases, potentially toxic substances.
1.1 Site and Foundation Drainage

- Slope hard surfaces and final grade away from the foundation.
- Install drain tile at the footings of basement and crawlspace walls.

- Install a drain or sump in basement and crawlspace floors.

*Exceptions: Slab-on-grade and areas with free draining soils*
1.2 Capillary Break Installation

- Install polyethylene sheeting or extruded polystyrene beneath concrete slabs.
- Install a capillary break at all crawlspace floors using polyethylene sheeting.

- Under the polyethylene sheeting or extruded polystyrene (XPS) insulation:
  - Install a 4 in. layer of aggregate; OR
  - A uniform layer of sand, overlain with a layer of geotextile drainage matting.

Exceptions: Slab-on-grade foundations, certified free-draining soils and dry climates (only in Radon zones 2 & 3)
1.2 Capillary Break Installation

**Diagram:**
- **4-IN. CONCRETE SLAB**
- **FOAM BOARD INSULATION**
- **SLAB EDGE CAULKED/SEALED TO WALL**
- **6-MIL. (MINIMUM) VAPOR RETARDER LAPPED 6-12-IN.**
- **4-IN. OF CLEAN AGGREGATE (COARSE GRAVEL, NO FINES) OR DRAINAGE MAT**

**Basement Slab with Capillary Break - Gravel and Geotextile Mat (Inset)**

Indoor Air Quality (IAQ)
1.3+1.4 Below-grade Foundation Walls

- Waterproof crawlspace and basement perimeter walls.
- All floors above unconditioned spaces shall be insulated.

- Insulate crawlspace and basement perimeter walls.
- Seal crawlspace and basement perimeter walls.
- Provide conditioned air (1cfm/50SF).

Exceptions: Dry climates, raised pier foundations, etc. (see spec)
1.5 – 1.7 Wall Drainage System

- Install a drainage plane behind exterior wall cladding.
- Install flashing at the bottom of exterior walls.
- Fully flash all window and door openings.
- Direct roof water away from the house using gutters or an underground catchment system.

For homes that meet ENERGY STAR exceptions for gutters and downspouts, provide protection for water splash damage by one of the following:
- Extend the foundation walls 16 in. above grade.
- Provide a drip line that is 16 in. from the foundation.
- Install cladding that can tolerate wetting and a drainage plane that extends 16 in. above grade.

Builder: “Can you use gutters?”
1.11 Moisture-Resistant Materials

- Install moisture-resistant backing material behind tub and shower enclosures.
- Install a corrosion-resistant drain pan.

- Install only water-resistant hard-surface flooring in kitchens, bathrooms, entryways, laundry areas, and utility rooms.
- Insulate water supply pipes in exterior walls with pipe wrap.
What does the Sales Team need to Know about Moisture Control & Water Management?

Benefits

- Water damage reduction
- Flood mitigation
- Structural durability
- Reduces potential for mold growth – even in places you can’t see.
- Fewer maintenance issues from peeling paint and moldy grout
2. Radon

- Radon is a cancer-causing, radioactive gas created by the natural breakdown of uranium in soil.
- Radon can be found all over the US.
- 1 in 15 homes have radon above 4 pCi/L.
- You are most likely to get your greatest exposure to radon at home.
- Radon is the second leading cause of lung cancer after smoking.
2.1 Radon Control

Note: these maps indicate average risk by county. However, high levels of radon can be found in any home.

For an easy-to-use map, see: http://www.wxplushealth.org/geoeplorer
Radon Zones around St. Louis

For an easy-to-use map, see: http://www.wxplushealth.org/geoexplorer
2.1 Radon Control

Note: These techniques are only required in Radon Zone 1.

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>
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<td>Radon</td>
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</table>
What does the Sales Team need to Know about Radon Control?

**Homeowner Benefits**

Protection against radon, the second leading cause of lung cancer in the U.S.

**Surgeon General’s Warning:**
Radon Causes Lung Cancer.
3. Pest Barriers
3.2 Rodent/Bird Screens

• Provide corrosion-proof rodent/bird screens for all openings that cannot be sealed or caulked.

Note: Does not apply to dryer vents
What does the Sales Team need to know about Pest Barriers?

**Homeowner Benefits**

- Prevention of potential damage from pests
- Less vacuuming and dusting
- Reduced pest-related allergens, asthma triggers and diseases
4.1 HVAC Sizing and Design

- Properly size all heating and cooling equipment using ACCA Manual J, ASHRAE Handbooks, or equivalent software.

- "Warm-Humid" climates: equipment shall be installed with sufficient latent capacity to maintain indoor relative humidity (RH) at or below 60 percent.
## 4.1 HVAC Sizing and Design

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<th>Location</th>
<th>Elevation (Feet)</th>
<th>Latitude (Degrees North)</th>
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<th>Winter Cooling 1% Dry Bulb</th>
<th>Winter Coincident Wet Bulb</th>
<th>Summer Design Grains 55% RH</th>
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</table>
4.1 HVAC Sizing and Design

• Heating and cooling equipment generally has just two modes – on & off.
• Right sizing is key in controlling RH with HVAC systems
• The HVAC system must operate to remove moisture!
4.1 HVAC Sizing and Design

• By following the procedures in Manual S for selecting HVAC systems you can ensure the HVAC system selected can cover the Latent (Moisture) load of the home.

• HVAC systems have a broad range of capabilities depending on fan speeds and controls.

• A humidistat may be used in some systems to achieve additional dehumidification.

• In some extreme cases a separate dehumidifier may be required to supplement moisture removal.
4.1 HVAC Sizing and Design

Controlled to ≤ 60% RH

For IECC climate zone map, visit [www.iccsafe.org](http://www.iccsafe.org)
### 4.1 HVAC Sizing and Design

<table>
<thead>
<tr>
<th>Entering Wet Bulb Temperature</th>
<th>Total Air Volume (cfm)</th>
<th>Total Cool Cap. (kBTU/h)</th>
<th>Comp Motor Input (kW)</th>
<th>Sensible to Total Ratio (S/T)</th>
<th>Total Cool Cap. (kBTU/h)</th>
<th>Comp Motor Input (kW)</th>
<th>Sensible to Total Ratio (S/T)</th>
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<td>37.4</td>
<td>2.25</td>
<td>0.5 0.67 0.83</td>
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</table>

**Total Design Capacity = 33.2 kBTU/h**

**Sensible Design Capacity = 33.2 x 0.83 = 27.6 kBTU/h**

**Latent Design Capacity = 33.2 - 27.6 = 5.6 kBTU/h**
4.1 HVAC Sizing and Design Verification

- Must be Rater verified.
- Rater should **verify documentation before the start of construction** showing the method and calculations for retaining an indoor relative humidity below 60 percent.
- Rater should **visually verify at final inspection** that the designed system has been properly installed.

<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>
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<tr>
<td>4.1</td>
<td>Equipment selected to keep relative humidity &lt; 60% in “Warm-Humid” climates (Exception: see spec).</td>
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<tr>
<td>4.2</td>
<td>Duct systems protected from construction debris AND no building cavities used as air supplies or returns.</td>
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<tr>
<td>4.3</td>
<td>No air-handling equipment or ductwork installed in garage AND continuous air barrier in adjacent assemblies.</td>
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<tr>
<td>4.7</td>
<td>Central forced-air HVAC system(s) have minimum MERV 8 filter AND no ozone generators in home.</td>
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</tbody>
</table>
4.2 Duct System Design and Installation

- Design all duct systems according to ACCA Manual D, ASHRAE Handbooks, or equivalent software.
- Ensure that all duct systems are airtight and properly balanced.
- Do not use building cavities as part of the forced air supply or return systems.
- Cover duct openings throughout construction or vacuum out ducts prior to installing registers.
4.2 Duct System Design and Installation

COVERING DUCT OPENINGS DURING CONSTRUCTION

SEALING WITH MASTIC
Building cavities (e.g., panned joists) shall not be used as forced-air supplies or returns (1 of 2).
POLLUTANTS FROM ATTIC ABOVE, CARRIED IN WALL CAVITY

RETURN AIR FLOW FROM ROOM

POLLUTANTS DRAWN INTO AIR STREAM FROM BASEMENT, GARAGE, OUTSIDE WALLS OR OTHER UNANTICIPATED SOURCES

BUILDING CAVITIES (E.G., PANNED JOISTS)

SHALL NOT BE USED AS FORCED AIR SUPPLIED OR RETURNS, 2/2
4.3 Location of Air Handler and Ducts

- Do not locate air-handling equipment or ductwork in garages.
- Note: Ducts may be located in building cavities adjacent to the garage if they are separated with a continuous air barrier.
4.5 Mechanical Whole-House Ventilation

- Provide mechanical whole-house ventilation meeting ASHRAE 62.2-2010.
- Test airflows to ensure they meet ASHRAE 62.2-2010.

- Advisory: 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.
4.5 Mechanical Whole-House Ventilation

- Fresh Air Damper
- Ducted Fresh Air Supply
4.7 Filtration

- Equip all filter access panels with gasket material or comparable sealing mechanism to prevent bypass air.

- Install only HVAC filters that are rated MERV 8 or higher.

- Do not install any air-cleaning equipment designed to produce ozone.
4.7 Filtration for Central Forced-Air HVAC Systems

- Filters come multiple sizes.
- Filters are typically 1”, 2” or 4” in depth.
- In years past the primary purpose for filtration was to protect the HVAC system not IAQ.
4.7 Filtration for Central Forced-Air HVAC Systems

- Filters have performance data that must be accounted for in the duct design.
- When selecting a filter try to find a filter that creates the least amount of resistance.
- There are multiple types of filter sizes and depths.
- Media filters have a much greater surface area and will cause less restriction.

<table>
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<tr>
<th>Filter Depth</th>
<th>Nominal Size</th>
<th>Capacities (CFM)</th>
<th>Resistance (inches W.G.)</th>
<th>Pleats per Linear foot</th>
<th>Media Area (SQ FT)</th>
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</table>
What does the Sales Team need to know about HVAC Systems?

**Homeowner Benefits**

- Reduced exposure to mold and mildew
- Increased comfort
- Helps remove allergens, toxins, irritants and asthma triggers from the home
- House stays cleaner
5. Combustion Pollutants

- 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.
5.1 Combustion Equipment

- Mechanically draft or direct vent all gas- and oil-fired furnaces, boilers and water heaters.

- Fireplaces that are not mechanically drafted must meet exhaust flow or pressure differential.

- Do not install any unvented combustion space-heating appliances.

- Ensure naturally drafted fuel-burning appliances comply with ASHRAE 62.2 or conduct a Worst Case Depressurization Combustion Air Zone (CAZ) Test.

- Ensure that all fireplaces and other fuel-burning appliances are vented to the outdoors and supplied with ventilation air.

- Meet emissions standards and restrictions for all fuel-burning appliances located in conditioned spaces.
5.1 Combustion Equipment

DIRECT VENTED FURNACE

POWER VENTED WATER HEATER

Indoor Air Quality (IAQ)
5.2 Carbon Monoxide Alarms

- All homes with combustion appliance(s) or an attached garage shall have a carbon monoxide (CO) alarm installed in a central location in the immediate vicinity of each separate sleeping zone.
5.3 Multi-family ETS Protections

• Reduce exposure to environmental tobacco smoke (ETS) in multi-family buildings by:
  – Prohibiting smoking in indoor common areas.
  – Locating designated outdoor smoking areas.
  – Minimizing uncontrolled pathways for ETS transfer between individual dwelling units by sealing walls, ceilings, and floors of dwelling units.
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;
  - Conduct a pressure test to verify the effectiveness of the garage-to-house air barrier.

Note: Requirements for attached garages revised. See November 13, 2013 Policy Record update.
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 Verification

- 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.

<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>
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</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Emissions standards met for fuel-burning and space-heating appliances (Exception: see spec).</td>
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<td>5.2</td>
<td>CO alarms installed in each sleeping zone (e.g., common hallway) according to NFPA 720.</td>
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<tr>
<td>5.3</td>
<td>Multifamily buildings: Smoking restrictions implemented AND ETS transfer pathways minimized.</td>
<td>□</td>
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<td>□</td>
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<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>
<td>□</td>
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</table>
What does the Sales Team need to Know about Combustion Pollutants

Benefits

- Reduced exposure to carbon monoxide.
- Pollutants in attached garages isolated from living space.
- Round-the-clock peace of mind.

Indoor Air Quality (IAQ)
6. Low Emission Materials

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.
6.1 Composite Wood

- **Structural plywood is rated for durability and moisture resistance** (PS1 or PS2)
- **Composite wood is certified as low-formaldehyde** (see spec for referenced standards)
6.2 Interior Paints and Finishes

- Interior paints and finishes are certified as low-VOC or no-VOC
  - Greenseal GS11
  - Greenguard
  - Scientific Certification Systems
  - Master Painters Institute
  - Verified using CA 01350 (CDPH Standard Method V1.1-2010).
6.3 Carpets and Carpet Adhesives

- Use carpets and carpet adhesives labeled with the Carpet and Rug Institute (CRI) Green Label Plus testing program criteria.
  - Note: at least 90% of carpeted area

- For carpet cushion (i.e., padding), use only products certified to meet the CRI Green Label testing program criteria.
What does the Sales Team need to know about Low Emission Materials

Homeowner Benefits

- Less “chemical” smell
- Lowered exposure to VOCs
- Reduced potential for occupant health complaints
7. Home Commissioning
7.1 HVAC and Duct Verification

- Verify that HVAC systems and ductwork are installed according to their design.

- Inspect ductwork to verify it is dry and substantially free of dust or debris. If duct openings were not covered during construction, thoroughly vacuum out each opening.

- Inspect air-handling equipment and verify that heat exchangers/coils are free of dust AND the filter is new, clean and meets specified MERV rating.
7.2 Ventilation after Material Installation

- Verify that the home has been ventilated with outside air:
  - During and shortly after installing products that are known sources of contaminants, AND
  - During the period between finishing and occupancy.

- Note: Encourage the builder to maintain a record of the times ventilation of the home is completed.
Quiz - Last Item on the Checklist: What else should the Builder communicate to the Homebuyer?

Hint: They may need the Rater’s help.

7.3 Buyer Information Kit

- Provide buyers with information and documentation of the home’s IAQ protections, including:
  - A copy of the Indoor airPLUS Verification Checklist.
  - HVAC, duct, and ventilation system design documentation.
  - Operations and maintenance instruction manuals for all installed equipment and systems addressed by Indoor airPLUS and ENERGY STAR requirements.
That’s it. You’re ready to build & label Indoor airPLUS homes!

One additional checklist verified by the Rater

Place the Indoor airPLUS label adjacent to the ENERGY STAR label
Indoor airPLUS Examples - St. Louis

Blue Brick Renovation and Construction
309 South Spoede Rd

Images courtesy of ASERusa Building Performance

67
• Active House
• Ecohome
• IAQ monitoring

Images courtesy of

St. Louis . . .
Hibbs Homes
215 Gray Avenue

Indoor Air Quality (IAQ)
Image courtesy of ASERusa Building Performance

Horve Builders
1003 & 1001 Annabelle Lane

St. Louis . . .
Indoor airPLUS Homes Around St. Louis – Affordable Housing

Photos courtesy of Kyle Lee Hunsberger, Director of Construction, Habitat for Humanity - Saint Louis
Habitat for Humanity – St. Louis

• Over 120 Indoor airPLUS homes built since 2009
• Volunteer and homeowner labor

Photos courtesy of Kyle Lee Hunsberger, Director of Construction, Habitat for Humanity - Saint Louis
2109 North 13th Street

6801 Virginia Avenue

Photos courtesy of Kyle Lee Hunsberger, Director of Construction, Habitat for Humanity - Saint Louis
Rainscreen siding application
Excellent durability (although not required by Indoor airPLUS)

Photos courtesy of Kyle Lee
Hunsberger, Director of Construction,
Habitat for Humanity - Saint Louis
Rainscreen siding application - maintaining positive drainage
Rainscreen siding application - window flashing details
“Superior” details

- Balanced ventilation with ERV
- Superior Walls in basement
Moisture management and radon resistance
“Superior” details, but more affordable

- 2” foam with firring
- Subslab membrane sealed to concrete wall
- Slab poured to foam
Basement Details

• Creating livable, comfortable, and DRY basement space
Basement Details
HVAC Details

- MERV 11 filter comes with unit.
- Close out home with MERV 13
HVAC Details

- Pressure balancing solutions
HVAC Details

• Supply side ventilation instead of ERV
Protecting ductwork during construction

- Very economical
- Scrap lumber and weather-stripping
- Reusable
- Keeps jobsite safe and ductwork clean

Indoor Air Quality (IAQ)
Indoor airPLUS Builder Successes

- Poolesville, MD
- 79 homes
  - About 7 lots remaining

Photos and graphics courtesy of Dave Griffin and Dick Kettler, Kettler Forlines Homes
Indoor airPLUS Builder Successes

• “The Reserve”
  – 98 home lots
  – Breaking ground fall 2014
Kettler Forlines Homes Commitment to Energy Efficiency and Healthy Indoor Living

It’s no surprise that new homes have been getting tighter and more energy efficient. Over the past twenty years, building materials and techniques have gradually changed to reflect ever increasing energy costs. In the past, when electricity and other fuels were cheap, it was easy to simply increase the size of the heating, ventilation and cooling equipment to compensate for a leaky structure. Today, the building codes and building industry standards have increased to provide a higher level of energy efficiency. At Kettler Forlines Homes, the standards have been set to an even higher level. Since January of 2008, we have been an Energy Star Builder Partner.

Energy Star for Homes is an Environmental Protection Agency program that requires qualified third party testing to ensure that our homes are 15% to 30% more efficient in terms of energy use than homes that are built to current building codes. Utilizing building science and state of the art diagnostic equipment, we are able to identify where improvements to the building envelope can be made. That, along with improved material and equipment specifications, allows us to meet our energy efficiency goals. At Brightwell Crossing, we are now enrolled in the EPA Indoor Air PLUS program, which works together with Energy Star to provide assurance that our homes incorporate proper ventilation and air flow. Indoor Air PLUS includes a set of material and...
Energy Efficiency Details

- Raised heel trusses
- 2x4s with insulated exterior sheathing
Pressure Balancing

- Standard grill over BR door
- Filter for noise & light
IAQ Details

- KCMA Certified cabinetry
- Basement slab caulked to walls
Indoor airPLUS Leader Awards

Announced July 2014:
www.epa.gov/indoorairplus

2014 Verifier Leaders
Indoor airPLUS Leader Awards

- 2014 -- 1st annual Builder Award Winners
- 2015 applications available in January

To see company profiles, visit the INDOOR airPLUS website:
http://www.epa.gov/indoorairplus/leader_awards

2014 Builder Leaders
Resources and Tools
Marketing and Technical Support for Partners

- Construction requirements
- Technical guidance
- Recorded webinars
- YouTube videos
- Builder and consumer resources
- Partner locator
- Website widgets
- Free brochures

www.epa.gov/indoorairplus
New Marketing Resources

Co-brandable Consumer Brochure
• Add company name, logo, and other info (testimonials, etc.)

Visit your My ENERGY STAR Account
www.energystar.gov/MESA
Mold and Moisture Control
- Paying close attention to moisture details:
  - Increases structural durability
  - Reduces the potential for mold-related health issues
  - Prevents recurring maintenance issues

Homeowner Education
- Indoor airPLUS homebuyers receive:
  - An Indoor airPLUS label and certificate
  - A list of features included in their home
  - Instructions for regular equipment maintenance

Radon Control
- Planning for the possibility of radon helps reduce risks posed by the second leading cause of lung cancer in the United States.

Efficient HVAC Systems
- A well-designed heating, ventilation, and air conditioning system provides:
  - Improved comfort
  - Humidity control
  - Enhanced filtration
  - Clean, well-sealed ductwork

Indoor airPLUS construction specifications are designed to help improve indoor air quality (IAQ) in new homes compared with homes built to minimum code. However, these features alone cannot prevent all IAQ problems. Occupant behavior is also important for IAQ. For example, products used in the home after occupancy and smoking inside may both negatively impact the home’s IAQ and the performance of the specified indoor airPLUS features. See: http://www.epa.gov/indoorairplus/ for more information.

Building Materials
- Choosing low-emission building materials:
  - Lowers exposure to Volatile Organic Compounds (VOCs)
  - Reduces the potential for health problems
  - Minimizes “chemical smell” in the home

Combustion Pollutant Control
- Careful attention to venting and combustion sources:
  - Reduces pollutants in living spaces
  - Minimizes CO exposure
  - Provides peace-of-mind for everyone in the home

Pest Barriers
- Blocking pest entry:
  - Keeps the home cleaner
  - Limits allergens, germs, and asthma triggers
  - Prevents potential pest damage

Benefits of an Indoor airPLUS Qualified Home
Indoor airPLUS is required for Zero Energy Ready Home certification.

More IAQ resources coming soon! Please consider submitting images and content:

https://basc.pnnl.gov/criteria-submitting-content-building-america-solution-center
What’s Next?
Becomes an Indoor airPLUS Partner

- For *current* ENERGY STAR Partners:
  - Log into your My ENERGY STAR Account (MESA) [www.energystar.gov/mesa](http://www.energystar.gov/mesa)

If you don’t know your user name and password, click the link or email [energystarhomes@energystar.gov](mailto:energystarhomes@energystar.gov) for assistance.
Become an Indoor airPLUS Partner

- After entering your account, click “Join Indoor airPLUS”.
  - For builders, be sure you’ve completed the required ENERGY STAR training.
Become an Indoor airPLUS Partner

• Use the logos to promote your partnership and commitment to offering healthier, more durable homes.
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