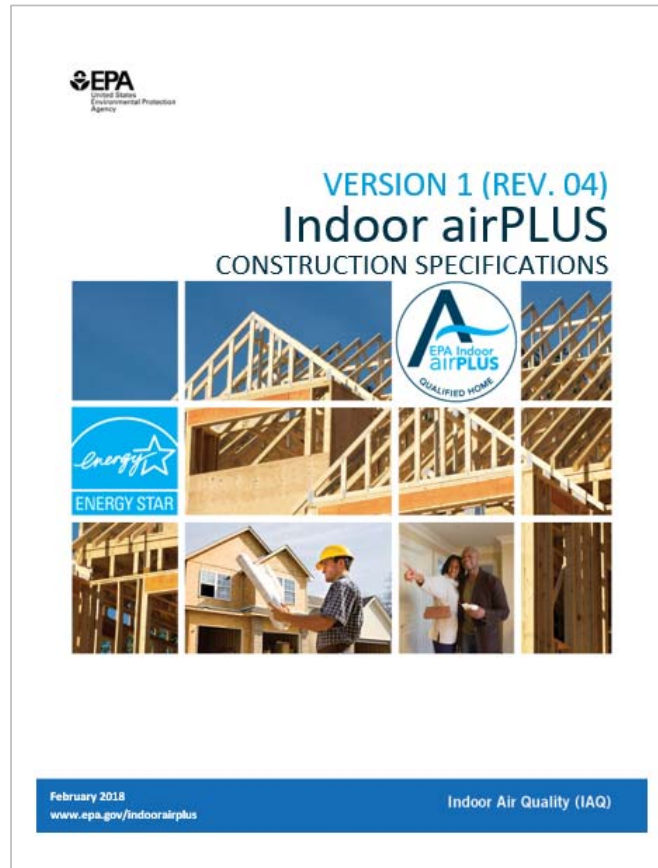




Achieving Indoor airPLUS on New and Existing Residential Buildings



Indoor airPLUS Program Overview

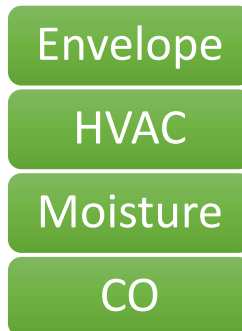


- Non-regulatory home label; currently for new homes.
- Assists home builders, trade contractors & renovators
- Concrete way for builders to sell health benefits to customers
- Independent, 3rd-party verification
- Construction Specs, technical support, marketing resources

ENERGY STAR + Indoor airPLUS



+



=



1. **Better durability**
2. **Less long-term maintenance**
3. **Comprehensive indoor air quality protection**
4. **A safer, healthier home**

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.
-

Indoor airPLUS as a Health Benchmark for High-Performance Homes

- IAP is respected as a benchmark for IAQ to protect occupant health in new homes.
- IAP is required by other labeling programs (Zero Energy Ready, PHIUS) as a pre-requisite.
- IAP is also referenced by LEED for Homes and the National Green Building Standard.

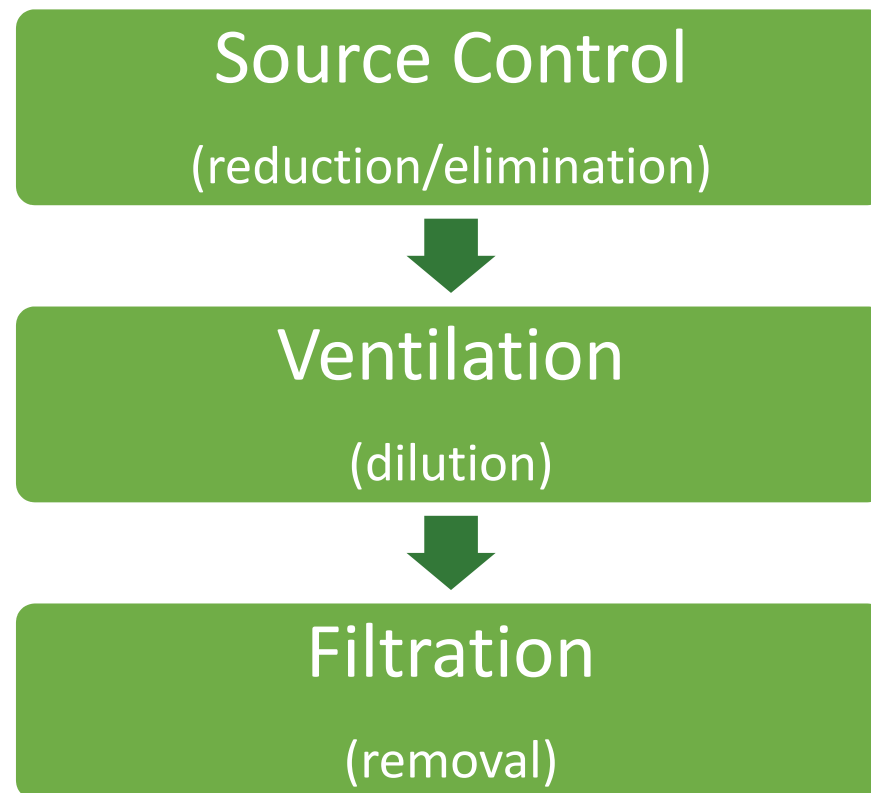


What Causes Poor IAQ and Health Risks?

- Pollution sources that release gases, moisture vapor, or particles into the air are the primary cause.
- Inadequate ventilation can increase indoor pollutant levels.
- Symptoms may appear immediately, or only after long exposure.

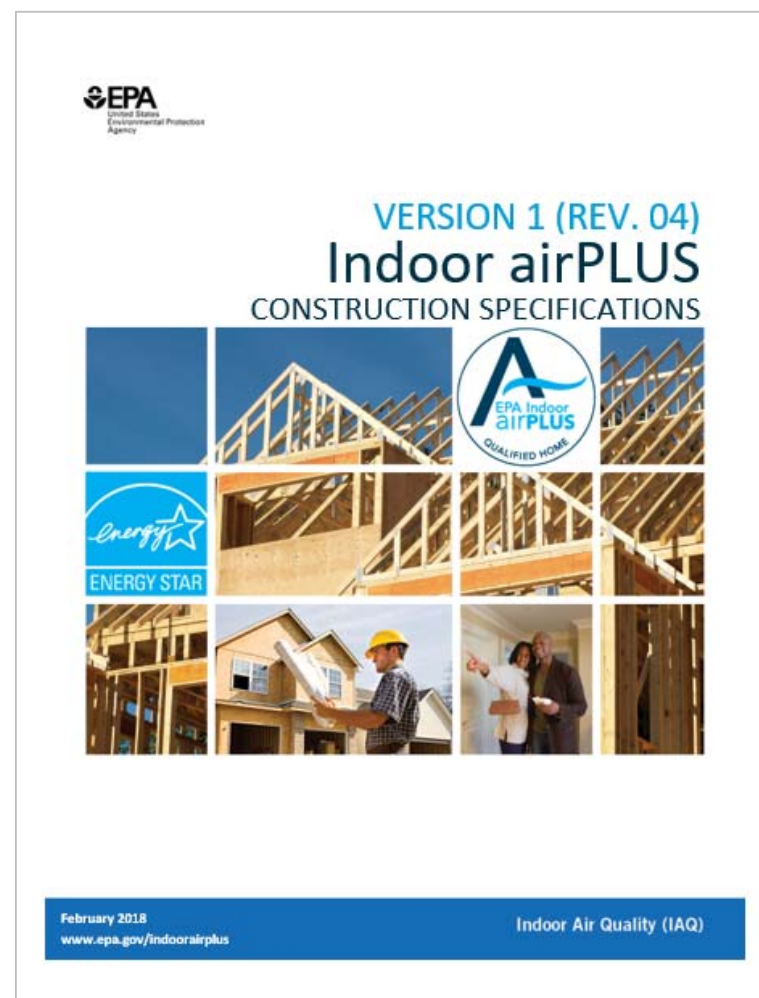


Strategy for Creating a Safer Home by Reducing Health Risks From Poor IAQ



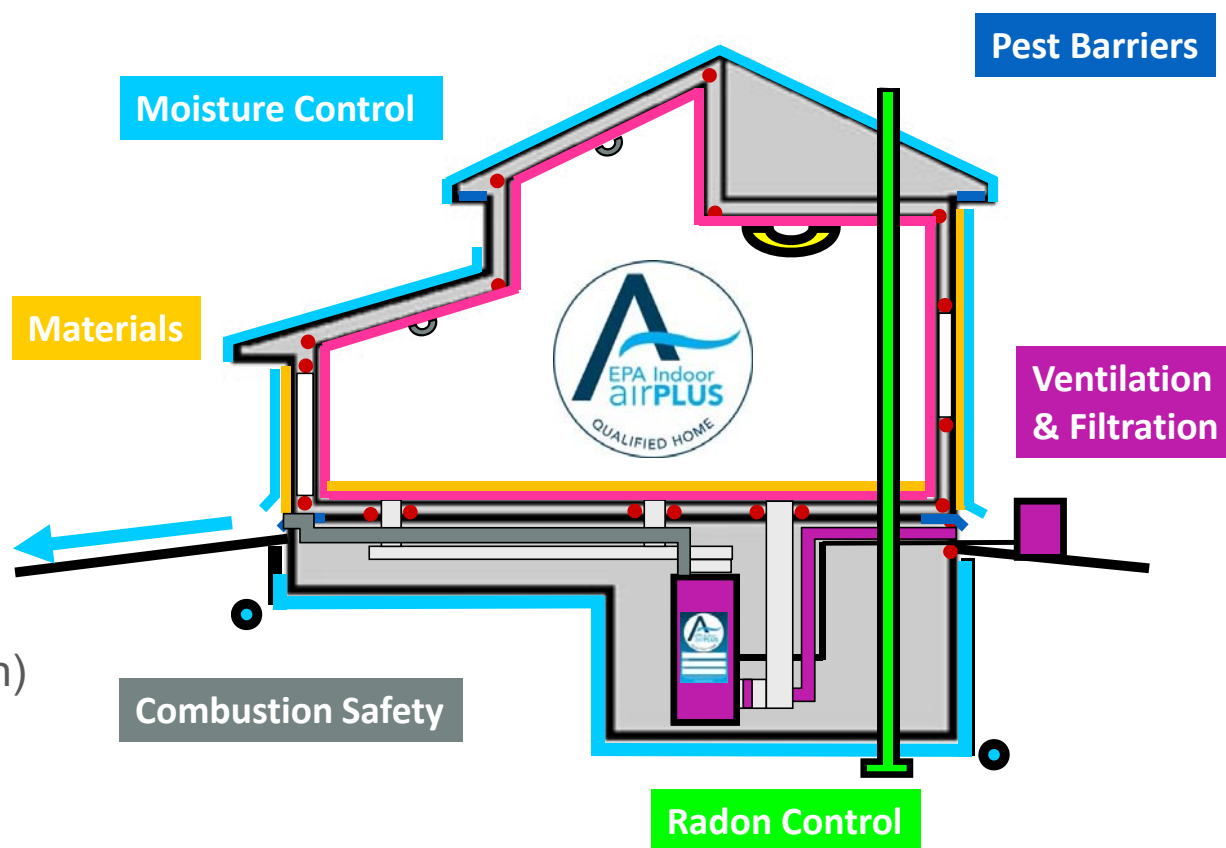
Indoor airPLUS Revision 4

- Released February 2018.
- Incorporates Policy Record updates.
- Updates or eliminates various referenced standards.
- Clarified multiple requirements.
- Provided additional advisories (e.g. adhesives & sealants).
- Provided additional exceptions.



How to Use the Construction Specifications

- Seven sections:
 - Moisture Control
 - Radon
 - Pests
 - HVAC Systems
 - Combustion Pollutants
 - Materials
 - Home Commissioning
 - (Homeowner Education)



How to Use the Construction Specifications

- Relevant ENERGY STAR checklist items are summarized at the beginning of each measure.
- Additional Indoor airPLUS requirements are listed separately.
- Advisories, notes and exceptions listed where applicable.

4.7 Filtration for Central Forced-Air HVAC Systems

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirement:

- ✓ Equip all filter access panels with gasket material or comparable sealing mechanism and ensure access panels fit snugly against the exposed edge of the installed filter when closed to prevent bypass (Rater-F 9.3).

Additional Indoor airPLUS Requirements:

- Install only HVAC filters that are rated MERV 8 or higher according to ASHRAE 52.2-2007 (at approximately 295 fpm).

Advisory: 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:


- Flexible, air-tight (e.g., closed-cell foam) gasket material on the surface that contacts the air-leaving (downstream) side of the filter.
- Friction fit or spring clips installed on the upstream side of the filter to hold it firmly in place.

How to Complete the Verification Checklist


- Items may be verified:
 - Visually on site during construction.
 - By reviewing photographs taken during construction.
 - By checking documentation.
 - Through equivalent methods as appropriate.

Home Address:		City:	State:	Zip:	
Climate Zone (1-6):		Radon Zone (1-3):			
Section	Requirements (Refer to full Indoor airPLUS Construction Specifications for details)	Must Correct	Builder Verified	Rater Verified	N/A
ENERGY STAR V3	Note: The Rev. 04 checklist reflects 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.				
	ENERGY STAR Version 3 (or 3.1, 3.2) Program Requirements must be followed and the home shall be ENERGY STAR certified in conjunction with Indoor airPLUS qualification.	<input type="checkbox"/>		<input type="checkbox"/>	

Indoor airPLUS Revision 4 Introduction & Checklist



**Indoor airPLUS Version 1 (Rev. 04)
Verification Checklist**



Home Address:		City:		State:		Zip:	
Climate Zone (1-4):		Radon Zone (1-3):					
Section	Requirements (Refer to full Indoor airPLUS Construction Specifications for details)	Must Correct	Builder Verified	Rater Verified	N/A		
ENERGY STAR V3	<small>Note: The Rev. 04 checklist reflects 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.</small> <small>ENERGY STAR Version 3 (or 3.1, 3.2) Program Requirements must be followed and the home shall be ENERGY STAR certified in conjunction with Indoor airPLUS qualification.</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Section	Requirements (Refer to full Indoor airPLUS Construction Specifications for details)	Must Correct	Builder Verified	Rater Verified	N/A
Radon	2.1 Radon-resistant features installed in Radon Zone 1 homes in accordance with Construction Specification 2.1.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input checked="" type="checkbox"/> Perimeter pipe loop in lieu of full aggregate (dry climate) <input type="checkbox"/> Manufactured home with raised pier foundation				

Revision 4 Checklist:

- Additional fields and checkboxes.
- Reminds verifier to confirm specific exceptions.
- Enhances programmatic QA.

Radon Example:

- Passive system required in Radon Zone 1.
- 4" aggregate under slab . . .
 - Except in dry climates when a perimeter pipe loop is used.

Section	Requirements (Refer to full Indoor airPLUS Construction Specifications for details)	Must Correct	Builder Verified	Rater Verified	N/A
Radon	2.1 Radon-resistant features installed in Radon Zone 1 homes in accordance with Construction Specification 2.1. Exception Applied: <input type="checkbox"/> Perimeter pipe loop in lieu of full aggregate (dry climate) <input type="checkbox"/> Manufactured home with raised pier foundation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pests	3.2 Corrosion-proof rodent/bird screens installed at all openings that cannot be fully sealed. (Not required for clothes dryer vents.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HVAC Systems	4.1 Equipment selected to keep relative humidity < 60% in "Warm-Humid" climates. Exception Applied: <input type="checkbox"/> Climate zones 4-8, 3B, 3C and portions of 3A and 2B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.2 Duct systems protected from construction debris AND no building cavities used as air supplies or returns.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.3 No air-handling equipment or ductwork installed in garage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.6 Clothes dryers vented to the outdoors or plumbed to a drain according to manufacturer's instructions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.7 Central forced-air HVAC system(s) have minimum MERV 8 filter AND no ozone generators in home. Temporary filter installed to protect unit from construction dust.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Combustion Pollutants	5.1 Emissions standards met for fuel-burning and space-heating appliances. Identify appliance type: <input type="checkbox"/> Masonry heater <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 Appliance model name/number: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.2 CO alarms installed in each sleeping zone (e.g., common hallway) according to NFPA 720.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.3 Multifamily buildings: Smoking restrictions implemented AND ETS transfer pathways minimized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.4 Attached garages: Door closer installed on all connecting doors. Attached garages: In homes with exhaust-only whole-house ventilation EITHER <input type="checkbox"/> 70 cfm exhaust fan installed in garage OR <input type="checkbox"/> Pressure test conducted to verify the effectiveness of the garage-to-house air barrier.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Indoor airPLUS Version 1 (Rev. 04) Construction Specifications (January 2018) 3

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

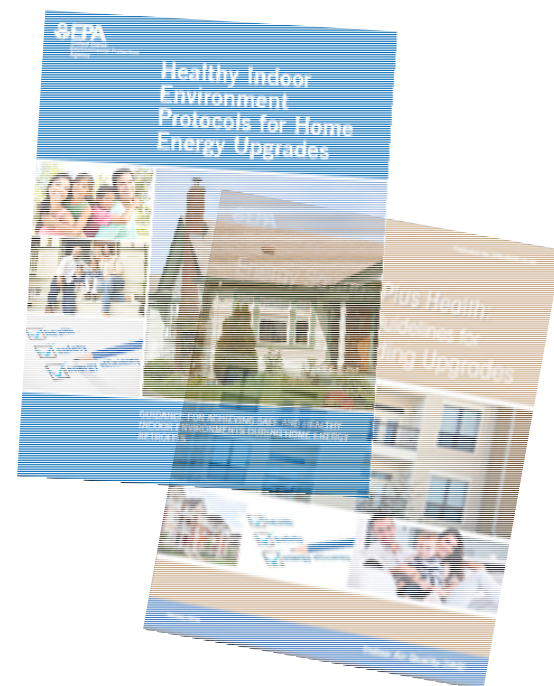


Indoor Air Quality (IAQ)

What About Existing Homes?

- Indoor airPLUS qualification is not available for existing homes except in the case of gut rehabs if all 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](#).
- Renovating multifamily buildings? See [Energy Savings Plus Health: Multifamily Building Upgrades](#).

More info at: <https://www.epa.gov/indoor-air-quality-iaq/protect-indoor-air-quality-your-home>



Indoor Air Quality (IAQ)



PART2

How to Build and Verify Indoor airPLUS Homes – Moisture Management

LEED Credit or Prerequisite?

Prerequisite



Credit (points)

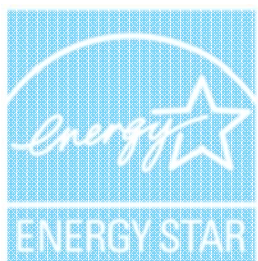


1. Moisture Control

- 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 tiles at the footings of basement and crawlspace walls.*



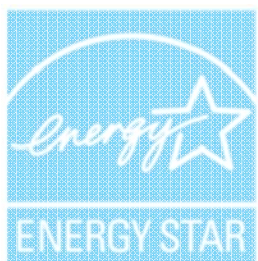
- Install a drain or sump pump in basement and crawlspace floors.

Exceptions:

- Slab on grade and sites 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.
- Alternate path for gut-rehabs.

Some exceptions (dry climates, slab-on-grade, free draining soil.)

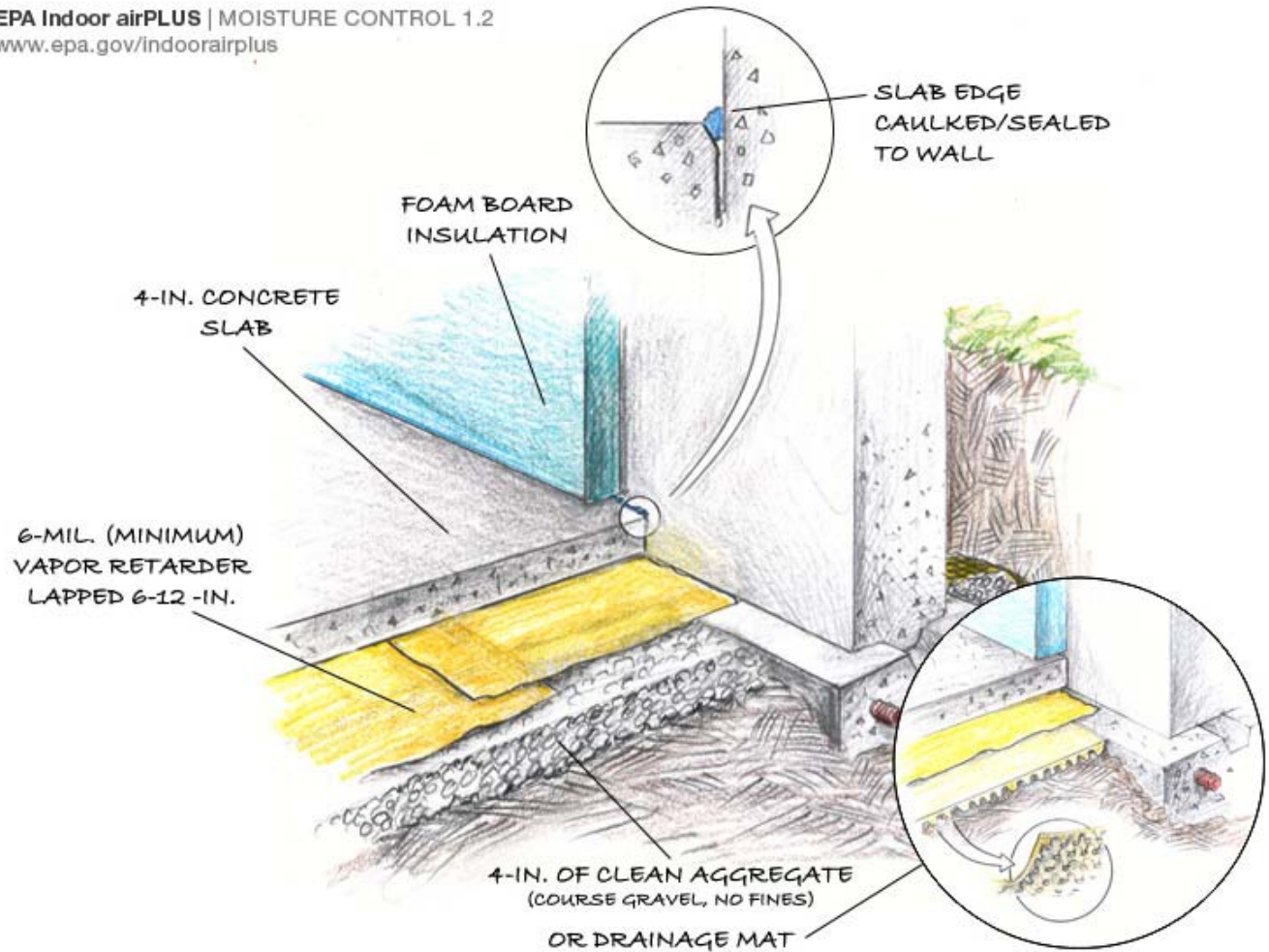


Capillary Break Installation

Gut Rehabs:

Alternate slab treatment:

- Poly above slab
- Durable floor covering, if occupiable.
- Radon Zone 1: Must install an active radon system utilizing sub-slab depressurization & test.



BASEMENT SLAB W/ CAPILLARY BREAK - GRAVEL AND GEOTEXTILE MAT (INSET)

Items 1.3 and 1.4

Foundation Walls, Basements, Crawlspace

- Finish all masonry and concrete walls with damp-proofing.
- Seal crawlspace and basement perimeter walls to prevent outside air infiltration.
- Insulate crawlspace and basement perimeter walls according to the prescriptive values determined by local code at minimum or R-5, whichever is greater.
- 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 (2015 IRC section R408.3.2.2) or through crawl-space exhaust (2015 IRC section R408.3.2.1).
 - Exceptions: Flood zones, dry climates, marine climates, etc. (See spec).



1.4 Basement & Crawlspace Insulation & Conditioned Air

- Dehumidification exception:
 - 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.
-

1.5, 1.6, and 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 house using gutters or an underground catchment system.*

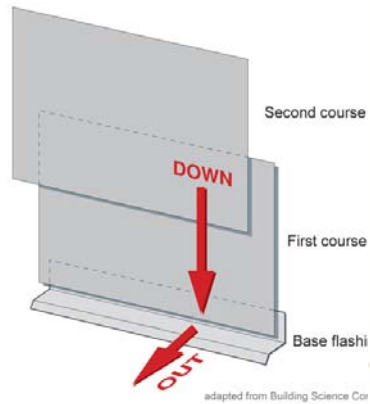


Not using gutters?

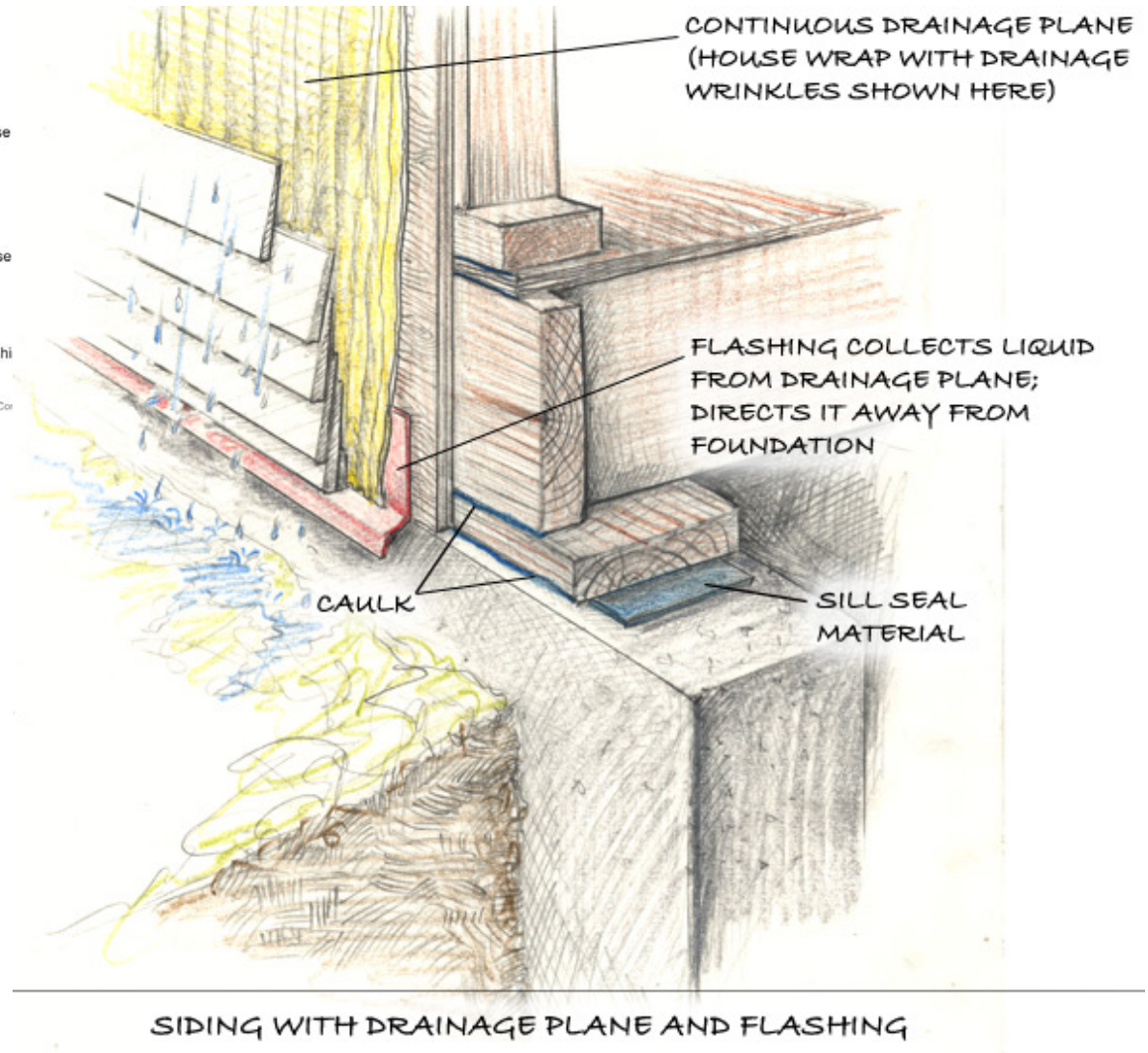
- For homes that meet ENERGY STAR exceptions for gutters and downspouts, provide protection for water splash damage by one of the following:
 - Extend the foundation walls 16 in. above grade. OR
 - Provide a drip line that is 16 in. from the foundation. OR
 - Install cladding that can tolerate wetting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



Wall Drainage System



Courtesy [DOE Building America Solution Center](#)

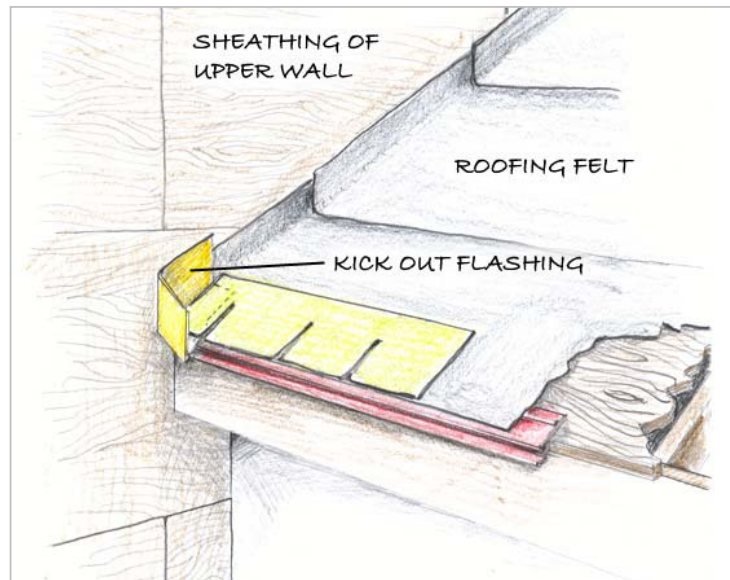


1.8, 1.9, and 1.10 Water Managed Roof

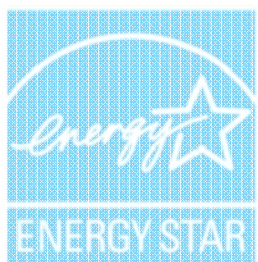


Note: Some exceptions per climate zone.

- ✓ Fully flash all roof-to-wall intersections and all roof penetrations.
- ✓ Install a bituminous membrane at valleys and roof decking penetrations.
- ✓ Install ice flashing over the sheathing at eaves.



1.11 Moisture-Protective Systems



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



- Insulate water supply pipes in exterior walls with pipe wrap.
 - Exceptions:
 - home is located in climate zones 1-3 in dry climates, as defined by 2015 IECC, **OR**
 - insulation in wall cavity qualifies as an air barrier and pipes are to the inside half of cavity



1.12 Class 1 Vapor Retarders

1.13 Materials with Water Damage/Mold



- ✓ *Do not install Class 1 vapor retarders on the interior side of below-grade exterior walls or in any exterior walls in Warm-Humid climates.*
- ✓ *Do not install building materials that have visible signs of water damage or mold.*
- ✓ *Do not enclose framing members and insulation products having high moisture content.*
- ✓ *For wet-applied insulation, follow the manufacturer's drying recommendations. Lumber with water and/or mold damage may be used only if visible mold has been physically removed.*
- *Note: Lumber with “sap stain fungi” may be used as long as the lumber is structurally intact.*



1.14 Moisture-Resistant Materials



- Install only water-resistant hard-surface flooring in kitchens, bathrooms, entryways, laundry areas and utility rooms.





Water Management System Builder Requirements¹

ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 08)

Builder Responsibilities:

- It is the exclusive responsibility of builders to ensure that each certified home is constructed to meet these requirements.
- While builders are not required to maintain documentation demonstrating compliance for each individual certified home, builders are required to develop a process to ensure compliance for each certified home (e.g., incorporate these requirements into the Scope of Work for relevant sub-contractors, require the site supervisor to inspect each home for these requirements, and / or sub-contract the verification of these requirements to a Rater).
- In the event that the EPA determines that a certified home was constructed without meeting these requirements, the home may be decertified.

1. Water-Managed Site and Foundation

1.1 Patio slabs, porch slabs, walks, and driveways sloped ≥ 0.25 in. per ft. away from home to edge of surface or 10 ft., whichever is less. ²

1.2 Back-fill has been tamped and final grade sloped ≥ 0.5 in. per ft. away from home for ≥ 10 ft. See Footnote for alternatives. ²

1.3 Capillary break beneath all slabs (e.g., slab on grade, basement slab) except crawlspace slabs using either: ≥ 6 mil polyethylene sheeting, lapped 6-12 in., or ≥ 1 in. extruded polystyrene insulation with taped joints. ^{3, 4, 5}

1.4 Capillary break at all crawlspace floors using ≥ 6 mil polyethylene sheeting, lapped 6-12 in., & installed using one of the following: ^{3, 4, 5}

1.4.1 Placed beneath a concrete slab; OR,

1.4.2 Lapped up each wall or pier and fastened with furring strips or equivalent; OR,

1.4.3 Secured in the ground at the perimeter using stakes.

1.5 Exterior surface of below-grade walls of basements & unvented crawlspaces finished as follows:

a) For poured concrete, masonry, & insulated concrete forms, finish with damp-proofing coating. ⁶

b) For wood framed walls, finish with polyethylene and adhesive or other equivalent waterproofing.



Materials and Resources

Filter Credits

Preliminary Y 0

Maybe 0

Verified 0

(Select one)

All wood in the building is nontropical, reused or reclaimed, or certified by the Forest Stewardship Council, or USGBC-approved equivalent.

MR Prerequisite Durability Management

Required

Required

Verified

N

(Select one)

ENERGY STAR for Homes, version 3, water management system checklist is collected from builder.

Confirm all of the following have been implemented on the project:

(Select one)

Nonpaper-faced backer board, or a product or coating over wallboard that meets standard ASTM D 3273 standard, was installed on the area above bathtub, spa or shower, and in areas behind fiberglass enclosures where wallboard is installed.

(Select one)

Water-resistant flooring was installed in the kitchen, bathroom(s), laundry room, spa area(s). No carpet was installed in these areas.

(Select one)

Water-resistant flooring was installed in entryways within 3 feet of exterior door(s).

(Select one)

A drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for all tank water heaters in or over living space.

(Select one)

A drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for clothes washer in or over living space.

(Select one)

Conventional clothes dryers exhaust directly to outdoors.

MR Credit Durability Management Verification

1 point

Preliminary Y

0

M

0

Verified

0

(Select one)

Each measure in the ENERGY STAR for Homes, version 3, water management system builder checklist was verified by the verification team.

Materials and Resources

Filter Credits

Preliminary Y 0

Maybe 0

Verified 0

(Select one)

All wood in the building is nontropical, reused or reclaimed, or certified by the Forest Stewardship Council, or USGBC-approved equivalent.

MR Prerequisite Durability Management

Required

Required

Verified

N

(Select one)

ENERGY STAR for Homes, version 3, water management system checklist is collected from builder.

Prerequisite	Durability Management	<ul style="list-style-type: none"> Added in stainless steel hoses as a compliance option for clothes washer moisture control.
Credit	Durability Management Verification	<ul style="list-style-type: none"> Added two new options: overhangs; plumbing condensation control. Credit is now worth 3 points.

V4.1 HOMES

(Select one)

A drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for all tank water heaters in or over living space.

(Select one)

A drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for clothes washer in or over living space.

(Select one)

Conventional clothes dryers exhaust directly to outdoors.

MR Credit Durability Management Verification

1 point

Preliminary Y

0

M


0

Verified

0

(Select one)

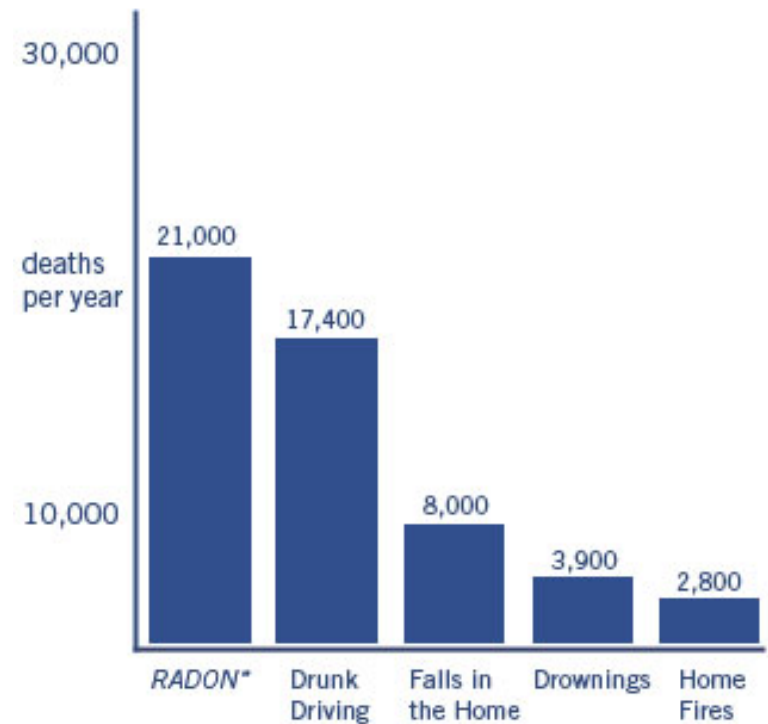
Each measure in the ENERGY STAR for Homes, version 3, water management system builder checklist was verified by the verification team.

The background of the slide features a bokeh effect with out-of-focus light circles in shades of yellow, orange, and purple. On the left side, there are vertical streaks of light, possibly from a camera lens or a light trail.

--- PART 3 --- How to Build and Verify Indoor airPLUS Homes – IAQ Features ---

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



✓ *Air seal all sump covers.*

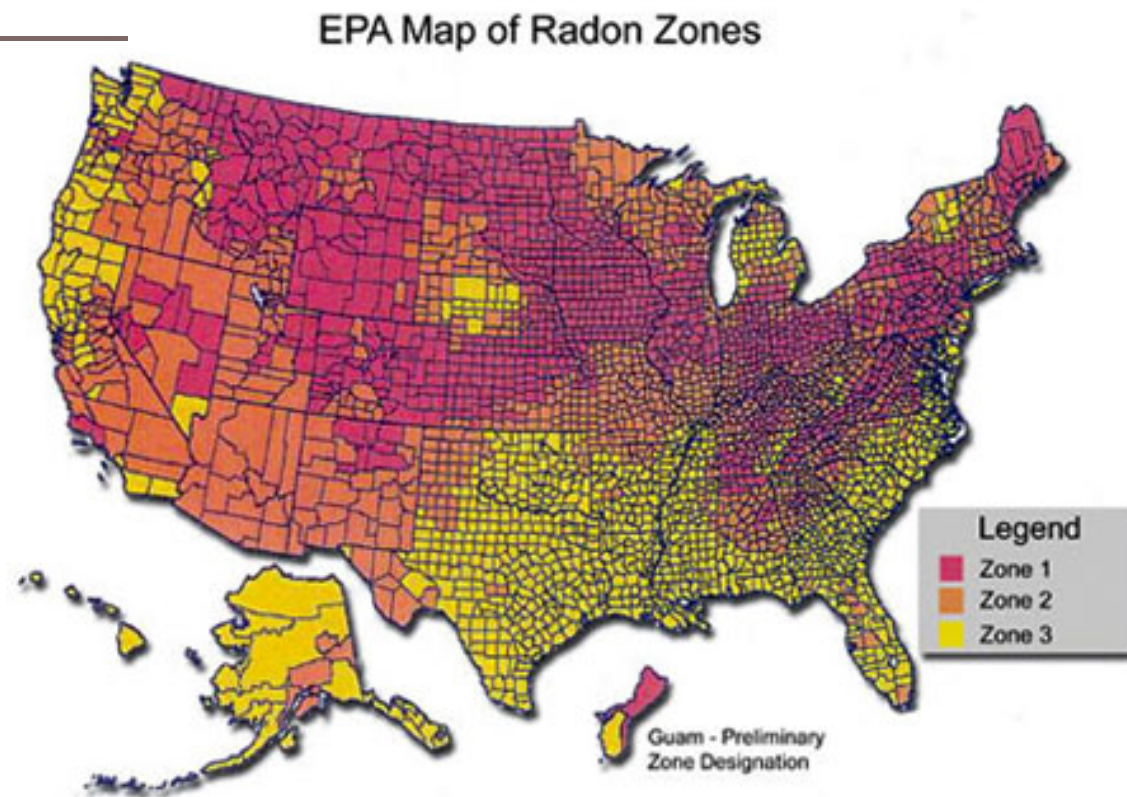


- Construct homes built in EPA Radon Zone 1 with radon-resistant features (passive system at minimum).
- Advisories:
 - Active systems recommended in Zone 1.
 - Passive systems recommended in Zones 2-3.
 - Educate homeowners.
 - Consider radon testing post-completion.

For more on radon-resistant construction, see: <https://www.epa.gov/radon/radon-resistant-construction-basics-and-techniques>



2.1 Radon Control



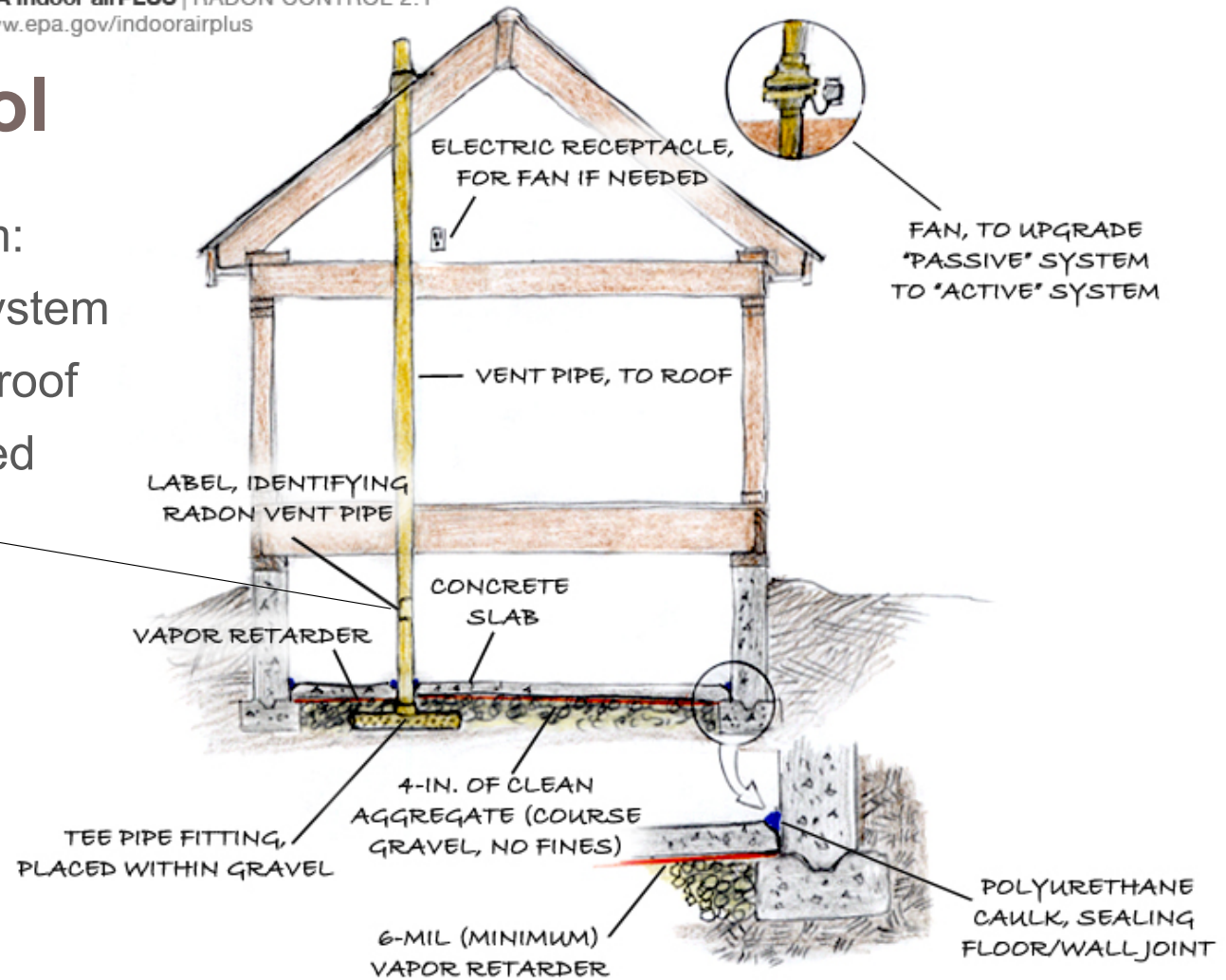
Note: These maps indicate average risk by county. However, high levels of radon can be found in any home.

See: www.epa.gov/radon/zonemap.html or for an interactive map, see: <http://www.wxplushealth.org/geoexplorer>.

2.1 Radon Control

Elements of a Passive System:

- Foundation gas collection system
- Pipe to convey gas through roof
- Provision to add fan if needed



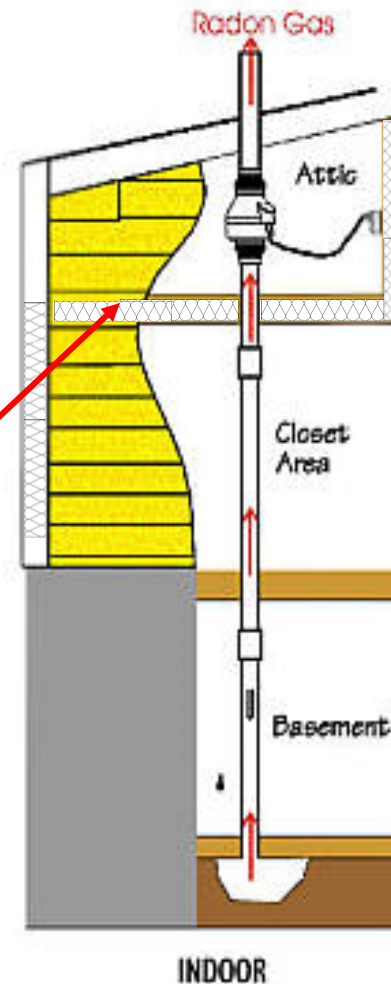
2.1 Radon Control

Radon Fundamentals:

1. Soil gas collection plenum (well-sealed)
2. Vent pipe
3. Fan or receptacle for future fan installation

Where is the thermal boundary of the home?

Note: Fan and positively pressurized pipe must be in unconditioned space.

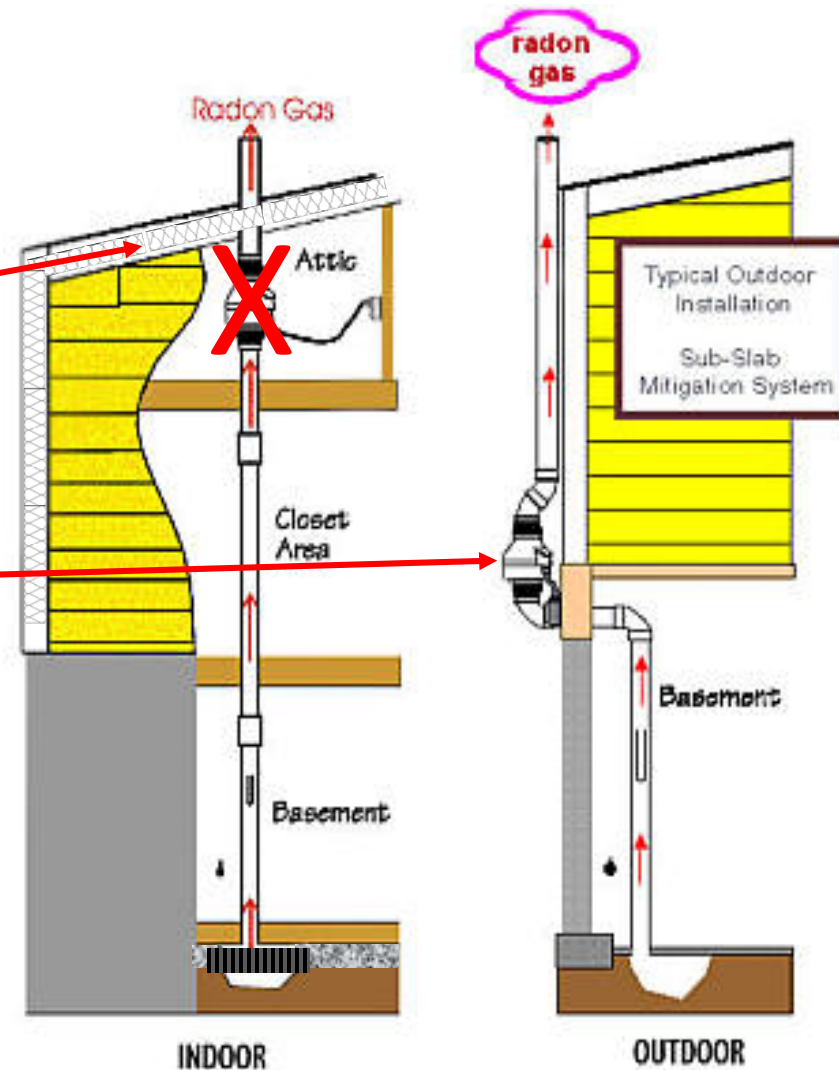


2.1 Radon Control – Enclosed Attics

Where is the thermal boundary of the home?

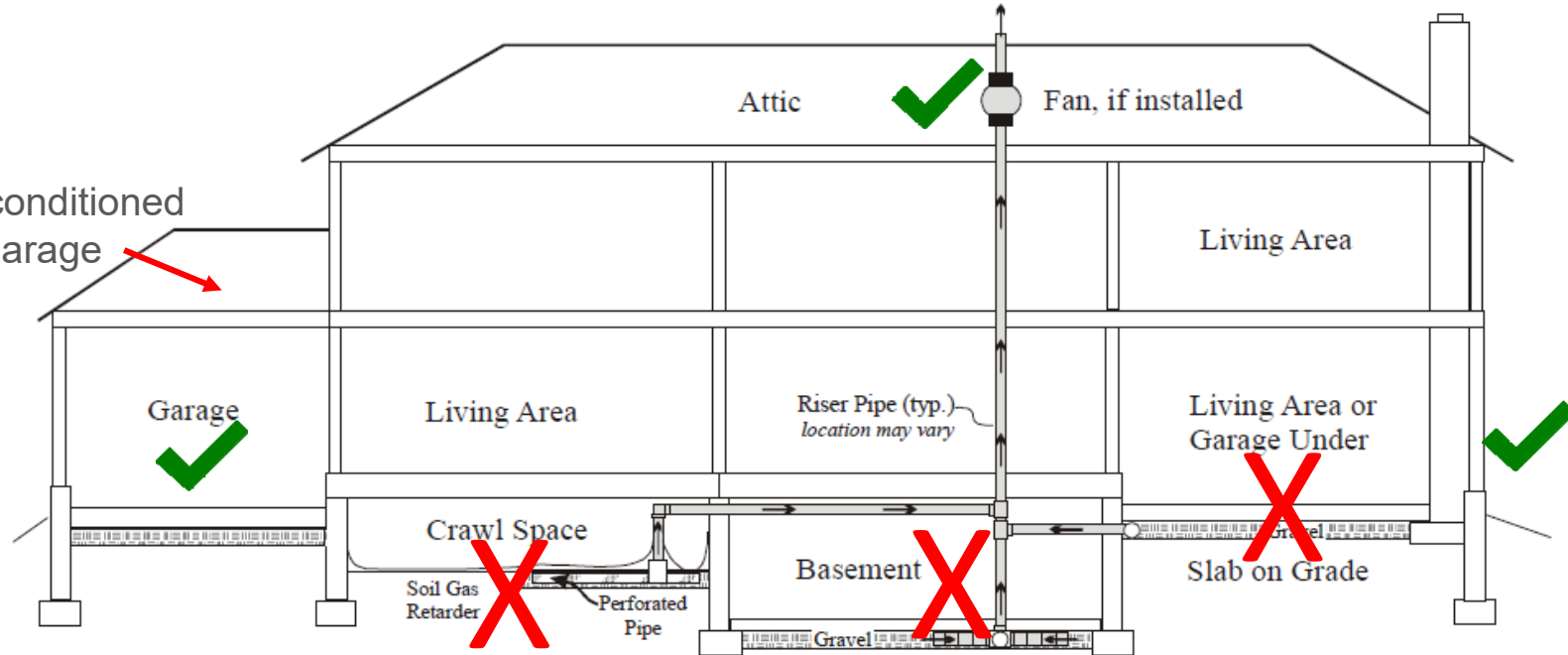
Homes with no accessible attic location for a fan must utilize another exterior location or a garage that is not below conditioned space.

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.



Possible Fan Locations

**FIGURE 302.1
FOUNDATION TYPES**



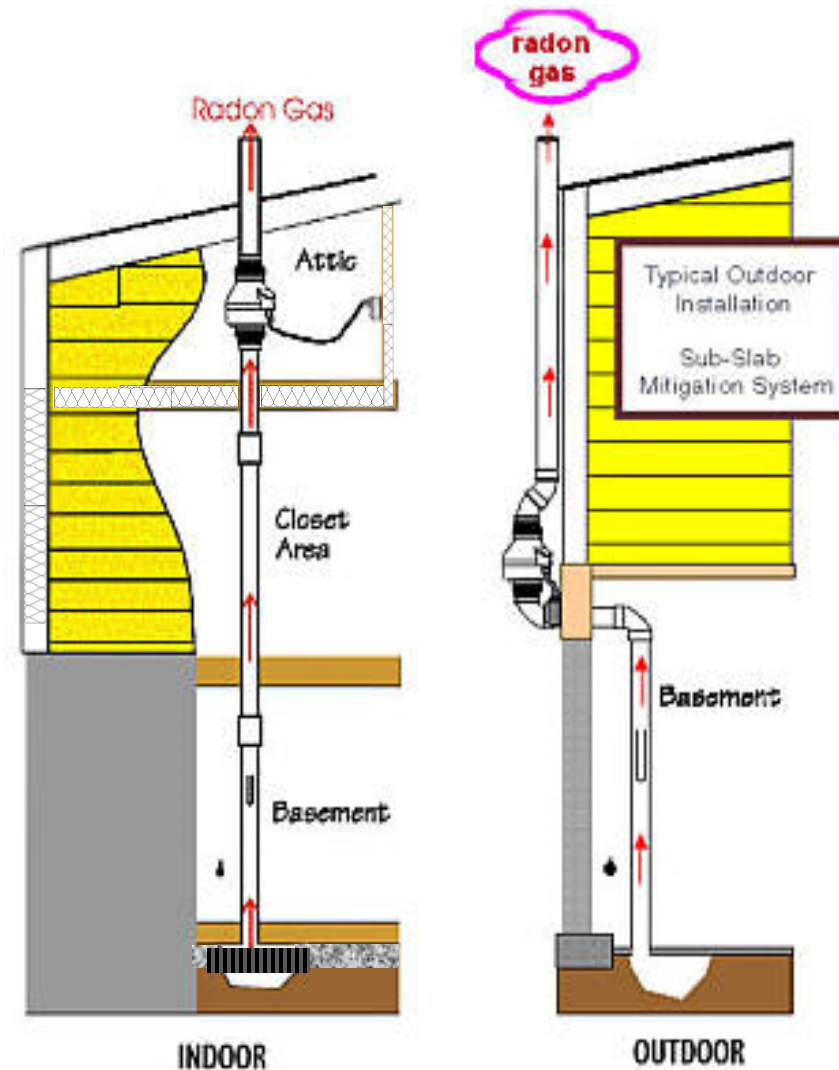
*Image from ANSI/AARST CCAH-2013

Indoor airPLUS – Radon & Gut Rehabs

Can I earn the Indoor airPLUS label with a gut-rehab in RZ1 if there's an existing slab?

Yes, but . . .

1. An active system must be installed
2. Test out required upon final inspection (below 4 pCi/L)



Radon Control – Large Foundations & Multifamily

For foundations larger than 2500 sf, see ANSI/AARST CC-1000 for sizing of soil gas plenums and pipe.

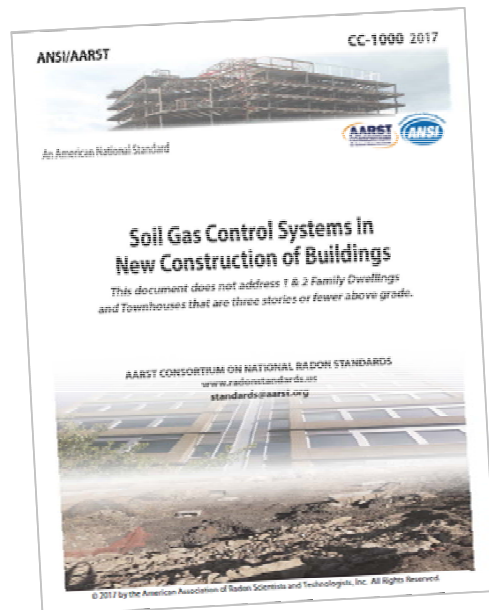
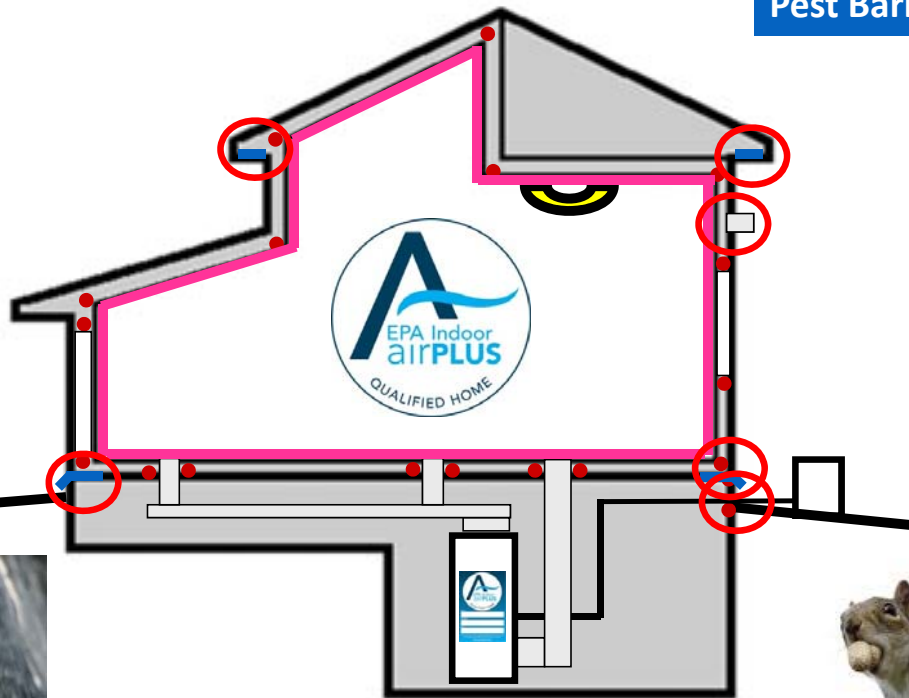


Table 4.3*	
4.3.1 Basic Configuration	
Nominal inside pipe diameter	Maximum nominal size of <i>Soil Gas Collection Plenum(s)</i> per duct size
3 inch [7.6 cm]	2,500 square feet (232 m ²)
4 inch [10.2 cm]	4,500 square feet (418 m ²)
6 inch (15.2 cm)	10,000 square feet (929 m ²)
<p>Figure 4.3</p>	

*Image from ANSI/AARST CC-1000

3. Pest Barriers



Pest Barriers





3.1 Minimize Pathways for Pest Entry



- ✓ Seal all penetrations and joints between the foundation and exterior wall assemblies.
- ✓ Air seal all sump covers.



- No additional Indoor airPLUS Requirements.
- Advisories:
 - When sealing large gaps use copper or stainless steel wool.
 - Additional precautions should be taken in areas classifies as “Moderate to Heavy” termite infestation.

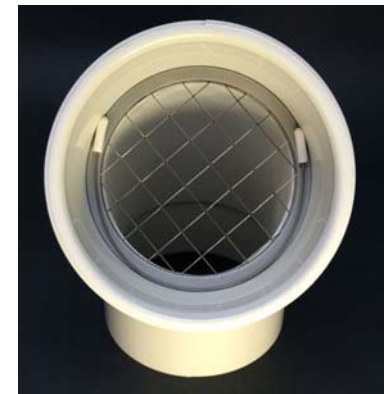


3.1 Minimize Pathways for Pest Entry



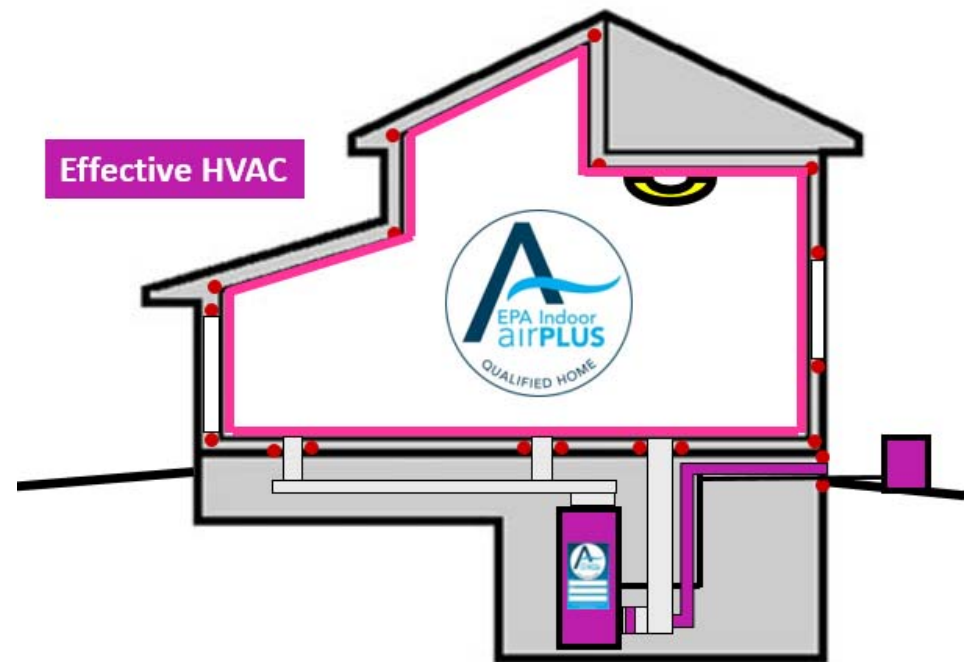
- Provide corrosion-proof rodent/bird screens for all opening that cannot be sealed or caulked.

Note: Does not apply to dryer vents



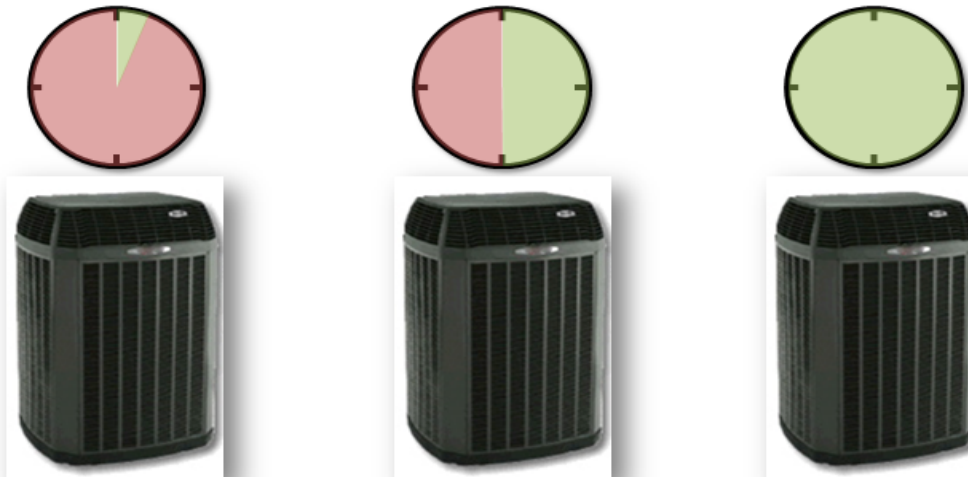
4. HVAC Systems

- Indoor relative humidity greater than 60% can encourage mold growth and attract organisms such as dust mites or other pests.
- HVAC components in wall cavities and garages can expose occupants to mold, carbon monoxide, hydrocarbons, nitrogen oxides, radon, pesticides and other contaminants.
- Ordinary residential panel filters collect less than 20 percent of the particles between 3 and 10 microns. A MERV 8 filter collects more than 70% of the particles in this range.



4.1 HVAC Sizing and Design

- Heating and cooling equipment generally have 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

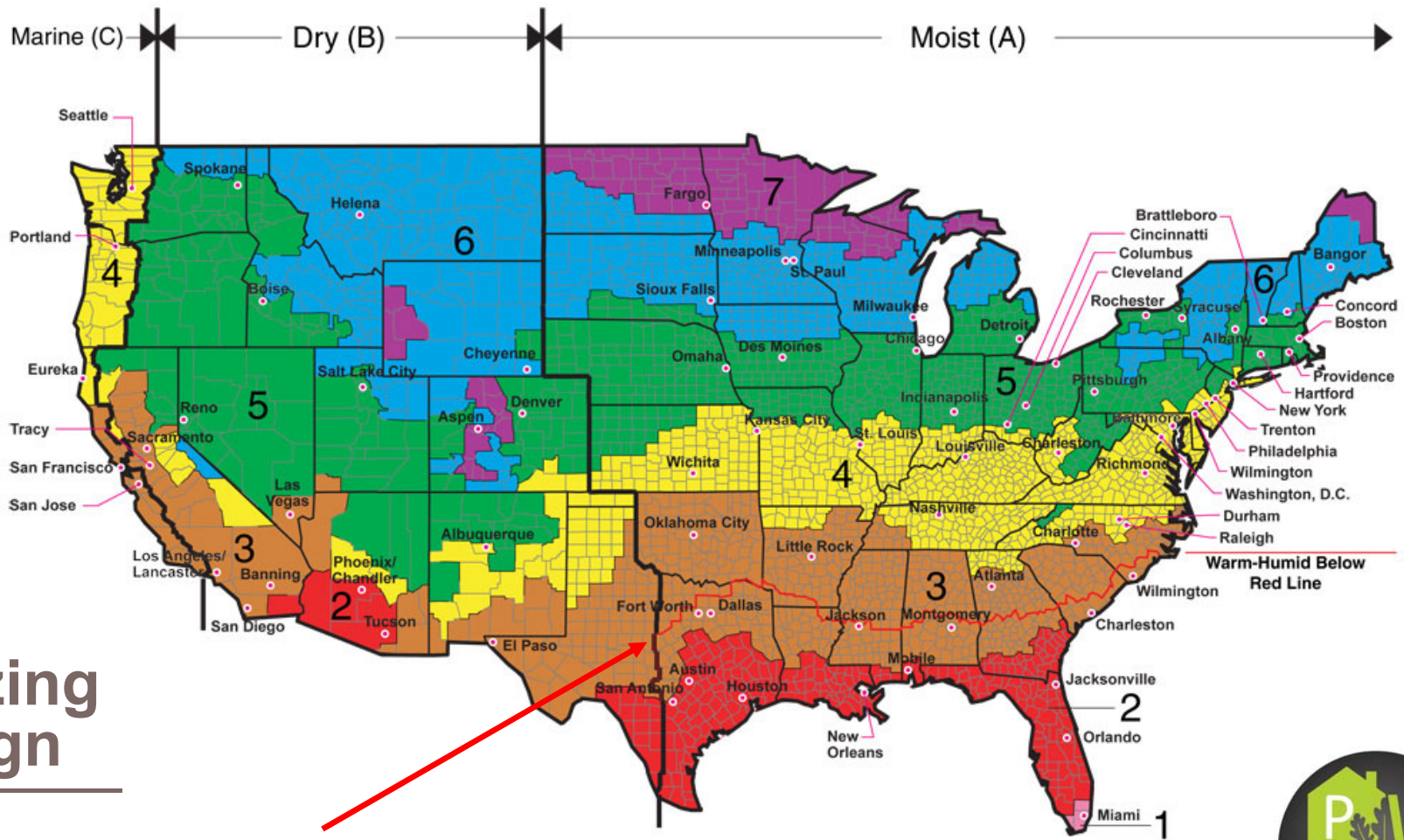


- ✓ Properly size all heating and cooling equipment using ACCA Manual J, ASHRAE Handbooks, or equivalent software.



- “Warm-Humid” climates: equipment shall be installed with sufficient latent capacity to maintain indoor relative humidity (RH) at or below 60 percent.





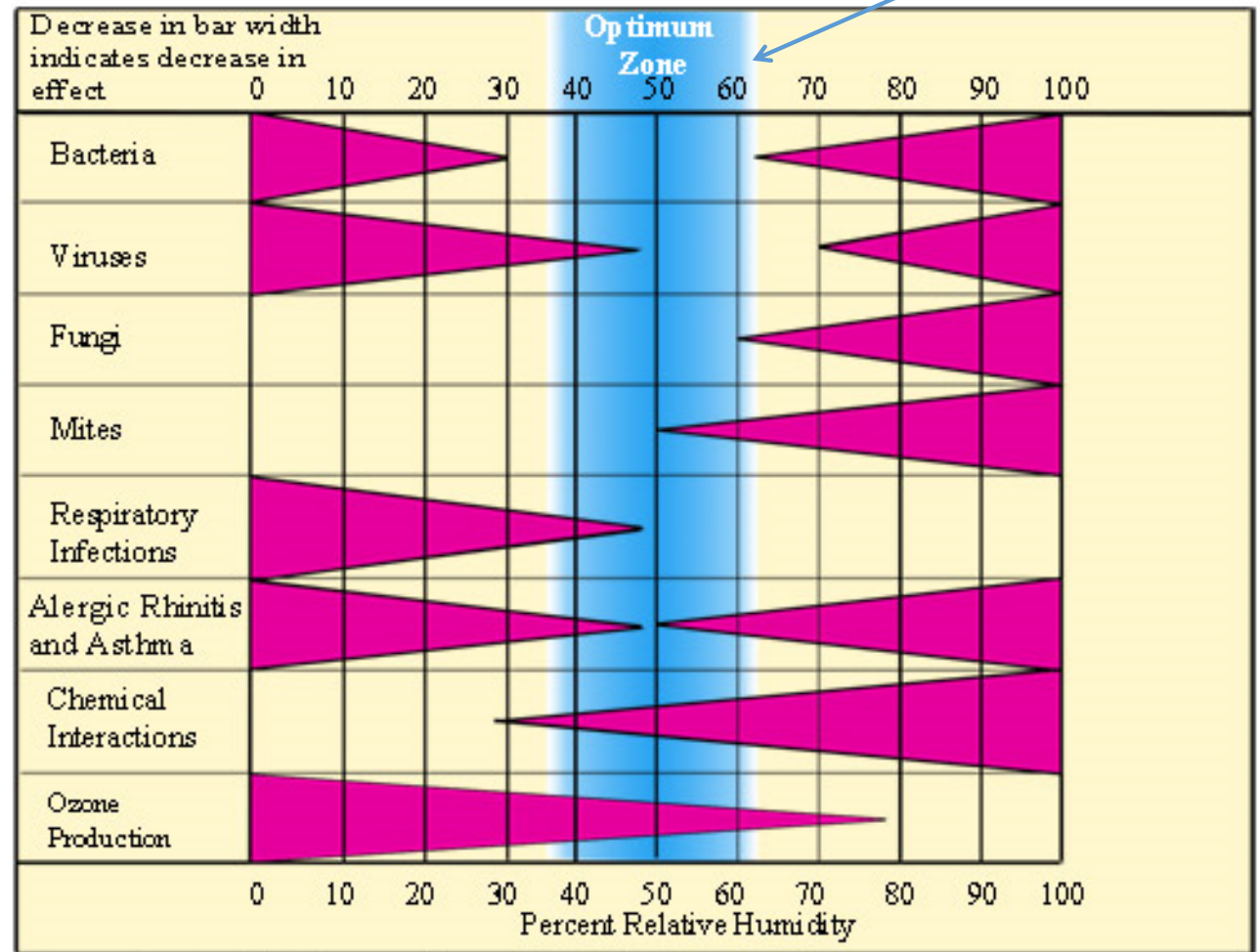
Item 4.1: HVAC Sizing and Design

Homes in “Warm-Humid” climates use additional controls or dehumidification systems to maintain $RH \leq 60\%$



Moisture & Relative Humidity

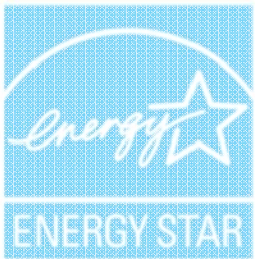
Indoor airPLUS:
Design to maintain
RH < 60% in warm
humid climates.



Source: Theodor D. Sterling and Associates, Ltd, Vancouver, B.C.



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.*

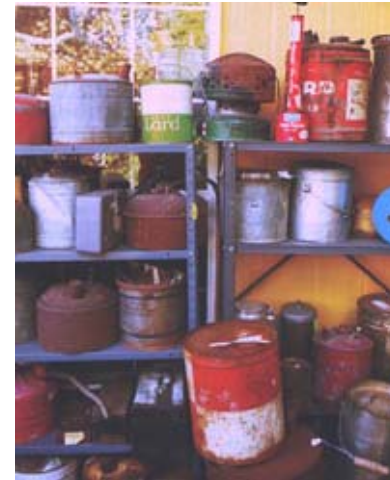


- Do not use building cavities as part of the forced air supply or return systems.
- Cover duct openings throughout construction or vacuum out ducts prior to installing registers.

Even bad filters will keep soda cans from the air handler!



4.3 Location of Air Handler and Ducts

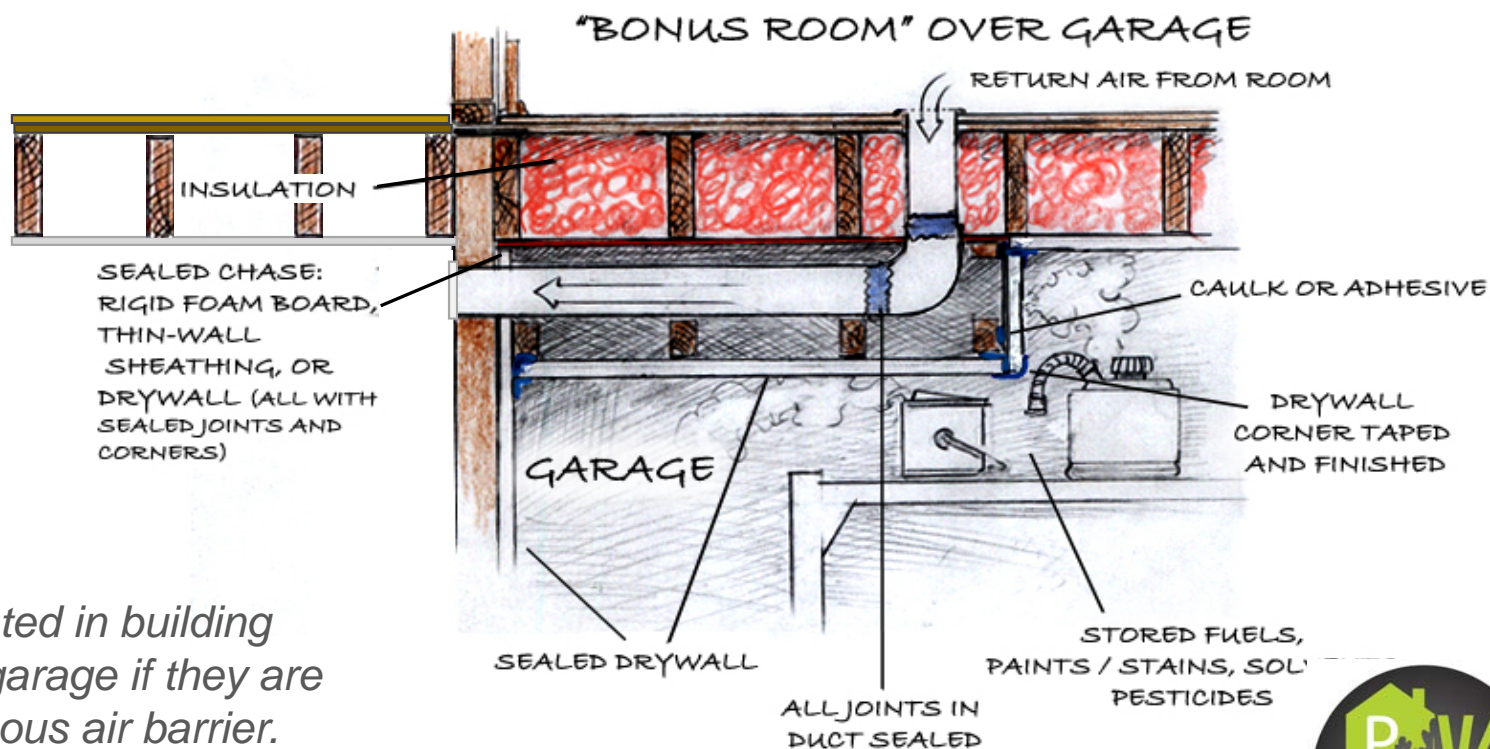


Do not locate air-handling equipment or ductwork in garages.

- We put everything in the garage that we don't want in the house!
- If the pressure in the house is lower than the pressure in the garage, whatever is in the garage air will flow into the home's air.



4.3 Location of Air Handler and Ducts



Note: Ducts may be located in building cavities adjacent to the garage if they are separated with a continuous air barrier.

But—any bad joints of ducts in unconditioned space could impact IAQ of the entire house. (More on garages in Item 5.4)





4.5 Mechanical Whole-Dwelling Ventilation



- ✓ *Provide mechanical whole-dwelling 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 manufacturer's requirements for return air temperature are met.
- Note:
 - Added to the return side of the air handler, puts the house under *positive* pressure.

4.5 Mechanical Whole-Dwelling Ventilation

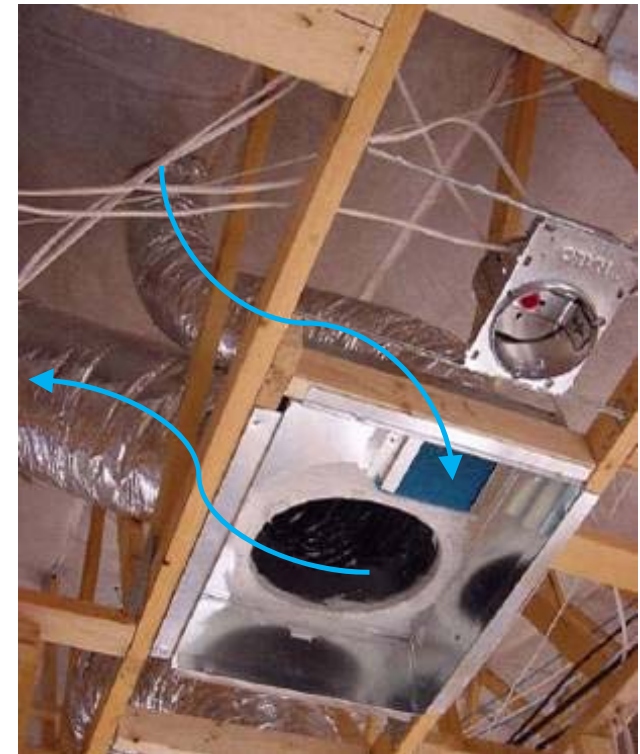


Exhaust ventilation

Fresh
air
damper



Timer control



Ducted fresh air supply

4.6 Local Exhaust for Known Pollutant Sources



- ✓ *Provide local mechanical exhaust ventilation to the outdoors in bathrooms and kitchens.*



- Vent conventional clothes dryers to the outdoors.
- Electric condensing dryers must be plumbed to a drain.





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.
- Use a filter in the air handling unit during construction and a clean filter upon final inspection.



HVAC Filters

- IAP requires a *minimum* MERV 8 filter, but recommends MERV 13 to reduce exposure to PM_{2.5}.
- Filters are available in various widths (e.g. 1", 2", 4").
- At higher MERV ratings, thinner filters typically have a *higher* resistance to airflow.
- Filters with greater surface area can capture more particulates with less resistance, but wider filter slots may be required.



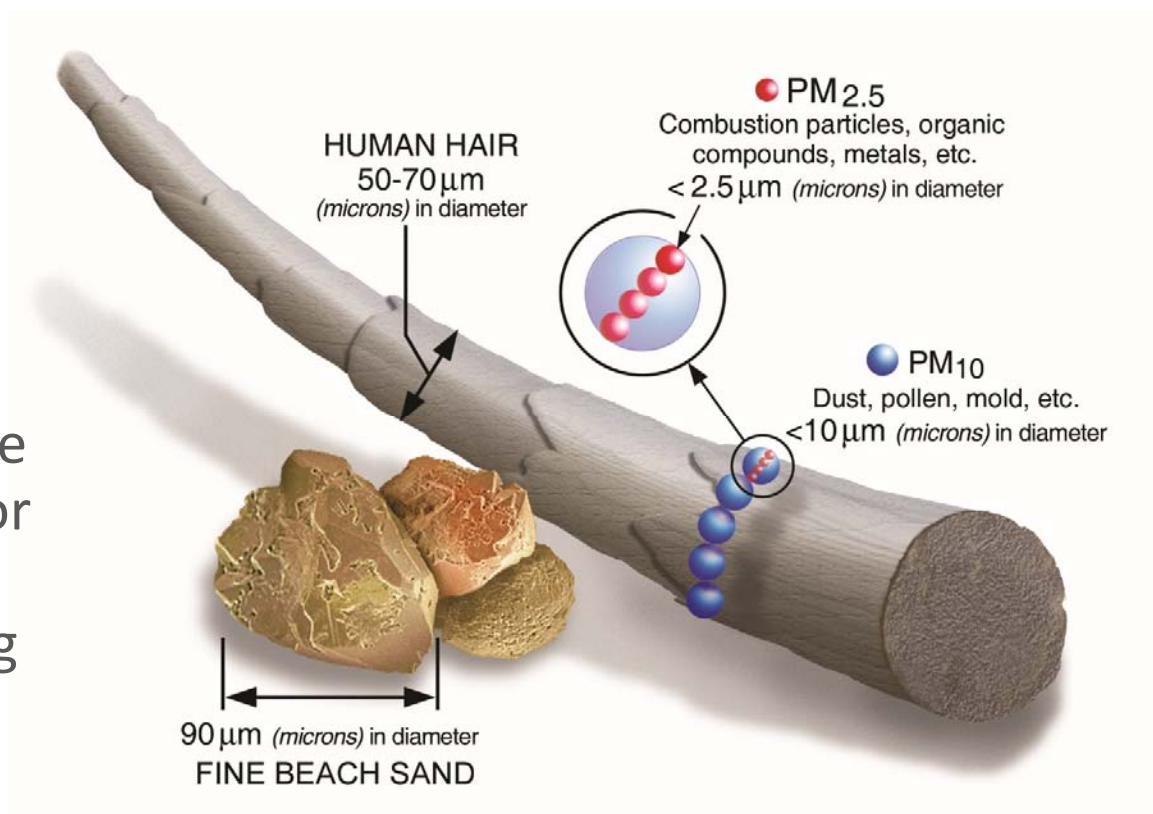
MERV Ratings

Efficiency	MERV	Micron	Type of Filter	Test Contaminant
< 20%	1 – 4	> 10	Disposable panel filters, fiberglass & foam media, hogshair	Pollen, Spanish moss, dust mists, sanding
< 20%	5	3.0 – 10	Pleated panel filters	Pudding mix, snuff, powdered milk
20 – 30%	6		Cube filters, self-supported filters	Dusting aids, cement dust
25 – 30%	6 – 7		Pleated filters	Hair spray, fabric protector
40 – 50%	8		Pleated filters, extended surface	Mold spores
50 – 60%	9 – 10	1.0 – 3.0	Extended pocket filters	Welding fumes, nebulizer drops, coal dust, auto emissions
60 – 70%	10 – 11		Pleated panel filters, extended surface	Lead dust, milled flour
80 – 90%	12 – 14		Extended surface pocket filters	Legionella, smoke, copier toner, face powder
90 – 95%	14 -15	0.3 – 1.0	Extended surface pocket filters	Sneeze, cooking oil

Note: when selecting a filter, try to find a filter that creates the least amount of resistance.

How big is a micron?

- PM 2.5 particles can travel deeply into the respiratory tract, reaching the lungs.
- Some ways to reduce exposure are to limit indoor and outdoor activities that produce fine particles (for example, burning candles indoors or open burning outdoors).



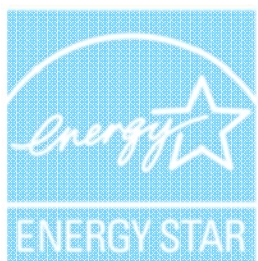
5. Combustion Pollutants

- Carbon monoxide (CO), an odorless, colorless gas that can cause sudden illness and death, is produced any time a fossil fuel is burned.
- Accidental CO poisoning kills over 400 Americans annually. (CDC)
- Nitrogen dioxide (NO₂) can come from appliances that burn gas, kerosene and wood. Elevated short-term NO₂ exposure is connected with increased visits to emergency departments and hospital admissions for asthma and respiratory issues.
- Respirable particles can be directly emitted into indoor air from woodstoves & fireplaces.



Indoor Air Quality (IAQ)

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 decorative appliances within conditioned space.
- 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 – Emission Standards



- For fuel-burning and space-heating appliances in conditioned spaces . . .
 - **Traditional masonry fireplaces** designed for open fires are not permitted, with the exception of "masonry heaters"
 - **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.



5.1 Combustion Equipment – Emission Standards



- For fuel-burning and space-heating appliances in conditioned spaces . . .
 - **Wood stove and fireplace inserts** ...shall meet the emission requirements of the EPA's New Source Performance Standards for new residential wood heaters.
 - **Pellet stoves** shall meet the requirements of ASTM E1509 AND they shall meet the emission requirements of the EPA's New Source Performance Standards for new residential wood heaters.



5.1 Combustion Equipment – Emission Standards



- For fuel-burning and space-heating appliances in conditioned spaces . . .
 - **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 Z20.88/CSA2.33.
 - Decorative gas logs as defined in ANSI Z21.84/CSA 2.33 are not permitted.



Combustion Equipment



Direct vent furnace



Power vented water heater

Note: Naturally drafted equipment is allowed in Climate Zones 1-3 with a combustion safety test. Wood stoves and fireplace inserts shall meet UL 1482 and [EPA's New Source Performance Standards](#).



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.

Advisory for Compartmentalization:

- The maximum air leakage rate should not exceed 0.3 CFM per square foot of the dwelling unit's enclosure area during the blower door test.



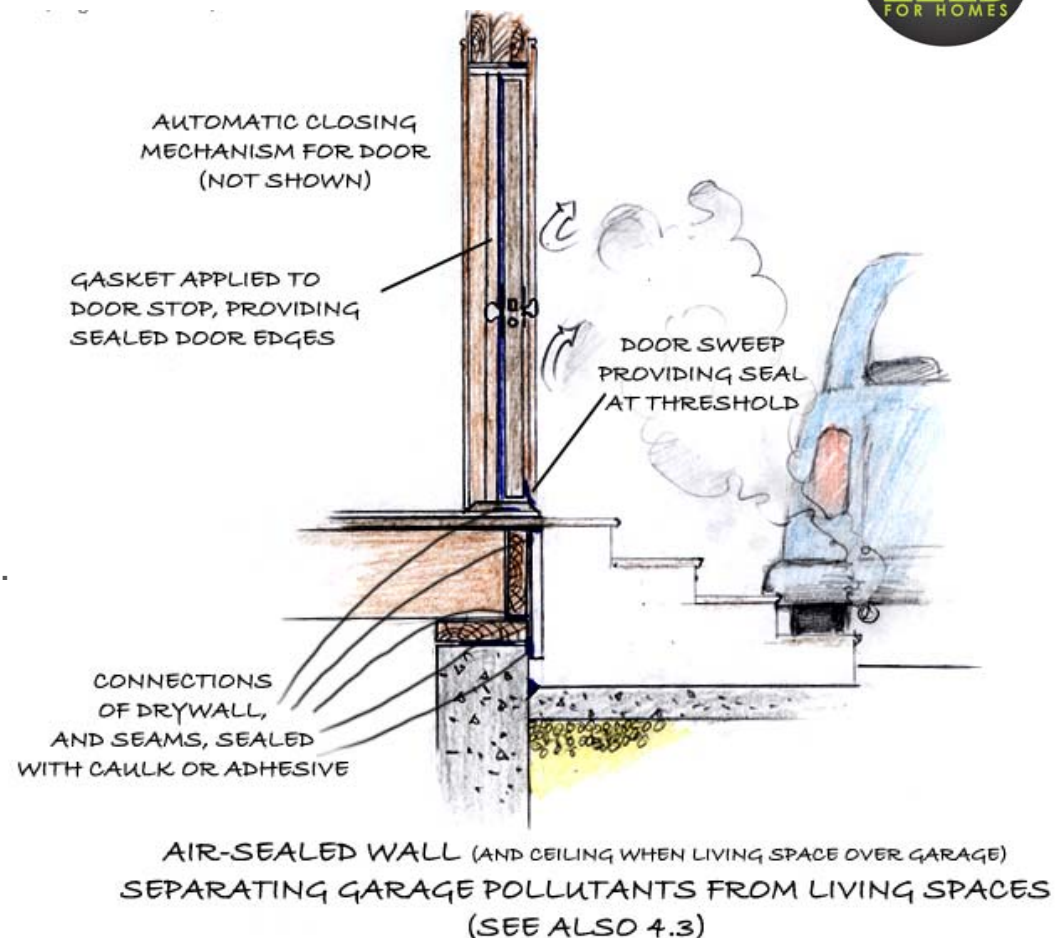
5.4 Attached Garages

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.

- Pressurize the home, depressurize the garage, or substantially air-seal.



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.



6. Low Emission Materials

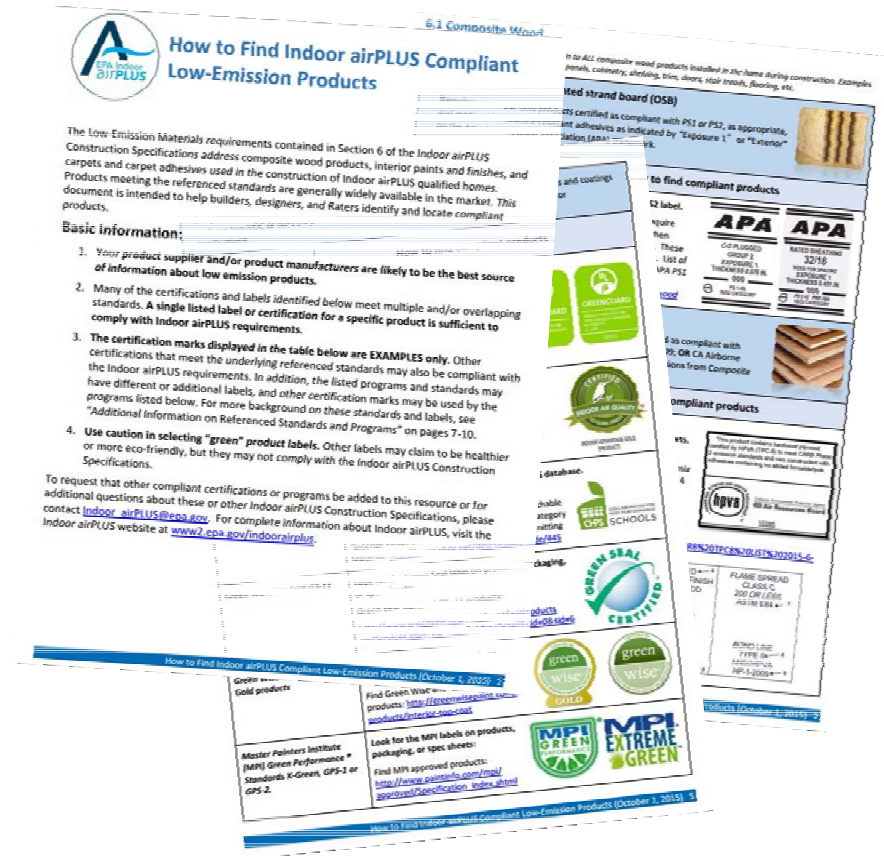
Potential Issues:

- 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.



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](#)



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”.

Indoor airPLUS – Section 6 *Low-emission Materials*

6.4 – Adhesives and Sealants

Recommended but not yet required.

6.3 – Carpet and Carpet Adhesives

CRI Green Label

6.5 – Hard Surface Flooring

Recommended but not yet required.

6.1 Composite Wood



- Use certified low-formaldehyde products for all composite wood materials installed in the home including, but not limited to: **structural panels, cabinetry, shelving, trim, doors, stair treads, flooring, etc.**
- Specific standards or certifications apply to these product types:
 - Structural Plywood (PS-1 or PS-2)
 - Hardwood Plywood
 - Particleboard & MDF
 - Cabinetry

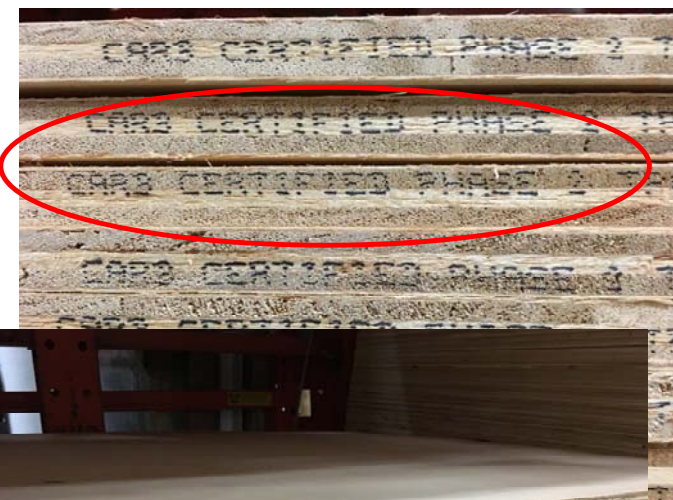


6.1 Composite Wood – Hardwood Plywood



Use only products certified compliant with:

- Formaldehyde emissions requirements of ANSI/HPVA HP-1-2016; OR
- California Air Resources Board (CARB) Airborne Toxics Control Measure (ATCM) Phase II to Reduce Formaldehyde Emissions from Composite Wood Products; OR
- EPA Toxic Substances Control Act (TSCA) Title VI certified.



6.1 Composite Wood – Particleboard and MDF



Use products certified compliant with:

- CARB Phase II; OR
- EPA (TSCA) Title VI; OR
- ANSI A208.1 (particleboard) and ANSI A208.2 (MDF); OR
- ECC Sustainability Standard by the Composite Panel Association; OR
- GREENGUARD or GREENGUARD GOLD; OR



6.1 Composite Wood – Cabinetry



Also compliant:
NAF – No added formaldehyde
ULEF – Emissions are consistently below Phase 2

Use products certified compliant with:

- CARB Phase II; OR
- EPA (TSCA) Title VI; OR
- ANSI A208.1 (particleboard) and ANSI A208.2 (MDF); OR
- ECC Sustainability Standard by the Composite Panel Association; OR
- GREENGUARD or GREENGUARD GOLD; OR
- (KCMA) Environmental Stewardship Certification Program (ESP 05-12)



6.2 Interior Paints and Finishes







- At least 90% of the interior surface area covered by site-applied paints and coatings shall use low-VOC or no-VOC products certified by one of the following third-party standards or certifications:
 - GREENGUARD or GREENGUARD Gold
 - SCS Indoor Advantage Gold
 - A third-party low-emitting product based on CA Section 01350 (CDPH Standard Method V1.1-2017)
 - Green Seal Standard GS-11
 - Green Wise and Green Wise Gold
 - MPI Green Performance Standards X-Green, GPS-1, or GPS-2.



6.2 Interior Paints and Finishes

6.2 Interior Paints and Finishes

Requirement: At least 90 percent of the interior surface area covered by site-applied paints and coatings shall use low-VOC or no-VOC products certified by one of the following third-party standards or certifications:

Meet at least one of the standards below	How to find compliant products
GREENGUARD or GREENGUARD GOLD Certification for Paints and Coatings	<p>Look for GREENGUARD labels on products, packaging, or spec sheets:</p> <p>Search for GREENGUARD and GREENGUARD Gold certified paint and coating products at:</p> <p>http://productguide.ulenvironment.com/SearchResults.aspx?CategoryID=15&SubCategoryID=28</p>  
Scientific Certification Systems (SCS) Standard EC-10.2-2007 or Indoor Advantage Gold	<p>Look for the Indoor Advantage Gold label on products, packaging, or spec sheets.</p> <p>OR find Scientific Certification Systems certified products at:</p> <p>http://www.scsglobalservices.com/certified-green-products-guide?scscertified=1</p> 
CA Section 01350 (CDPH Standard Method V1.1-2010)	<p>Look for low-emitting products found in the CHPS database.</p> <p>CA 01350 Certified products can be found in the Collaborative for High Performance Schools searchable high performance product database under the category "Interior Finish and Trim" with attribute "Low Emitting Material": http://www.chps.net/dev/Drupal/node/445</p> 

Look for the Green Seal label on products, packaging, or spec sheets:

Standard GS -11 products:

<http://greenseal.org/FindGreenSealProducts.aspx?vid=ViewProductDetail&cid=0&sid=6>



Look for Green Wise labels on products, packaging, or spec sheets.

Look for Green Wise Gold and Green Wise labels on products, packaging, or spec sheets.



Look for MPI labels on products, packaging, or spec sheets:

Look for MPI products: http://mpi.com/mpi/specification_index.shtml



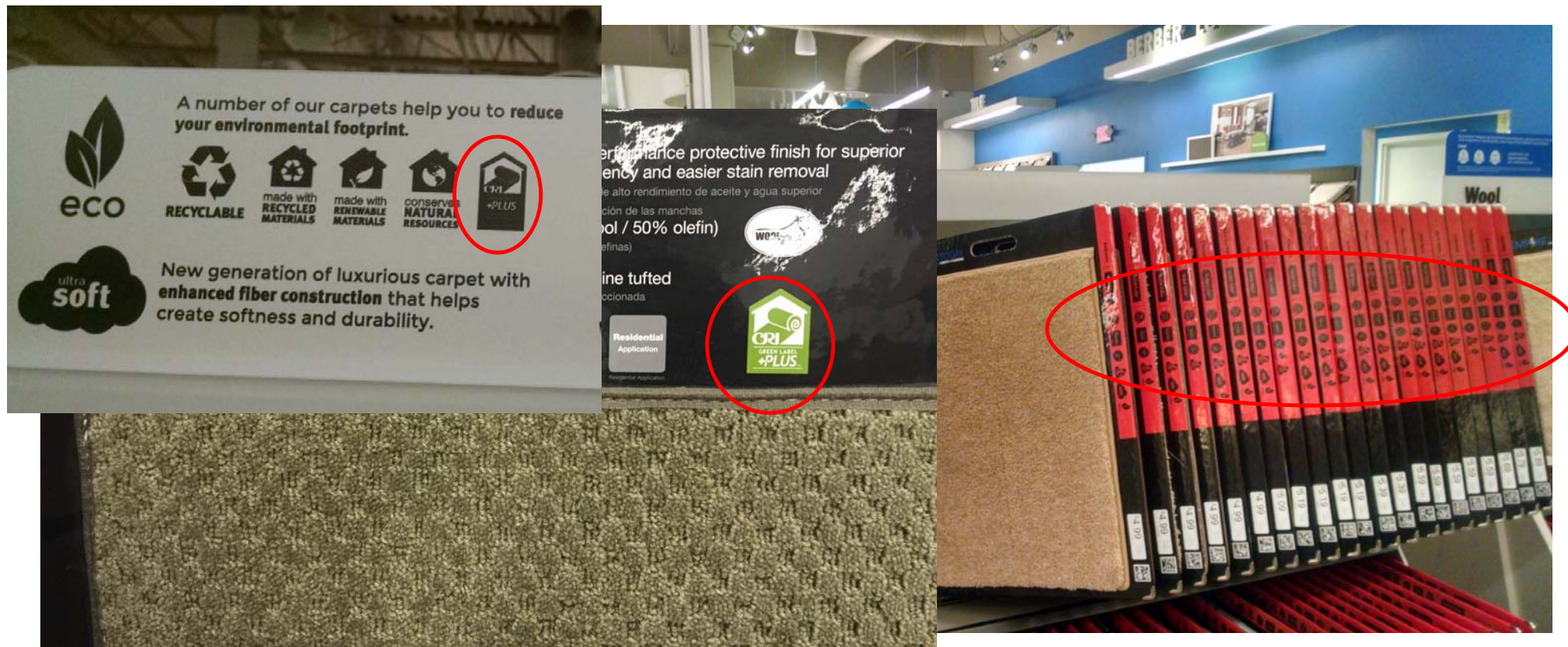
6.3. Carpets and Carpet Adhesives



- Use carpets and carpet adhesives labeled with the Carpet and Rug Institute (CRI) Green Label Plus testing program criteria.
- Use carpet cushion products certified to meet the CRI Green Label Plus testing program criteria.



6.3 Carpet and Carpet Cushion





6.4 Adhesives and Sealants



- **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:

- Green Seal GS-36; OR
- GREENGUARD or GREENGUARD Gold; OR
- A third-party product based on CA Section 01350 (CDPH Standard Method V1.2-2017).



6.5 Hard Surface Flooring



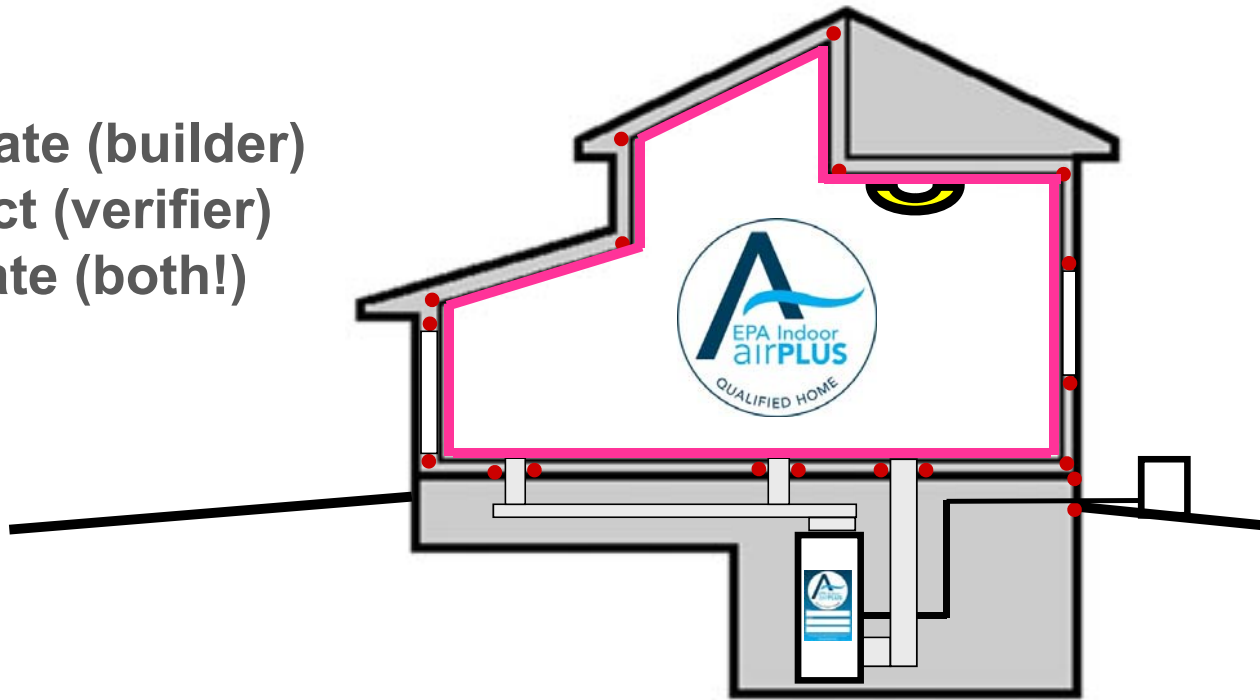
Advisory: While not currently required by Indoor airPLUS, EPA recommends that at least 90 percent of the interior hard surface flooring materials, adhesives, and underlayments be low-VOC or no-VOC emitting as certified by one of the following third-party standards or certifications:

- FloorScore ®; OR
- GREENGUARD or GREENGUARD Gold; OR
- SCS Indoor Advantage Gold; OR
- A third party low-emitting product list based on CA Section 01350 (CDPH Standard Method v1.1-2017); OR
- CRI Green Label Plus (adhesives)

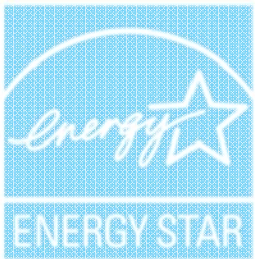


7. Home Commissioning

1. Ventilate (builder)
2. Inspect (verifier)
3. Educate (both!)



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 the filter is new, clean and meets specified MERV rating.



7.2 Ventilation after Material Installation



- Ventilate the home with outside air at the highest rate and duration practical, meeting ventilation requirements for air flow and humidity control (see Item 4.5):
 - During and shortly after installing products that are known sources of contaminants, AND
 - During the period between finishing and occupancy.



7.3 Buyer Information Kit



- Provide resident(s), property manager, and/or building owner(s) buyers with information and documentation of the home's IAQ protections, including:
 - An Indoor airPLUS label and certificate.
 - 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.




Sign and Date

The Rater who conducted the verification, or a responsible party from the Rater's company, must sign the completed Verification Checklist. The builder must sign the checklist if any items in the "Builder Verified" column are checked, and by so doing accepts full responsibility for verifying that those items meet Indoor airPLUS requirements.

Rater Company: _____	Builder Company: _____
Rater Employee: _____	Builder Employee: _____
Rater Signature: _____ Date: _____	Builder Signature: _____ Date: _____


You Are Now Ready to Build and Label Indoor airPLUS Homes!



**Indoor airPLUS Version 1 (Rev. 04)
Verification Checklist**

Home Address: _____ City: _____ State: _____ Zip: _____

Climate Zone (1-8): _____ Radon Zone (1-3): _____



Section	Requirements (Refer to full Indoor airPLUS Construction Specifications for details)	Most Correct	Builder Verified	Rater Verified	N/A
ENERGY STAR	ENERGY STAR Version 3 (or 3.1, 3.2) Program requirements must be followed and the home shall be ENERGY STAR certified in conjunction with Indoor airPLUS qualification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Moisture Control	1.1 Drain or sump pump installed in basements and crawlspaces. In EPA Radon Zone 1, check water also installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input type="checkbox"/> Slab-on-grade foundation <input type="checkbox"/> Free-draining soils				
	1.2 Layer of aggregate or sand (8 in.) with geotextile matting installed below slabs AND radon techniques used in EPA Radon Zone 1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input type="checkbox"/> Slab-on-grade foundation <input type="checkbox"/> Free-draining soils <input type="checkbox"/> Dry climate				
Radon	1.4 Basements/crawlspaces insulated, sealed and conditioned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input type="checkbox"/> 100-year flood zone <input type="checkbox"/> Marine climate <input type="checkbox"/> Dry climate <input type="checkbox"/> Crawlspaces sealed with capillary break and active dehumidification <input type="checkbox"/> Raised per foundation with no walls				
	1.7 Protection from water system damage if no gutters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input type="checkbox"/> Rainwater harvesting system <input type="checkbox"/> Dry climate				
Fuels	1.13 Supply piping in exterior walls insulated with pipe wrap.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input type="checkbox"/> Dry climate AND climate zone 1-3 <input type="checkbox"/> Air barrier insulation in wall cavity				
	1.14 Hard surface flooring in kitchens, baths, entry, laundry, and utility rooms.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input type="checkbox"/> No capillary lines in dry climate with implementation of a radon pipe loop <input type="checkbox"/> Manufactured home with raised per foundation				
HVAC Systems	2.1 Radon-resistant features installed in Radon Zone 1 homes in accordance with Construction Specification 2.1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input type="checkbox"/> Manufactured home with raised per foundation				
	3.3 Corrosion-proof outdoor fan screens installed at all openings that cannot be fully sealed. (Not required for clothes dryer vents.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input type="checkbox"/> Climate zones 4-8, 10, 12 and portions of 14 and 20				
Combustion Appliances	4.1 Equipment selected to keep relative humidity < 60% in "Warm-Humid" climates.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exception Applied: <input type="checkbox"/> Climate zones 4-8, 10, 12 and portions of 14 and 20				
	4.2 Duct systems protected from construction debris AND no building cavities used as air supply or return.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.3 No air-handling equipment or ductwork installed in garages.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Combustion Appliances	4.6 Clothes dryers vented to the outdoors or plumbed to a drain according to manufacturer's instructions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.7 Central forced air HVAC system(s) have minimum MERV 8 filter AND no ozone generators in home. Temporary filter installed to protect and from construction dust.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Emissions standards met for fuel-burning and space-heating appliances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.1 Identify appliance type: <input type="checkbox"/> Factory-built wood-burning fireplace <input type="checkbox"/> Wood stove <input type="checkbox"/> Masonry heater <input type="checkbox"/> Pellet stove <input type="checkbox"/> Natural gas/propane fireplace				
Combustion Appliances	5.2 Appliance model name/number.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.3 CO alarms installed in each sleeping zone (e.g., common hallway according to NFPA 720).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.4 Multifamily buildings: Smoking restrictions implemented AND ETS traveler pathway minimized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.5 Attached garages: Door closer installed on all connecting doors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Combustion Appliances	5.6 Attached garages: In homes with exhaust-only whole-house ventilation EITHER <input type="checkbox"/> 10 ftm exhaust fan installed in garage OR <input type="checkbox"/> Pressure test conducted to verify the effectiveness of the garage-to-house air barrier.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Indoor airPLUS Version 1 (Rev. 04) Construction Specifications (January 2018) 3

Indoor airPLUS Version 1 (Rev. 04) Construction Specifications (January 2018) 4

volatile wood products certified low-emission. See spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
or paints and finishes certified low-emission. See spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
carpet adhesives, and carpet cushion certified low-emission. See spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
system and ductwork verified to be dry and clean AND new filter installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ventilated before occupancy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ment manuals, Indoor airPLUS label, and certificate provided for owner/occupant.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Date: _____ Builder Company: _____
 Date: _____ Builder Employer: _____
 Date: _____ Builder Signature: _____

Completing the Indoor airPLUS Verification Checklist:

ertified homes verified to comply with these specifications can earn the Indoor airPLUS label. See Indoor airPLUS ations for full descriptions of the requirements, terms, exceptions, abbreviations, references and climate map used in this h. It is not complete and this checklist is not in full and agreed.

Notations and exceptions will always be utilized unless otherwise noted in the Indoor airPLUS Construction Specifications, r airPLUS modifies or excludes certain ENERGY STAR exceptions or alternate pathways.

he, Check "N/A" for specifications that do not apply for specific conditions (e.g., climate) according to the exceptions per airPLUS Construction Specifications. Check either "Builder Verified" or "Rater Verified" for all other items to indicate m. Items may be verified visually on site during construction, by reviewing photographs taken during construction, by ion, or through equivalent methods as appropriate.

ected the verification, or a responsible party from the Rater's company, must sign the completed verification checklist. o sign the checklist if any items in the "Builder Verified" column are checked, and by so doing accepts full responsibility for items meet Indoor airPLUS requirements.

In the rating documentation, all required ENERGY STAR Certified Homes documentation, and the Indoor airPLUS r for the home for a minimum of 2 years from final verification. The Rater shall coordinate with the Provider and/or Indoor airPLUS label and certificate for each qualified home.

nder a Sampling Provider are permitted to use a RESNET approved sampling protocol for Indoor airPLUS homes located at a sampling protocol approved by the California Energy Commission for homes located in California, to verify any item "infract." For example, if the approved sampling protocol requires rating one in seven homes, then the checklist will be he home that was rated. Only Raters are permitted to use sampling. All items verified by the builder shall be verified for or unit within a multifamily building. For example, if a Rater verifies 10 items on the Indoor airPLUS Checklist and the remaining checklist items, then an approved sampling protocol is permitted to be used only on the 10 Rater-verified items.

may provide the Rater with a single signed copy of the checklist for an entire building or group of units with under- the condition that all units within the building or group utilize: 1) the same HVAC system type (i.e., ductless mini-split, 2) the same combustion appliances and combustion pollutant controls; and 3) the same low-emission materials for all products (within their respective categories) verified in Section 4 of the Indoor airPLUS Construction e are no builder-verified items, the Rater may also utilize one checklist per group of units if the above criteria are met.

any of the following conditions will require a separate and unique checklist to be completed and signed by the Rater and offering HVAC system type (i.e., ductless mini-split, forced air, hydronic); offering combustion appliance types (e.g., masonry heater, pellet stove, wood-burning fireplace) stove, factory-built, etc.) pollutant controls; or any unit/group with low-emission materials or finishes addressed in Section 8 that are compliant and certifications/standards within their product category.

ers and Raters may use a single checklist for units utilizing low-emission materials certified to different labels or ided that documentation of the certifications for those materials are retained by the builder and available for inspection

tion on the Indoor airPLUS

www.epa.gov/indoorairplus



All Indoor airPLUS qualified homes must also guidelines for energy efficiency set by ENERGY STAR, the nationally-recognized symbol for energy efficiency.



Checklist verified and signed
by both the builder and Rater

Place the Indoor airPLUS label
adjacent to the ENERGY STAR label

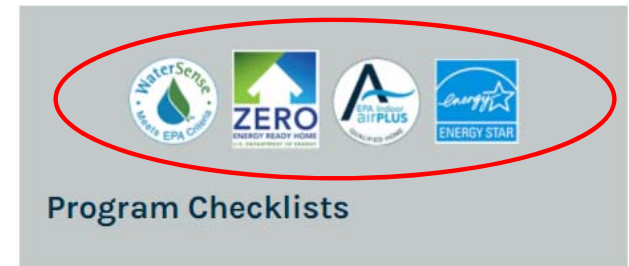
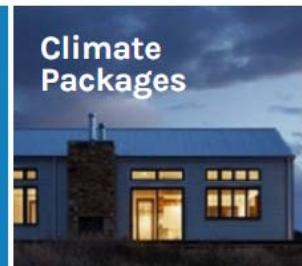
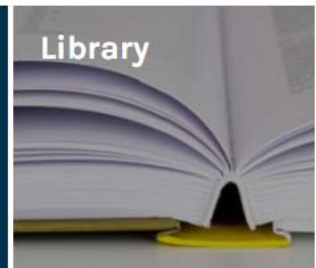
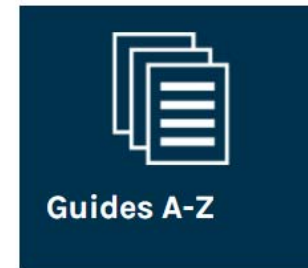
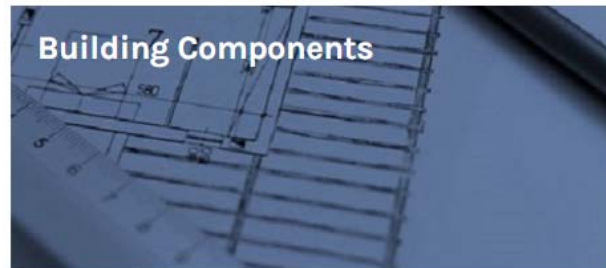


PART 4

Tools / Resources & Conclusion

Technical Assistance

- Specifications
- Webinars
- Online Resources and Tools
- Integration with DOE Building America Solution Center



<https://basc.pnnl.gov/>

Resources and Tools



Multimedia tools:

- YouTube Videos
- Webinar recordings
- Podcasts
- Facebook
- Twitter

Indoor airPLUS Videos, Podcasts, Webinars and Interviews

[Videos](#) [Podcasts](#) [Webinars](#) [Interviews](#)

Rater Perspective – Benefits of Earning the Indoor airPLUS Label with Ross Britton, US-EnviroLogic, and Nick Hurst



Ross Britton Nick Hurst

00 07:52


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11 MB

[Script of Podcast with Ross Britton](#)

2 K, [About PDF](#)



Healthier Homes with Indoor airPLUS

U.S. Environmental Protection Agency

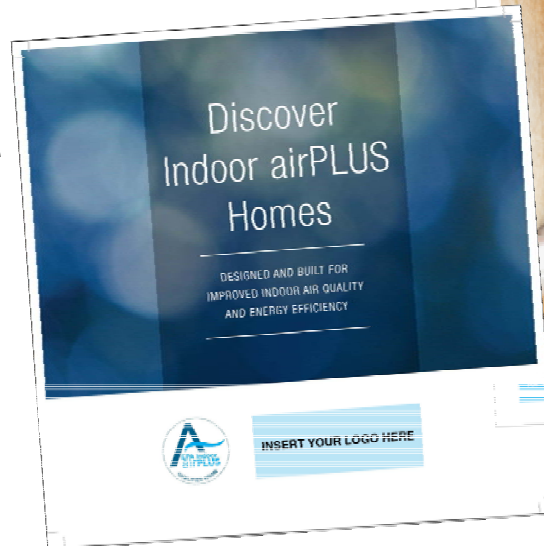
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12 1

Resources and Tools

- Partner logos
- Co-brandable brochures
- Partner locator
- Website widgets
- 100% Commitment



Indoor airPLUS Leader Awards

The Indoor airPLUS Leader Awards were created to recognize and reward Indoor airPLUS Program partners who construct and verify Indoor airPLUS homes designed and built for improved indoor air quality.

This annual award recognizes market leading organizations who promote safer, healthier and more comfortable indoor environments by participating with Indoor airPLUS and offering enhanced indoor air quality protections for their new homebuyers.



2017 Indoor airPLUS Leader Award Winner

www.epa.gov/indoorairplus/leader_awards.html



Indoor airPLUS

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

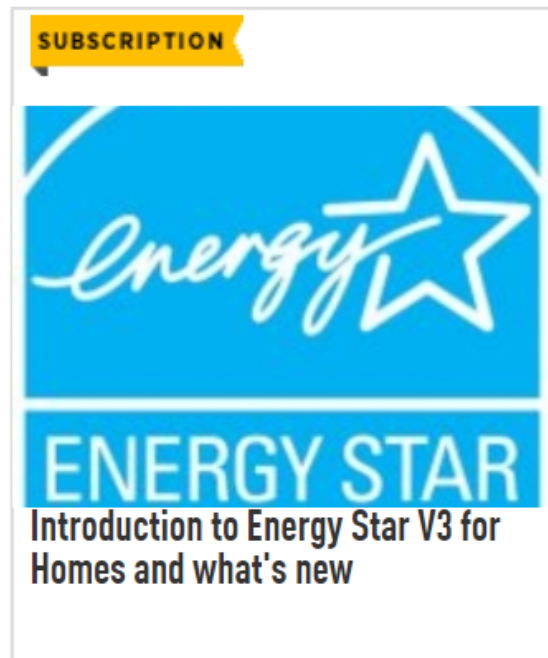
Learn more at:
www.epa.gov/indoorairplus

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



LEED CHECKLIST REVIEW

Further Courses



<https://www.usgbc.org/organizations/greenhome-institute?view=courses>



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

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