



Updates to the Building America Solution Center

Chrissi Antonopoulos
Senior Energy Analyst,
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- **BASC Introduction**
 - Overview of stakeholders and users
 - Tour of core BASC content and user interface

- **Overview of BASC Business Applications:**
 - Develop guidance/training materials for field crews
 - Develop construction documents
 - Create sales materials
 - Use content to prepare presentations
 - Develop guidance for company decision makers
 - Use content to create code official agreements

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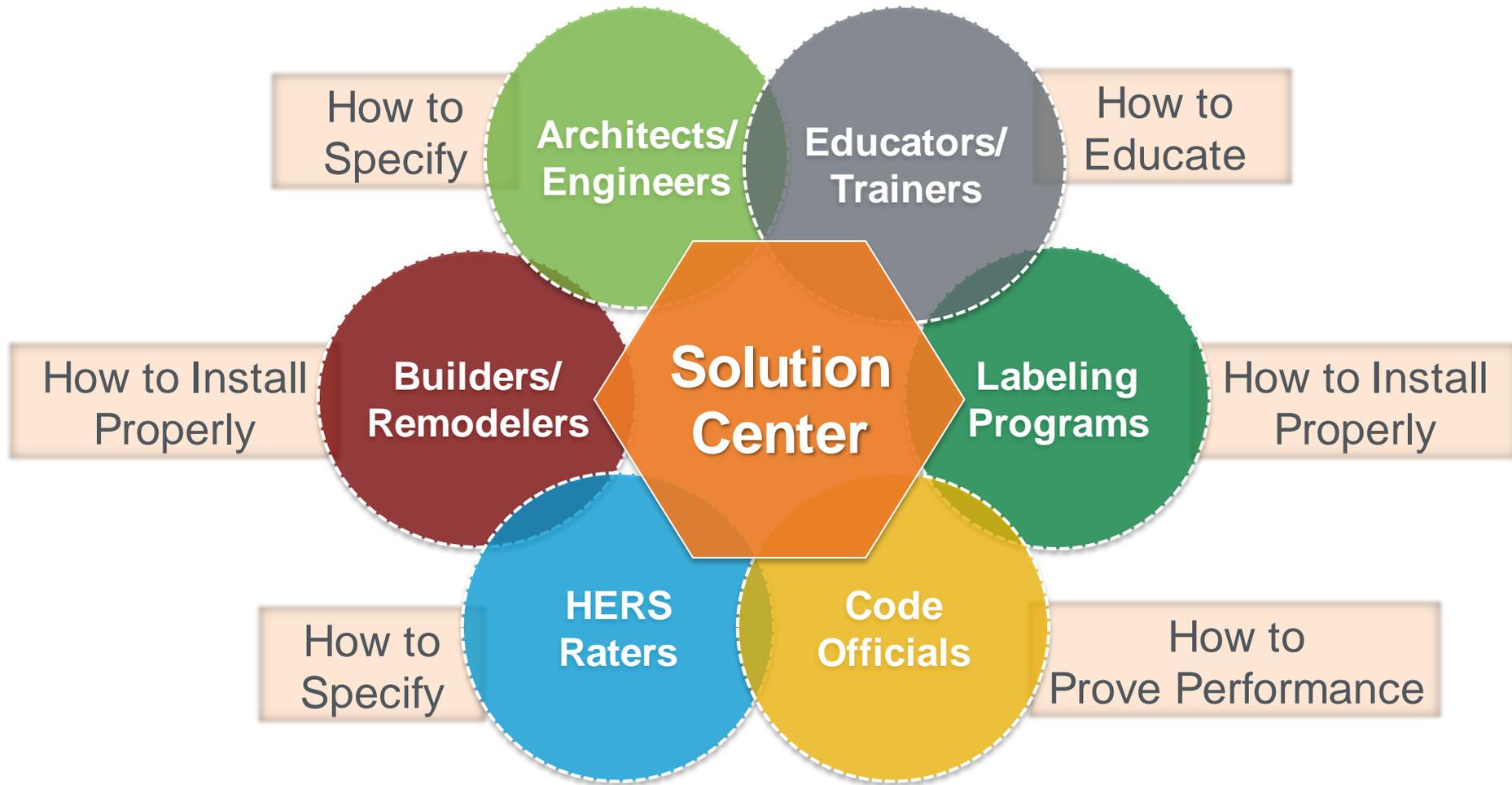
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...At Your
Fingertips

- Continuously Improved vs. Fixed Content
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The screenshot shows the top navigation bar with the U.S. Department of Energy logo and the text 'Energy Efficiency & Renewable Energy'. On the right, there are links for 'Log In' and 'Register'. Below the navigation bar is a search bar with the placeholder text 'Enter your keywords' and a magnifying glass icon. The main content area is titled 'Solution Center' and contains a welcome message: 'Welcome to our new homepage! The Building America Solution Center provides access to expert information on hundreds of high-performance construction topics, including air sealing and insulation, HVAC components, windows, indoor air quality, and much more. Click on the links below to explore the Solution Center.' Below the welcome message are several featured content tiles: 'Building Components' (with an image of a building facade), 'Guides A-Z' (with an icon of a stack of papers), 'Library' (with an image of an open book), 'Sales Tool' (with a gear icon), 'Climate Packages' (with an image of a modern house at night), 'Program Checklists' (with logos for WaterSense, ZERO, A+ Plus, and ENERGY STAR), 'Existing Homes' (with an image of a house interior), 'Code Briefs' (with a house icon and a checklist), 'Website Widget' (with a house icon), and 'Mobile Apps' (with an image of a smartphone). At the bottom, there is a 'Recently Added Content' section with three entries: 'Termite shield with exterior rigid foam above and below' (CAD File Posted: November, 2017), 'Spray foam on concrete foundation wall with framed interior wall' (CAD File Posted: November, 2017), and 'Foundation wall interior rigid insulation with furring strips' (CAD File Posted: November, 2017). The footer includes the Building America logo and the text 'U.S. Department of Energy' on the left, and a community-driven tool notice on the right: 'As a community driven tool, we welcome your [comments](#) on how to continuously improve the Solution Center. If you are interested in submitting content, please become a [registered user](#) and see the [criteria for submissions](#).'

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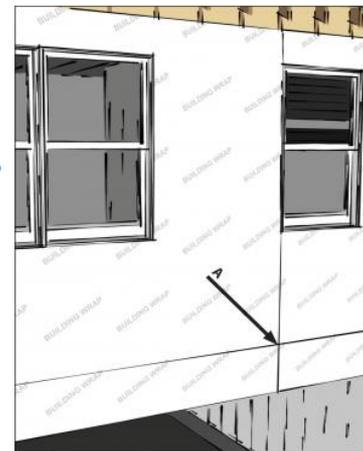
Scope | Description | Success | Climate | Training | CAD | Compliance | Retrofit | More | Sales

Scope

Install a fully sealed continuous drainage plane behind the exterior cladding on the walls of the home to keep water out of the wall cavities.

- Make sure that this layer laps over flashing installed around doors, windows, and wall penetrations and any flashing installed at the top or base of walls.
- Provide an additional bond-break drainage plane layer behind all stucco and non-structural masonry wall cladding assemblies.
- Possible monolithic weather-resistant barrier materials include house wrap that is sealed or taped at all joints; rigid foam insulation or other sheathing materials with a weather-resistant coating if all joints are fully taped; building paper or building felt installed with shingle-style laps; liquid-applied coatings; or other water-resistive barrier materials recognized by the ICC-ES or another accredited agency.

See the [Compliance Tab](#) for related codes and standards requirements, and criteria to meet national programs such as DOE's Zero Energy Ready Home program, ENERGY STAR Certified Homes, and Indoor airPLUS.



House wrap is sealed at all seams and overlaps flashing to serve as a continuous drainage plane over the exterior walls.

Last Updated: 06/13/2017

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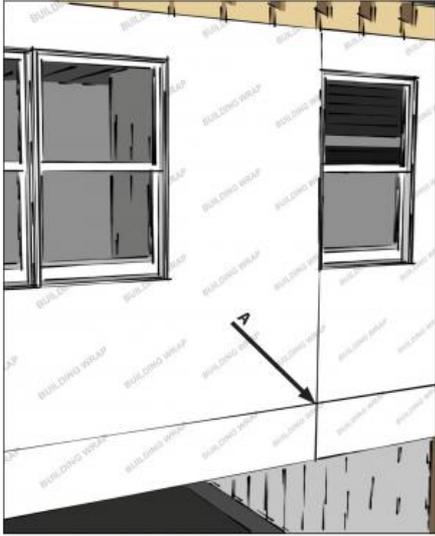
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Description

Most exterior wall cladding systems leak. Wind pressure and capillary action can drive rainwater through the many cracks, joints and small gaps in a building's exterior, and with typical residential siding systems, it is nearly impossible to seal all those holes. Even if a builder succeeds in sealing a majority of the holes, the caulks and sealants used to seal them will not last as long as the exterior cladding materials, and the sealants will need to be reapplied periodically. A wall that tries to block entry of water using caulks and sealants is sometimes called a "barrier wall," but it is not a very practical system for residential buildings ([BSC 2007](#)).

A more practical way to protect building exteriors from rainwater relies on a "drainage approach," achieved by installing a drainage plane beneath the exterior cladding. With this approach, any water that leaks through the cladding will run into a water-resistant surface, and safely drain down the wall. For a detailed Building America sponsored research report about taped insulating sheathing drainage planes, see [Guidance on Taped Insulating Sheathing Drainage Planes](#).

To work effectively, the drainage plane must be designed and installed to channel water away from the building. This will involve the following ([Smegal and Lstiburek 2012](#)):

- Lapping drainage plane materials over all exterior wall flashings so water flowing down the walls is directed away from the building. Common wall flashings include flashing at the base of walls, sidewall flashing where roofs intersect walls, and flashings around window and door openings.
- Carefully sealing around all penetrations through the wall. Examples of common wall penetrations include those for water spigots, exhaust vent outlets, HVAC line sets, and wiring for outdoor light fixtures and receptacles.

While the primary function of a weather-resistant barrier is rainwater control, the drainage plane may also serve as an air barrier if the seams in the drainage plane are taped or otherwise sealed. An effective air barrier is critical to long-term durability of the building, particularly in hot and cold climates where moisture-laden air moving into the enclosure may cause condensation problems ([Lstiburek 2006](#)).

Drainage Plane Materials

Materials that may be used to create an effective drainage plane include:

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Ensuring Success

Visually inspect the exterior walls before siding is installed to ensure that the weather-resistive barrier or rigid foam sheathing is correctly installed and correctly integrated with wall flashings to direct water out and down, away from the wall cavities. Seams in house wrap and rigid foam insulation should be taped, and the tape must adhere uniformly to the substrate without peeling or open "fish mouths" (i.e., folds in the tape that create an opening that does not adhere to the house wrap or rigid foam sheathing).



Figure 1 - The tape shown here was not firmly bonded to the house wrap.

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Climate

The chief climate factor is exposure to rainfall. Buildings in regions with more rainfall are subject to increased incidence of water damage.

Drainable wall assemblies are recommended in all exposure regions. Rain-screen wall systems are considered best-practice upgrades in all exposure regions to ensure the long-term durability of building assemblies, but are especially recommended in High and Extreme exposure regions, as shown on the map below ([BSC 2004](#)).



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Training

Right and Wrong Images



Presentations

[Flashing at the Bottom of Brick-Veneer Walls](#)  (2 MB)
Author(s): Steve Easley & Associates
Organization(s): Steve Easley & Associates
[Edit](#)

[Flashing at the Bottom of Stucco Walls](#)  (7 MB)
Author(s): Steve Easley & Associates
Organization(s): Steve Easley & Associates
[Edit](#)

[Water-Managed Adhered Concrete Masonry](#)  (3 MB)
Author(s): Steve Easley & Associates
Organization(s): Steve Easley & Associates
[Edit](#)

Videos

 [Building Enclosure: Exterior Wall Overview](#) (68 MB)
Courtesy Of: [NAHB Research Center](#)
Author(s): NAHB Research Center
Organization(s): NAHB Research Center

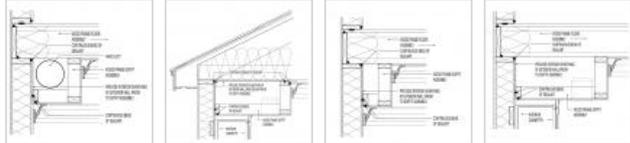
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CAD Images



The image displays four CAD drawings of exterior wall cladding cross-sections. Each drawing shows a different configuration of materials and components, including insulation, sheathing, and cladding. The drawings are arranged in a row, with a blue arrow pointing to the right between the last two drawings.

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Compliance

The Compliance tab contains both program and code information. Code language is excerpted and summarized below. For exact code language, refer to the applicable code, which may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our [webmaster](#)  if you find broken links.

ENERGY STAR Certified Homes

ENERGY STAR Version 3/3.1 (Rev. 08) National Program Requirements. Exhibit 1. Design the ENERGY STAR reference design home to meet the following infiltration limits:

IECC Climate Zones 1 and 2 - 6 air changes per hour at 50 Pascals (ACH50)
CZ 3 and 4 - 5 ACH50
CZ 5, 6, and 7 - 4 ACH50
CZ 8 - 3 ACH50

Rater Field Checklist, Thermal Enclosure System:

2. Fully-Aligned Air Barriers.⁵ At each insulated location below, a complete air barrier is provided that is fully aligned as follows:

Ceilings: At interior or exterior horizontal surface of ceiling insulation in Climate Zones 1-3; at interior horizontal surface of ceiling insulation in Climate Zones 4-8. Also, at exterior vertical surface of ceiling insulation in all climate zones (e.g., using a wind baffle that extends to the full height of the insulation in every bay or a tabbed baffle in each bay with a soffit vent that prevents wind washing in adjacent bays).⁶

2.1 Dropped ceilings/soffits below unconditioned attics, and all other ceilings.

Footnotes:

(5) For purposes of this Checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. EPA recommends, but does not require, rigid air barriers. Open-cell or closed-cell foam shall have a finished thickness ≥ 5.5 in. or 1.5 in., respectively, to qualify as an air barrier unless the manufacturer indicates otherwise. If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads ≥ 1 in. diameter unless

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This Retrofit tab provides information that helps installers apply this "new home" guide to improvement projects for existing homes. This tab is organized with headings that mirror the new home tabs, such as "Scope," "Description," "Success," etc. If there is no retrofit-specific information for a section, that heading is not included.

SCOPE

Retrofit an existing house with a new water control membrane drainage plane behind the existing cladding.

- Remove all existing cladding (siding).
- Remove any existing building paper or house wrap.
- Assess the condition of the exterior sheathing and replace it if necessary.
- If windows and doors are not properly flashed, remove and reinstall them to properly integrate them with the new water control membrane and drainage plane.
- Follow the steps in the [Scope](#) and [Description](#) tab for new construction to install a drainage plane layer.

For more information on conditions that may be encountered when working with walls in existing homes, see the [assessment guide](#) on walls, windows, and doors.

See the U.S. Department of Energy's [Standard Work Specifications](#) for more on sealing walls to keep out moisture, air, and pests. Follow safe work practices as described in the [Standard Work Specifications](#).

DESCRIPTION

Retrofitting an existing house with a new drainage plane and water control membrane is an invasive and costly project that involves removing the exterior cladding in its entirety. It is undertaken in extreme circumstances such as when a new cladding is desired for aesthetic reasons or because the current siding is in bad condition, and the existing siding cannot be "over-clad" (for structural reasons or setback requirements, for example). In these cases, the weather-resistant barrier is often replaced as part of the cladding replacement. It may also be done if the exterior of the wall has experienced extensive water damage and repair is not possible without increasing drainage and replacing the water control membrane. In the latter case, replacement of the exterior sheathing is also frequently required. Stucco or adhered-stone houses with inadequate drainage have required this type of retrofit.

As described in the [Description](#) tab, the weather-resistant barrier can consist of many types of material

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More Info.

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Case Studies

[Technology Solutions Case Study: Guidance on Taped Insulating Sheathing Drainage Planes](#) 

(612 KB)

 [Belongs to 0 Field Kits](#)

Author(s): Building Science Corporation

Organization(s): Building Science Corporation

Publication Date: November, 2014

Case study by Building Science Corporation on best practices for using rigid foam sheathing as a drainage plane in new and retrofit wall construction.

[Edit](#)

References and Resources*

[Brick, Stucco, Housewrap and Building Paper: Research Report 0105](#)

Author(s): Lstiburek

Organization(s): BSC

Publication Date: June, 2008

Research study discussing how housewraps restrict or permit the passage of water molecules based on size, but cannot control the direction in which the water vapor molecules move.

[Building America Best Practices Series Volume 11: 40% Whole-House Energy Savings in the Marine Climate](#) 

Author(s): Baechler, Gilbride, Hefty, Cole, Williamson, Love

Organization(s): PNNL, ORNL

Publication Date: September, 2010

Report providing builders in marine climates with guidance for building homes that have whole-house energy savings of 40% over the Building America benchmark with no added overall costs for consumers.

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BUILDING SCIENCE-TO-SALES TRANSLATOR

Continuous/Sealed Weather Resistant Barrier = **Wall Water Barrier**



TECHNICAL DESCRIPTION:

A water barrier and drainage plane directs water that leaks through the part of a wall exposed to the weather, to safely drain down and away from the wall. The water-resistant surface could be house wrap, rigid foam insulation that is taped or sealed at all seams, or a painted-on coating. House wrap should be lapped shingle style over any exterior wall flashings installed around openings, penetrations, or where the walls intersect roofs, foundations, or other transitions. Any holes through the wall, such as for windows, water spigots, exhaust vent outlets, HVAC condensate lines, or light fixtures and receptacles, should be carefully sealed and flashed.

Alternate Terms

- Dry-by-Design Wall Construction
- Wall Water Barrier Technology
- Professionally Installed Wall Water Barrier

Wall Water Barrier Sales Message

Wall water barriers help drain water away from above-grade walls. What this means to you is peace-of-mind knowing your home has a comprehensive set of measures that minimize the risk of water damage in your home. Wouldn't you agree every home should have full water protection?

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Ducts in Dropped Ceilings

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Scope

Install ducts in dropped ceilings or "fur-down" duct chases to keep the ducts within the home's thermal envelope.

- Install drywall at the ceiling plane before the chase is framed to form a continuous air barrier between the top of the chase and the unconditioned attic or floor cavity above.
- Install chase framing.
- Install the sealed, insulated ducts.
- Install drywall on chase sides and bottom when installing drywall in remainder of the house.

Several trades are critical to the success of this technique:

- [HVAC Designers](#) - Design a compact duct layout that does not cross load bearing walls. Use [ACCA Manual D](#) to determine the duct size needed.
- [Framers](#) - Construct any non-load bearing walls that will serve as one side of the chase with a gap of $\frac{3}{4}$ " between the top plate of the wall and the bottom chord of the attic trusses so that drywall can be installed over the top plates to form a continuous ceiling for the duct chase. Construct remaining duct chase after chase ceiling drywall is installed.
- [Drywallers](#) - Install drywall above duct chase location before framing the chase and before installing the ducting. The remaining drywall in the room will be installed after the duct and chase framing are installed.
- [Plumbers and Electricians](#) - Do not use the duct chase as a chase for electrical wiring or plumbing, and do not cut holes through the chase walls.
- [All Trades](#) - Participate in a pre-construction meeting to understand construction sequencing



The drywall above the dropped ceiling duct chase extends beyond adjoining top plates for a continuous air barrier

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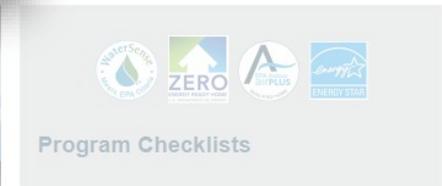
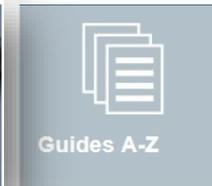
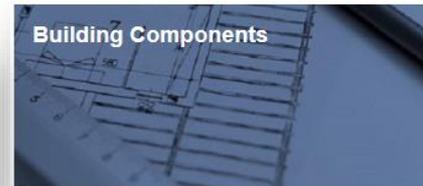
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Building Science Fundamentals



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- [Foundation wall interior rigid insulation with furring strips](#)
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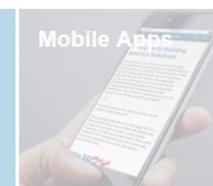
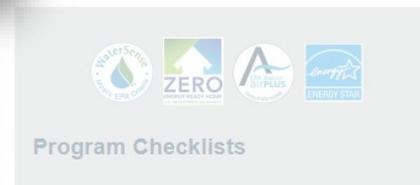
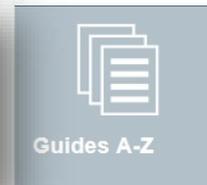
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HVAC - Ducts



Solution Center Guides

[Air Handler Closet Retrofit](#)

Guide describing repair and reconfiguration of air handler closet and platform when replacing air handler.

[Air Seal HVAC Cabinet Seams](#)

Guide describing air sealing of the seams and holes in HVAC air handler and furnace cabinets.

[Air Sealing Duct and Flue Shafts](#)

Guide describing how to air seal duct and flue shafts.

[Back-Draft Dampers at Shared Common Exhaust Duct](#)

Guide describing how to install back-draft dampers in exhaust fans to make a shared duct possible.

[Building Cavities Not Used as Supply or Return Ducts](#)

Guide describing the use of building cavities as supply or return ducts.

[Building Science Introduction - Air Flow](#)

Information guide providing background information about air flow in residential buildings.

[Compact Air Distribution](#)

Guide describing design and installation of compact duct systems for central heating and cooling systems.

[Ducts in Dropped Ceilings](#)

Guide describing method for installing ducts in a duct chase above a dropped ceiling.

[Ducts in Interstitial Floor Framing](#)

Guide for designing and installing interior ducts in an interstitial floor cavity in new and existing homes.

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TYPE

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Ducts in Dropped Ceilings

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Scope

Install ducts in dropped ceilings or "fur-down" duct chases to keep the ducts within the home's thermal envelope.

- Install drywall at the ceiling plane before the chase is framed to form a continuous air barrier between the top of the chase and the unconditioned attic or floor cavity above.
- Install chase framing.
- Install the sealed, insulated ducts.
- Install drywall on chase sides and bottom when installing drywall in remainder of the house.

Several trades are critical to the success of this technique:

- [HVAC Designers](#) - Design a compact duct layout that does not cross load bearing walls. Use [ACCA Manual D](#) to determine the duct size needed.
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- [Drywallers](#) - Install drywall above duct chase location before framing the chase and before installing the ducting. The remaining drywall in the room will be installed after the duct and chase framing are installed.
- [Plumbers and Electricians](#) - Do not use the duct chase as a chase for electrical wiring or plumbing, and do not cut holes through the chase walls.
- [All Trades](#) - Participate in a pre-construction meeting to understand construction sequencing



The drywall above the dropped ceiling duct chase extends beyond adjoining top plates for a continuous air barrier

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Program Checklists

The Building America Solution Center supports a suite of U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA) labeling programs designed to aid construction of comfortable, healthy, durable, and energy efficient homes. Click on the program logos below to find detailed guides to help you install and measure in each program's checklists.

Add guides to your Field Kit on the mobile app. Use the [Mobile Apps](#) to synchronize your field kits to your mobile devices and use them whenever and wherever you are. Visit the [Mobile App](#) page for detailed information.



The top builders in the country meet the high performance requirements of the DOE's [Zero Energy Ready Home](#). The Zero Energy Ready label shows that builders have achieved an extraordinary level of excellence. They are so efficient that with the installation of a renewable energy system, they offset all or most of their annual energy consumption. [Learn More](#) about the program.

[ENERGY STAR Certified Homes](#) are designed and built to standards well above most other homes on the market today, delivering energy efficiency savings of up to 30 percent when compared to typical new homes. A new home that has earned the ENERGY STAR label has undergone a process of inspections, testing, and verification to meet strict requirements set by the EPA, delivering better quality, better comfort, and better durability. [Learn More](#) about the program.

[Indoor airPLUS](#) helps builders meet the growing consumer preference for homes with improved indoor air quality. Indoor airPLUS builds on the foundation of EPA's ENERGY STAR requirements for new homes and provides additional construction specifications to provide comprehensive indoor air quality protections. [Learn More](#) about the program.

The U.S. Environmental Protection Agency (EPA) [WaterSense® checklist](#) provides links to technical guides that align with measures included in the EPA WaterSense New Home Specification. The numbers and titles of this checklist follow the same order and numbering of those in the EPA WaterSense Labeled New Home Inspection Checklist. [Learn More](#) about the program.

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DOE Zero Energy Ready Home



The U.S. Department of Energy (DOE) Zero Energy Ready Home is a program conducted by DOE to recognize homes that achieve exceptional levels of energy savings, comfort, health, and durability. The checklists below provide links to technical guides providing installation instructions for each measure included in the requirements. For more on eligibility, prescriptive and performance path options, and modeling of a target home to qualify via the performance path, please see the [DOE Zero Energy Ready Home National Program Requirements](#) ((Rev.06, for homes permitted on or after 7/20/2017). Visit the DOE Zero Energy Ready Home [program website](#) to learn more about training and marketing tools, to find a builder, or to become a partner. The Building America Solution Center is an ever expanding and improving technical resource for builders and installers. Visit [our website](#) for the latest guides, resources, and additional content.



▶ [Exhibit 1: Mandatory Requirements for All Labeled Homes](#)

▶ [Exhibit 2: Target Home](#)

▶ [Exhibit 3: Benchmark Home Size](#)

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Exhibit 1: Mandatory Requirements for All Labeled Homes

▶ 1.0 ENERGY STAR for Homes Baseline

▶ 2.0 Envelope

▶ 3.0 Duct System

▶ 4.0 Water Efficiency

▶ 5.0 Lighting & Appliances

▶ 6.0 Indoor Air Quality

▶ 7.0 Renewable Ready



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▶ Exhibit 2: Target Home

▶ Exhibit 3: Benchmark Home Size

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Ducts located within the home's thermal and air barrier boundary

There are several possible methods for locating the home's HVAC system within the home's thermal air barrier boundary. See the [DOE Zero Energy Ready Home National Program Requirements](#) for exceptions and alternative compliance paths.

The following Solution Center guides provide more information about these measures:

[Ducts Buried in Attic Insulation and Encapsulated](#)

This guide describes approaches to burying and encapsulating ducts in unconditioned attics to increase the overall R-value of duct insulation.

[Encapsulated Ducts](#)

Guide that illustrates how and when to encapsulate ductwork in unconditioned attics, increases the R-value of duct insulation, mitigating condensation issues and reducing air leakage.

[Ducts Buried in Attic Insulation](#)

This guide describes buried ducts in loose-fill attic insulation, a method that can only be used in dry climates.

[Unvented Attic Insulation](#)

Guide describing methods for insulating an unvented attic along the roof line.

[Unvented, Insulated Crawlspace](#)

Guide describing methods for insulating an unvented crawlspace or conditioned basement with rigid foam on the interior side of the walls to provide an insulated space for HVAC equipment.

[Application of Spray Foam Insulation in Unvented Attic and OSB Roof Sheathing](#)

Guide describing a method for insulating an unvented attic by spraying foam insulation along the underside of the roof deck.

[Ducts in Dropped Ceilings](#)

Guide describing method for installing ducts in a duct chase above a dropped ceiling.

[Ducts in Raised Ceiling Sections](#)

Guide describing method for designing and installing ducts in a raised ceiling chase.

[No Ducts or Air Handlers Located in Garage](#)

Guide describing how to design HVAC systems to be located within the conditioned space of the home, either in a utility closet or in an air sealed conditioned attic, basement, or crawl space.

[Ducts in Interstitial Floor Framing](#)

Guide for designing and installing interior ducts in an interstitial floor cavity in new and existing homes.



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Ducts in Dropped Ceilings

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Scope

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The drywall above the dropped ceiling duct chase extends beyond adjoining top plates for a continuous air barrier

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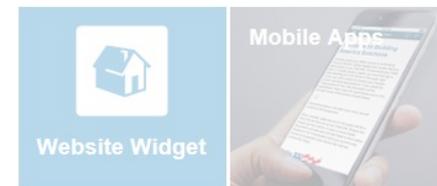
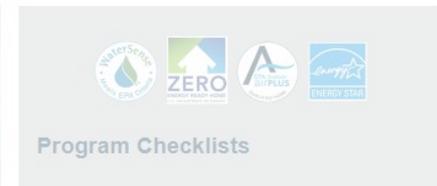
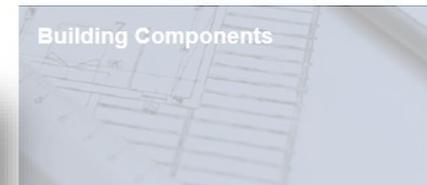
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Existing Homes Tool

Welcome to the Existing Homes tool. Here you will find installation guidance for making existing homes more energy efficient, comfortable, and less expensive to operate. The tool is designed around common upgrades. Steps are numbered to indicate priorities from a health and safety standpoint. If you are doing a comprehensive renovation you may be interested in all the listed steps. If you are doing a more limited project, such as insulating an attic, reroofing, or replacing a water heater, you may focus on just a few steps.

It is worth visiting the first section no matter what project you have in mind. Nine assessment guides are listed to help gauge whether a home is safe and sound for upgrades plus a guide to help consumers plan a series of upgrades over time. These guides may help ensure that projects (and bids and contracts) cover related upgrades and are completed in the correct sequence.

If you want to learn more about how the guides work, or about other features in the Solution Center that will help with existing homes, [click here](#).

- Step 1: Ensure Safe and Durable >
- Step 2: Ensure Fresh Air >
- Step 3: Ensure Moisture Protection >
- Step 4: Ensure Draft Free >
- Step 5: Ensure Thermal Comfort >
- Anytime: Equipment Upgrades >

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As a community driven tool, we welcome your [comments](#) on how to continuously improve the Solution Center. If you are interested in submitting content, please become a [registered user](#) and see the [criteria for submissions](#).

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-  Step 5: Ensure Thermal Comfort >
-  Anytime: Equipment Upgrades >



Step 5: Ensure Thermal Comfort

The following categories provide information about adding insulation in attics, walls, floors, and foundation to 2009 IECC or greater levels. Consult Step 1, Step 2, Step 3 and Step 4 before completing items here.

Click on the links below for detailed information about each topic in this step:

-  [Insulate Existing Attic or Roof](#) >
-  [Insulate Existing Exterior Walls](#) >
-  [Insulate Existing Foundations](#) >
-  [Insulate Existing Floors over Unconditioned Space](#) >
-  [Upgrade Windows](#) >
-  [Place HVAC Equipment and Ducts in Conditioned Space](#) >
-  [Dehumidification in Hot-Humid Climates](#) >



CURRENT PROJECT:



Home Improvement
Guides



Step 5: Ensure Thermal
Comfort

Step 5: Ensure Thermal Comfort

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-  [Insulate Existing Foundations](#) >
-  [Insulate Existing Floors over Unconditioned Space](#) >
-  [Upgrade Windows](#) >
-  [Place HVAC Equipment and Ducts in Conditioned Space](#) 
 -  Air Sealed, Insulated Basements
 -  Ducts in Dropped Ceilings
 -  Ducts in Interstitial Floor Framing
 -  Ducts in Raised Ceiling Sections
 -  No Ducts or Air Handlers Located in Garage
 -  Unvented, Insulated Crawlspace
-  [Dehumidification in Hot-Humid Climates](#) >



CURRENT PROJECT:



Home Improvement
Guides



Step 5: Ensure Thermal
Comfort

Ducts in Dropped Ceilings

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[Scope](#) [Description](#) [Success](#) [Climate](#) [Training](#) [CAD](#) [Compliance](#) **Retrofit** [More](#) [Sales](#)

This Retrofit tab provides information that helps installers apply this "new home" guide to improvement projects for existing homes. This tab is organized with headings that mirror the new home tabs, such as "Scope," "Description," "Success," etc. If there is no retrofit-specific information for a section, that heading is not included.

Additional Scope Language for Retrofit Applications

Bring air distribution system including air handling equipment and duct work into the conditioned space of the house.

- Following the design considerations outlined in the Main Body's Description Tab, layout a duct system that can be enclosed by constructing or retrofitting soffits to form ducts chases. If needed, relocate air handling equipment into home's interior or create a sealed closet around any air handling equipment installed in the garage, crawlspace or attic and connect it to the home's conditioned space.
- Lay out the duct system incorporating the chase work in dropped ceilings, soffits, and architectural features where possible.
- Pre-cut and seal any wall or ceiling penetrations necessary for constructing the chase; seal around any penetrations in the path of the chase. Repair any pre-existing damage in chase path.
- Install sealed and insulated ducts by suspending from the ceiling.
- Enclose the duct work with soffit framing.
- Install drywall, mud, and tape or otherwise finish the soffit exterior.
- For more on [duct sealing and insulating](#), see the U.S. Department of Energy's Standard Work Specifications. The Specifications also discuss [safe work practices](#).

Additional Description Language for Retrofit Applications

Attempting to retrofit ducts in a dropped ceiling is a challenging installation involving replacing or moving existing ducts and HVAC equipment out of an unconditioned attic or crawlspace and into the interior of the house. In all but the simplest floorplans this will be a difficult and most often not cost-effective retrofit. Installing a dropped ceiling or fur-down duct system in a retrofit situation is more challenging and less likely to be successful than implementing the system in new construction. The home's layout is presumably fixed, and the chase system must be made to work with the existing

CURRENT PROJECT:

-  Home Improvement Guides
-  Step 5: Ensure Thermal Comfort
-  Place HVAC Equipment and Ducts in Conditioned Space
-  **Ducts in Dropped Ceilings**

- Project map tracks existing homes tool clicks.
- User lands either on the scope tab or retrofit tab.

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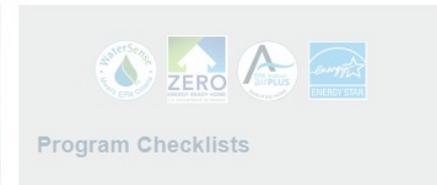
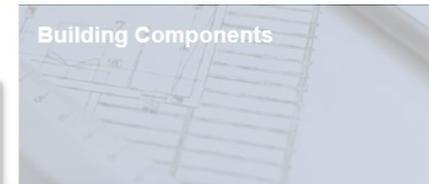
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Sales Tool

The goal of this Building Science-to-Sales Translator is to provide a new glossary of sales themes that can be used across the industry to consistently reinforce the value of high-performance homes. This includes applying this new language consistently to all consumer-facing materials used by government programs and industry alike. Use the tool below to explore sales themes that relate to each primary area of a high performance home.

Use the tool below to navigate through sales themes. When logged into your BASC account, you can create customized Sales Worksheets. You will see the MY SALES WORKSHEETS block on the upper right of your screen. Click Create Sales Worksheet to make a new customized sales list, or View My Sales Worksheets to see all saved Sales Tools. For in-depth instructions for creating sales worksheets, see [this presentation](#).

Recently Added Content

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Sales Tool - Whole-House Health Protection System

Whole-house health protection systems provide a comprehensive set of measures for controlling the most significant contaminant risks in homes. What this means to you is your family can breathe better every day knowing your home was designed and built to help manage indoor air quality. Explore the terms below to learn more about the sales themes associated with healthy homes.

Contaminant Resistant Home ▼

Contaminant resistant homes provide a comprehensive set of measures for controlling the most significant health risks where we live. What this means to you is your family can breathe better every day knowing your home was designed and built to help manage indoor air quality. Wouldn't you agree protecting health is too important to ignore in new homes?

Fresh Air System ▼

Fresh air systems help ensure adequate dilution of any indoor contaminants. What this means to you is your home is supplied with enough fresh air every day so your family can breathe better. Wouldn't you agree protecting health is too important to ignore in new homes?

Odor and Moisture Exhaust Fans ▼

Odor and moisture control fans help ensure adequate exhaust in bathrooms and kitchens. What this means to you is some of the most significant contaminants in homes are effectively removed right at their source. Wouldn't you agree protecting health is too important to ignore in new homes?

High-Capture Filtration Technology ^

High-capture filtration technology remove dangerous particles from the comfort system air stream. What this means to you is your family can breathe better every day knowing your home is equipped to help manage a critical respiratory contaminant. Wouldn't you agree protecting health is too important to ignore in new homes?

- [High Capture Filter](#)
- [Professionally-Installed Filtration](#)



The screenshot shows the 'Building America Solution Center' website. At the top, there is a navigation bar with the U.S. Department of Energy logo and 'Energy Efficiency & Renewable Energy' text, along with 'Log In' and 'Register' links. A search bar is located on the right side of the page. The main content area is titled 'BUILDING SCIENCE-TO-SALES TRANSLATOR' and features a green banner with the text 'High-MERV Filter = High Capture Filter'. Below this, there is a 'TECHNICAL DESCRIPTION' section with an image of a 'MERV 16' furnace filter. To the right of the technical description is an 'Alternate Terms' section with a bullet point for 'High-Capture Filter Technology'. At the bottom, there is a 'High Capture Filter Sales Message' box with a play button icon. Three large brown arrows point from the left side of the page to the 'Power Word Translation', 'Simple Description', and 'Sales Script' sections. A fourth large brown arrow points from the right side of the page to the 'Alternate Terms' section. A large white box at the bottom contains the text: 'This Sales guidance available on both the guide "Sales" tab and in the Sales Tool'.

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User information

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Spaces are allowed; punctuation is not allowed except for periods, hyphens, apostrophes, and underscores.

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Work Experience

Profession *

Construction Type *

New Homes
Existing Homes

Location

State *

Alaska
Arizona
Arkansas

Climate Zone *

Zone 1
Zone 2
Zone 3

- The following slides will illustrate how to:
 - Develop guidance/training materials for field crews
 - Develop construction documents
 - Use content to prepare presentations
 - Create sales materials
 - Develop guidance for company decision makers
 - Use content to create code official agreements



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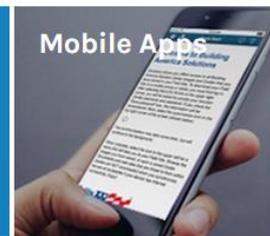
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[Advanced Framing vs Traditional Framing](#)
Video Posted: March, 2018

[Condensing HVAC has Corrosion-Resistant Condensate Drain Pan](#)
Guide Posted: March, 2018

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Ducted Returns

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Scope

Provide for pressure balancing between bedrooms and the rest of the house.

- Install ducted returns or a combination of ducted returns, transfer grilles, jump ducts, and/or door undercuts in bedrooms to allow pressure balancing between bedrooms and the rest of the house in homes with ducted heating and cooling systems by providing a path for room air to return to the central air handler, thereby increasing the volume of conditioned air circulating in the room.
- Do not use building cavities alone for return air pathways. Return pathways should be ducted from the return grille to the return plenum of the central air handler. The return ducts should be sealed with mastic or metal tape at all seams and joints.
- ENERGY STAR Certified Homes requires that the dedicated return ducts, transfer grilles, jump ducts, and/or door undercuts together achieve a rater-measured pressure differential of ≤ 3 Pascals (0.012 inch water column) with respect to the main body of the house when bedroom doors are closed and the air handler is operating on the highest design fan speed. A rater-measured pressure differential of ≤ 5 Pascals (0.020 inch water column) is acceptable for rooms with a design airflow ≥ 150 cfm.
- Refer to the balancing report provided by the HVAC contractor for the bedroom air flows to size the return ducts. If a balancing report was not provided, the flow of the supply register when the air handler is on high speed may need to be measured using a flow hood, anemometer, or other flow measurement tool.
- Test the pressure differential with the bedroom doors closed.



A ducted central return brings air from central return registers back to the air handler through insulated, air-sealed ducts

See the Compliance Tab for related codes and standards requirements, and criteria to meet national programs such as DOE's Zero Energy Ready Home program, ENERGY STAR Certified Homes, and Indoor airPLUS.

Last Updated: 03/13/2018

San Francisco Zero Energy Ready Home Project #1

Guides



[Cantilevered Floor](#)

Guide describing how to air seal and insulate a cantilevered floor.



[Step and Kick-Out Flashing at Roof-Wall Intersections](#)

Guide describing how to install step and kick-out flashing on roofs.



[Double Walls](#)

This guide describes air barrier and insulation installation, along with air sealing for double walls - h design as an architectural feature that provides a more dimensional appearance.



[Roof Deck Valleys and Penetrations Sealed](#)

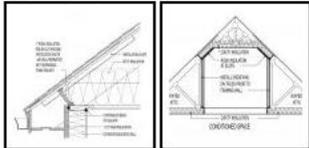
Guide describing how to apply heavy membranes at valley/roof deck penetrations in wet climates to roofing.



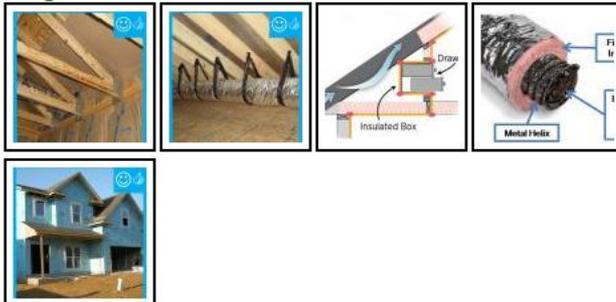
[Bathroom Fan Ratings](#)

Guide describing the bathroom exhaust fan ENERGY STAR rating requirements.

CAD Files



Images



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gh walls.

for a future solar photovoltaic

The screenshot shows the Building America Solution Center website. The header includes the U.S. Department of Energy logo and the text "Energy Efficiency & Renewable Energy". Below the header, the page title is "Building America Solution Center". A navigation menu on the left includes "Menu", "Solution Center Home", "Help", "FIND PROGRAMS & GUIDES", "Building Components", "Guides A-Z" (highlighted with a red box), "Existing Homes", "DOE Zero Energy Ready Home", "ENERGY STAR Certified Homes", "EPA Indoor airPLUS", "EPA WaterSense®", "FIND RESOURCES", "Sales Tool", "Code Briefs" (highlighted with a red box), "Case Studies", "Image Gallery" (highlighted with a red box), "Videos", "CAD Files", "Optimized Climate Solutions", "FIND PUBLICATIONS & RESEARCH", and "Library". The main content area is titled "Image Gallery" and features a grid of 20 thumbnail images representing various building components and systems, such as HVAC units, insulation, and construction techniques. A "Items per page" dropdown is set to "100" with an "Apply" button.

Build presentations, training materials and construction documentation using BASC Content Browsers:

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Construction Documents: Image Gallery

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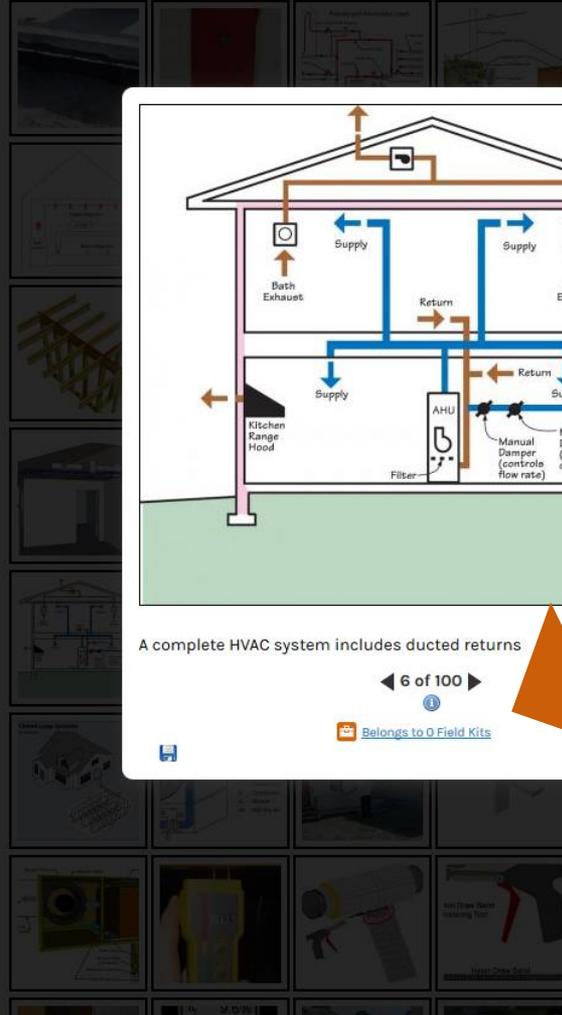
Building Science Fundamentals

Image Gallery

Items per page

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A complete HVAC system includes ducted returns

◀ 6 of 100 ▶

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1\" RIGID INSULATION
ROUGH CUT AROUND
VENTILATION CHUTE
- AIR SEAL PERIMETER
WITH EXPANDING
FOAM SEALANT

VENTILATION CHUTE

ATTIC INSULATION

CONTINUOUS BEAD
OF SEALANT

1 1/2\" RIGID INSULATION

EXTERIOR INSULATED WALL

1 inch rigid insulation as attic eave baffle cut around manufactured vent

◀ 2 of 50 ▶

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FILTER BY CLIMATE ZONE:

Blown Insulation for Existing Vented Attic

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Scope Description Success Climate Training CAD Compliance More Sales

Scope

Insulate a vented attic in an existing home by installing blown insulation on the ceiling deck of the attic, as follows:



- Before any retrofit work is done, inspect the roof and attic; repair any leaks, remove active knob and tube wiring, and remediate any hazardous materials.
- If existing bath fans vent into the attic, they must be vented to the outside.
- Remove any existing insulation, debris and dust, and prepare the attic floor for air sealing and loose-fill fibrous insulation.
- Seal all attic floor penetrations with sealant, one-part spray foam, or rigid blocking material as needed.
- Verify that proper ventilation of the attic is provided with soffit vents (preferred) or gable and ridge vents. Verify that there is a baffle at each soffit vent extending from the top plate to above the height of the insulation to provide a pathway for ventilation air while keeping insulation out of the soffit vents.
- Install blown loose-fill insulation over the attic floor to levels that meet or exceed the current adopted building and energy codes.

This approach is suitable for projects with a vented attic where the thermal boundary is established at the attic floor/ceiling plane. This approach requires that there be sufficient height between the underside of the roof deck and the top plate at the eave to install the full code-required amount of insulation while maintaining an air gap for ventilation above the insulation. Installing HVAC ducts and air handlers in vented attics is not recommended.

Last Updated: 11/30/2015

Use BASC guides to develop a scope of work for a subcontractor.



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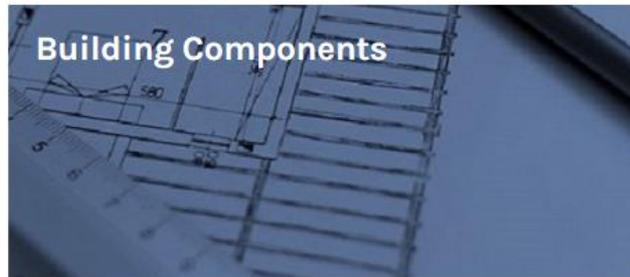
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Building America Sales Tool

Ultra Efficient List

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Click on the links below

Create customized fact sheets based on ZERH value propositions:

- Advanced Technology
- Engineered Comfort
- Enhanced Durability
- Healthful Environment
- Quality Built
- Ultra Efficient





The U.S. Department of Energy's (DOE) Building America program has been a source of [innovations](#) in residential building energy performance, durability, quality, affordability, and comfort for 20 years. This world-class research program partners with industry (including many of the top U.S. home builders) to bring cutting-edge innovations and resources to market.

BUILDING AMERICA: BUILDING AMERICA LIST NUMBER 2



Certified Low/No VOC Finishes

Certified low/no VOC finishes help control one of the most significant health risks where we live. What this means to you is your family can breathe better every day knowing your home was built to help manage a critical respiratory contaminant. Wouldn't you agree protecting health is too important to ignore in new homes?



Comfort Vent

Comfort vents at each bedroom ensure a continuous flow of heating and cooling even when the doors are closed. What this means to you is that you will not have to compromise comfort for bedroom privacy. Wouldn't you agree bedroom doors shouldn't have to be kept open to maintain comfort?



Earthquake Resistant Home

Earthquake resistant homes are designed and constructed to provide enhanced protection from locally prevalent seismic activity. What this means to you is better protection from harm and damage due to one of the most likely acts of mother nature in your location. Wouldn't you agree it's important to protect your family's safety and financial investment in a home?

- Access all Sales Tool messages and build your own customized worksheets
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Sales Binder: Zero Energy Ready Home Project Specs

Sales Messages

[High-R Window](#)



High-efficiency ENERGY STAR-rated windows perform at least 15% better than a standard window. Ultra-efficient windows perform at least 50% better. On average, high-efficiency windows save homeowners 7% to 15% on utility bills. These windows use a combination of insulating frames and other features to reduce heat loss. They consist of two or three glass panes separated by insulating spacers. The space between the glass layers is filled with a nontoxic gas like argon or krypton that insulates better than air and the glass panes are coated with a nearly invisible low-emissivity coating that reflects heat to keep warm air in during the winter and hot sun out in summer. The coatings also help to block ultraviolet rays, minimizing fading of curtains and furniture.



[High-R Insulation](#)



High-performance insulation systems include properly installed insulation in amounts that meets or exceeds the insulation levels required by the 2012 International Energy Conservation Code (IECC), which is ~15% more efficient than the 2009 IECC. Ultra-efficient insulation levels exceed the 2009 IECC levels by 50% or more. By using high-efficiency and ultra-efficient insulation, that is carefully installed to avoid gaps and compression, home builders create well-insulated conditioned spaces that require very little effort to heat and cool, provide even comfort throughout the house, and help occupants reduce costs.



[Fully Aligned Air Barriers](#)



A whole-house draft barrier is a continuously connected layer of solid or air-tight materials that block air leaks. This barrier can also function as part of a water barrier, thermal barrier, and vapor barrier, if the location and materials are compatible. For example, rigid foam insulation can provide a combined function. Rigid foam sheets can be used to block air flow when seams are sealed with tape, caulks or adhesives, or liquid applied sealants. An example of an interior air barrier may be the drywall on the home's walls and ceilings, when the seams are taped and mudded, and caulk, spray foam, or gaskets are used to seal around wiring, plumbing, and other penetrations. Insulation should be in full contact with the air barrier layer.

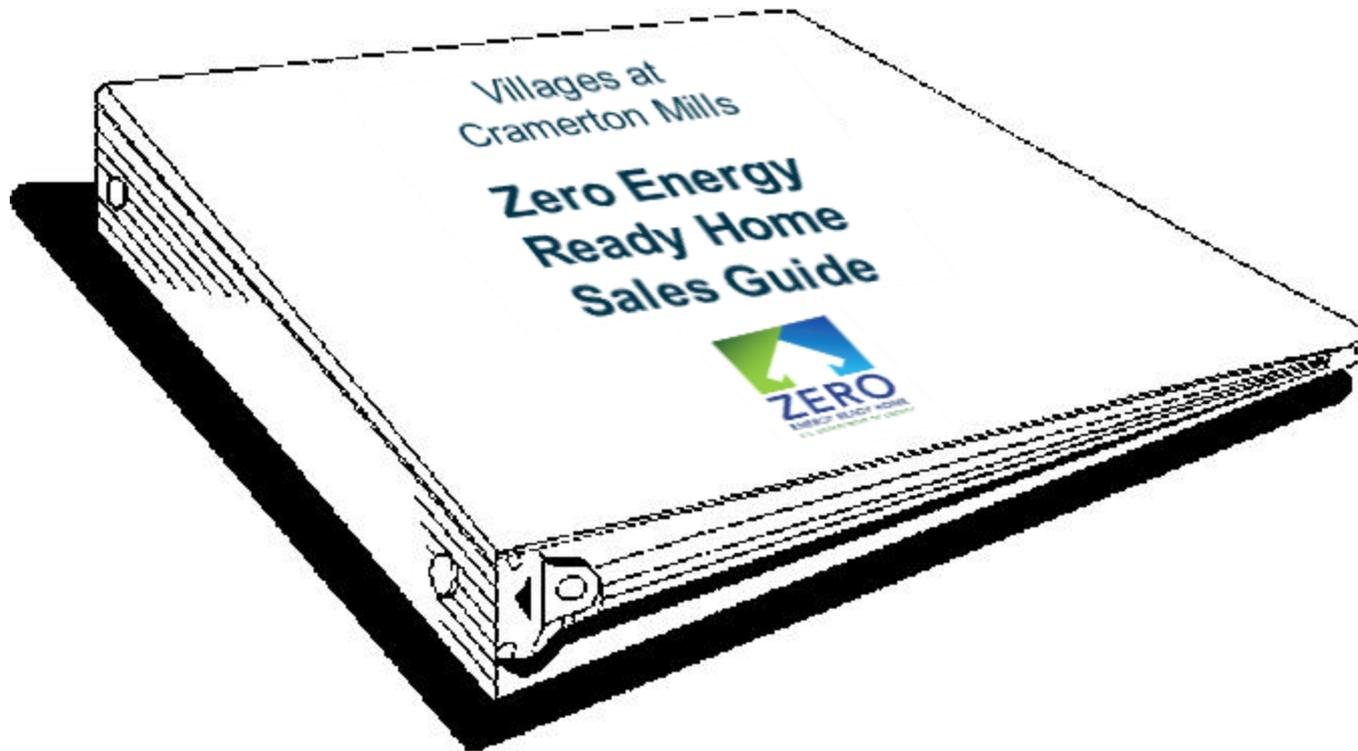


[Exterior Insulation Sheathing](#)



A continuous thermal blanket of rigid foam can be installed on the exterior of the walls, either over the plywood or OSB sheathing or in place of the wood sheathing. Adding sheets of rigid foam insulation to the outside of wall framing has many advantages. The rigid foam covers the entire surface of the wall or roof, which blocks the transfer of heat through the studs. When only cavity insulation is used, the studs form a bridge that heat can follow between inside the house and the exterior. As a form of insulation, rigid foam is a great addition to the thermal barrier, but it can also help block air leaks, water leaks, and vapor leaks.





Guidance for Decision Makers: BASC Library

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VOLUME 14
HVAC Energy Renovations
A Guide for Contractors to Share with Homeowners
PREPARED BY
Pacific Northwest National Laboratory & Oak Ridge National Laboratory
August 2011

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BEST PRACTICES SERIES
HOUSE ENERGY
Cold and Hot

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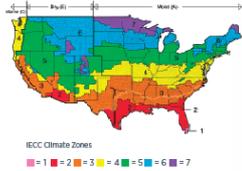
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Guidance for Decision Makers: BASC Climate Packages



Climate Zone Maps

Map of Building America climate regions (top) for program reporting and IECC climate zones (bottom) as a reference for compliance information



BUILDING TECHNOLOGIES OFFICE

2

BUILDING AMERICA'S OPTIMIZED SOLUTIONS FOR NEW HOMES: COLD CLIMATE

DOE's Building America Solution Center

Decades of research in energy efficient design have led to the Building America Solution Center. Builders and contractors are encouraged to use this resource to improve the durability and performance of energy efficiency options listed in Table 1.



The Building America Solution Center provides access to expert information on hundreds of high-performance construction topics, including air sealing and insulation, HVAC components, windows, indoor air quality, and much more.

Users can navigate the Solution Center in one of four ways:

- Building components
- Labeling program checklists
- Alphabetically
- By publications

Registered users can also save customized content in their own field-kits!

Find what you are looking for on the Building America Solution Center website: basc.energy.gov

Table 1. Optimized Solution: Cold Climate

Measure	Performance	Options
THERMAL ENCLOSURE		
High-R Ceiling	R-49	<ul style="list-style-type: none"> • Unvented Attics <ul style="list-style-type: none"> - Spray Foam Underside Roof - Spray Foam + Permeable Insulation - Exterior Rigid Insulation Over Sheathing - SIP Roof • Vented Attics <ul style="list-style-type: none"> - Blow-in or Batt Insulation
High-R Walls	R-20 Cavity and R-10 Continuous	<ul style="list-style-type: none"> • Single-Wall Cavity Insulation with Advanced Framing <ul style="list-style-type: none"> - Spray Foam + Permeable Insulation - Exterior Rigid Insulation • Double-Wall Cavity Insulation <ul style="list-style-type: none"> - SIP Walls - Insulated Concrete Walls
Basement Foundation	R-15 Continuous or R-19 Cavity	<ul style="list-style-type: none"> • Exterior Rigid Foundation Insulation • Interior Foundation Insulation <ul style="list-style-type: none"> - Rigid Insulation plus Batt - Cavity with Batt or Blow-in - Shallow Frost-Protected Foundation
High-R Window	U≤0.27 (R≥3.7) SHGC≤0.46	<ul style="list-style-type: none"> • ENERGY STAR® Certified Window • Ideally R-5 Window
Air Tightness	ACH50±2	<ul style="list-style-type: none"> • Air Sealing • Air Barriers
HVAC SYSTEM		
Heating Equipment	94% AFUE (Gas), or 10 HSPF (Electric)	<ul style="list-style-type: none"> • Direct Vent Gas Furnace • Air-Source Heat Pump • Geothermal Heat Pump • Ductless Mini-Split Heat Pump
Cooling Equipment	13 SEER	<ul style="list-style-type: none"> • Air-Source Heat Pump/Air Conditioner • Geothermal Heat Pump • Ductless Mini-Split Heat Pump
Duct Location	Conditioned Space	<ul style="list-style-type: none"> • Raised Ceiling • Dropped Ceiling • Buried and Encapsulated Ducts
Whole-House Ventilation	ASHRAE 62.2 5 cm/W and 70% Heat Recovery	<ul style="list-style-type: none"> • Exhaust-Only Ventilation • Supply-Only Ventilation • Balanced Ventilation
ENERGY EFFICIENT COMPONENTS		
Water Heating	EF 0.8	<ul style="list-style-type: none"> • Gas Tankless • Heat Pump Water Heater • Solar
Lighting	ENERGY STAR	<ul style="list-style-type: none"> • Compact Fluorescent Light (CFL) • Light-Emitting Diode (LED)
Appliances	ENERGY STAR	
Exhaust Fans	ENERGY STAR	<ul style="list-style-type: none"> • Individual Room • Central Exhaust
Ceiling Fans	ENERGY STAR	

Abbreviations: Solar Heat Gain Coefficient (SHGC), Annual Fuel Utilization Efficiency (AFUE), Heating Seasonal Performance Factor (HSPF), Air Changes Per Hour (ACH50), Seasonal Energy Efficiency Ratio (SEER), and Energy Factor (EF).

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Help decision makers understand technical requirements and energy savings to meet ZERH certification

Foundation wall interior rigid insulation with furring strips
CAD File Posted: November, 2017



As a community driven tool, we welcome your [comments](#) on how to continuously improve the Solution Center. If you are interested in submitting content, please become a [registered user](#) and see the [criteria for submissions](#).

BASC Climate Packages

Cold/Very Cold

This Building America Optimized Solution describes a set of building practices necessary to achieve the next step in energy performance for new homes (approximately 30% energy savings above the [B10 Benchmark](#) - roughly consistent with the 2009 International Energy Conservation Code). This package of measures meets and exceeds DOE's [Zero Energy Ready Home \(ZERH\)](#) program requirements and was selected for its performance in the following areas:

- Energy Savings
- Affordability
- Buildability
- Durability
- Healthy Indoor Environment

The high performance builders profiled in the **case studies found below** the interactive box show just a few examples of the hundreds of ways a builder can meet the premium levels of energy savings Building America strives for, while qualifying for the ZERH. Print the [Optimized Solution for the Cold Climate](#).

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Measure	Performance	Options
Water Heating	EF 0.8	<ul style="list-style-type: none"> • Gas Tankless • Heat Pump Water Heater • Solar <ul style="list-style-type: none"> • Solar Plumbing and Wiring Chase • Architectural Drawings • Utility Room Space • Mounting Surface for Pumps • Solar Thermal Bypass Valve • Hot Water Distribution <ul style="list-style-type: none"> • Core Plumbing • Demand Plumbing
Lighting	ENERGY STAR	<ul style="list-style-type: none"> • High Efficacy Lighting <ul style="list-style-type: none"> • Compact Florescent (CFL) • Light Emitting Diode (LED)
Appliances	ENERGY STAR	<ul style="list-style-type: none"> • Clothes Washer • Clothes Dryer Venting • Dishwasher • Refrigerator
Exhaust Fans	ENERGY STAR	<ul style="list-style-type: none"> • Individual Room <ul style="list-style-type: none"> • Kitchen Exhaust • Bathroom Exhaust • Central Exhaust
Ceiling Fans	ENERGY STAR	<ul style="list-style-type: none"> • ENERGY STAR Ceiling Fans

AC System | Efficient Components

Options

- Direct Vent Gas Furnace
- Gas-Fired Boilers
- Air-Source Heat Pump
- Geothermal Heat Pump
- Ductless Mini-Split Heat Pump

- Air-Source Heat Pump/Air Conditioner
- Geothermal Heat Pump
- Ductless Mini-Split Heat Pump

- Exhaust-Only Ventilation
- Supply-Only Ventilation
- Balanced Ventilation

[iders, Old Greenwich, Connecticut](#) (1 MB)

eenwich CT, that scored HERS 42 without PV or med framed walls with R-24 blown cellulose plus R-7.5 y foamed attic, R-13 closed-cell spray foam under the forced air and radiant floor heat.

[ons, Inc., Devens, Massachusetts](#)

s MA that scored HERS 34 without PV or HERS -21 d walls, a vented attic with R-67 blown cellulose, plus

AC System | Efficient Components

Options

- Unvented Attics
 - Spray Foam on Underside of Roof
 - Spray Foam and Permeable Insulation
 - Above Deck Rigid Insulation
 - SIP Roof
- Vented Attic
 - Blown-in Insulation
 - Batt Insulation

- Advanced Framing
 - Insulated Corners
 - Insulated Headers
 - Insulated Interior/Exterior Wall Intersections
- Single-Wall Cavity Insulation
 - Spray Foam
 - Spray Foam and Permeable Insulation
 - Exterior Rigid Insulation
- Double-Wall Cavity Insulation
 - SIP Walls
- Insulated Concrete Walls

- Water Managed Foundation
- Exterior Rigid Foundation Insulation
- Interior Foundation Insulation
 - Rigid Foam Board Insulation

AC System | Efficient Components

Options

- Average New Home (IECC 2009)
- EnergyStar V3
- Zero Energy Ready Home
- Building America's Optimized Solution for New Homes

[Old Greenwich, Connecticut](#) (1 MB)

h CT, that scored HERS 42 without PV or med walls with R-24 blown cellulose plus R-7.5 ed attic, R-13 closed-cell spray foam under the air and radiant floor heat.

[s, Devens, Massachusetts](#)

st scored HERS 34 without PV or HERS -21 a vented attic with R-67 blown cellulose, plus ssement walls, triple-pane windows, and mini-

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Code Briefs

The intent of Building America's Code Compliance Briefs are to provide code-related information about Building America's research, best practices, and new innovations to help ensure that the measures will be accepted as being in compliance with the code. Providing notes for code officials on how to plan review and conduct field inspections can help builders or remodelers with proposed designs and provide jurisdictional officials with information for acceptance. Providing the same information to all interested parties (e.g., code officials, builders, designers, etc.) is expected to result in increased compliance and fewer innovations being questioned at the time of plan review and/or field inspection.

[Air Sealing and Insulating Attic Knee Walls - Code Compliance Brief](#)

Air sealing and insulating attic knee walls to code.

[Air Sealing and Insulating Common Walls \(Party Walls\) in Multi-Family Buildings - Code Compliance Brief](#)

Publication Date: May, 2016

The intent of this brief is to provide code-specific information about air sealing and insulating common walls in multi-family buildings to help ensure that the measures will be accepted as being in compliance with the code. Providing the same information to all interested parties (e.g., code officials, builders, designers, etc.) is expected to result in increased compliance and fewer innovations being questioned at the time of plan review and/or field inspection.

[Air Sealing and Insulating Garage Walls - Code Compliance Brief](#)

This brief provides an overview of the 2009 through 2015 IRC/IECC code requirements related to air sealing and insulating attached garage walls.

[Bathroom Fan Ratings - Code Compliance Brief](#)

If the bathroom fan is part of the whole-house mechanical ventilation system (WHMV), there are code provisions that should be verified during plan review and field inspection depending upon codes enforced in your jurisdiction.

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Create Code Official Agreements with BASC Code Briefs

- **Help create code official agreements using Code Briefs:**
- **Address Code Barriers** (e.g., installation of advanced technologies)
- **Detailed References** (e.g., research findings and codes and tips for plan review and field inspections)
- **Consistent Expectations** increase compliance and fewer innovations being questioned.
- **Technical Validation** critical for code officials to accept innovations.

Buried Ducts in Vented Attics in Hot-humid and Mixed-humid Climate Zones - Code Compliance Brief

Overview:
The intent of this brief is to provide code-related information about buried ducts in vented attics to help ensure that the measure will be accepted as being in compliance with the code. Providing notes for code officials on how to plan review and conduct field inspections can help provide jurisdictional officials with information for acceptance. Providing the same information to all builders, designers, and others is expected to result in increased compliance and fewer innovations being questioned at the time of plan review and/or field inspection.

Ducts buried in the insulation of vented attics in hot-humid and mixed-humid climates are not addressed in the International Energy Conservation Code (IECC) or International Residential Code (IRC). This measure is an identified code barrier because it is not discouraged or encouraged by the recent model codes (IECC/IRC). This measure has been researched (successfully installed, tested, and monitored) and found to be nearly as effective as requiring that ducts be installed in conditioned spaces (inside the building thermal envelope^[1] or inside the air barrier). This alternative method is endorsed by Building America has been submitted to the International Code Council (ICC) as a proposed code change for the 2018 IECC/IRC code cycle. The "measure/alternative method" of the study was based on R-8 duct insulation. The proposed code changes require a higher level of duct insulation in hot and mixed-humid climates.

Buried ducts in vented attics, provide a cost-effective, energy-efficient alternative solution to installing ducts inside conditioned space. This is particularly useful for avoiding challenges resulting from many house configurations, including single-story, slab-on-grade, and two-story houses with complicated framing or open floor plans. Adapting house designs with standard interior ducts may require the addition of duct chases, dropped ceilings, soffits, or floors.

Publication Date: May, 2016

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Buried Ducts in Vented Attics in Hot-humid and Mixed-humid Climate Zones - Code Compliance Brief
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Continuous Insulation - Cladding/Furring Attachment - Code Compliance Brief
Guidance is needed for code-compliant installations of various cladding materials when installed over thicker foam sheathing also known as insulated sheathing or continuous insulation (c.i.).

Controlling Moisture in Unvented Attics - Code Compliance Brief
Publication Date: May, 2017

The intent of this brief is to provide code-related information about controlling moisture in unvented attics by installing a vapor diffusion port/vent that would convey water vapor from an unvented attic to the outside when air-permeable insulation

BASC Mobile App



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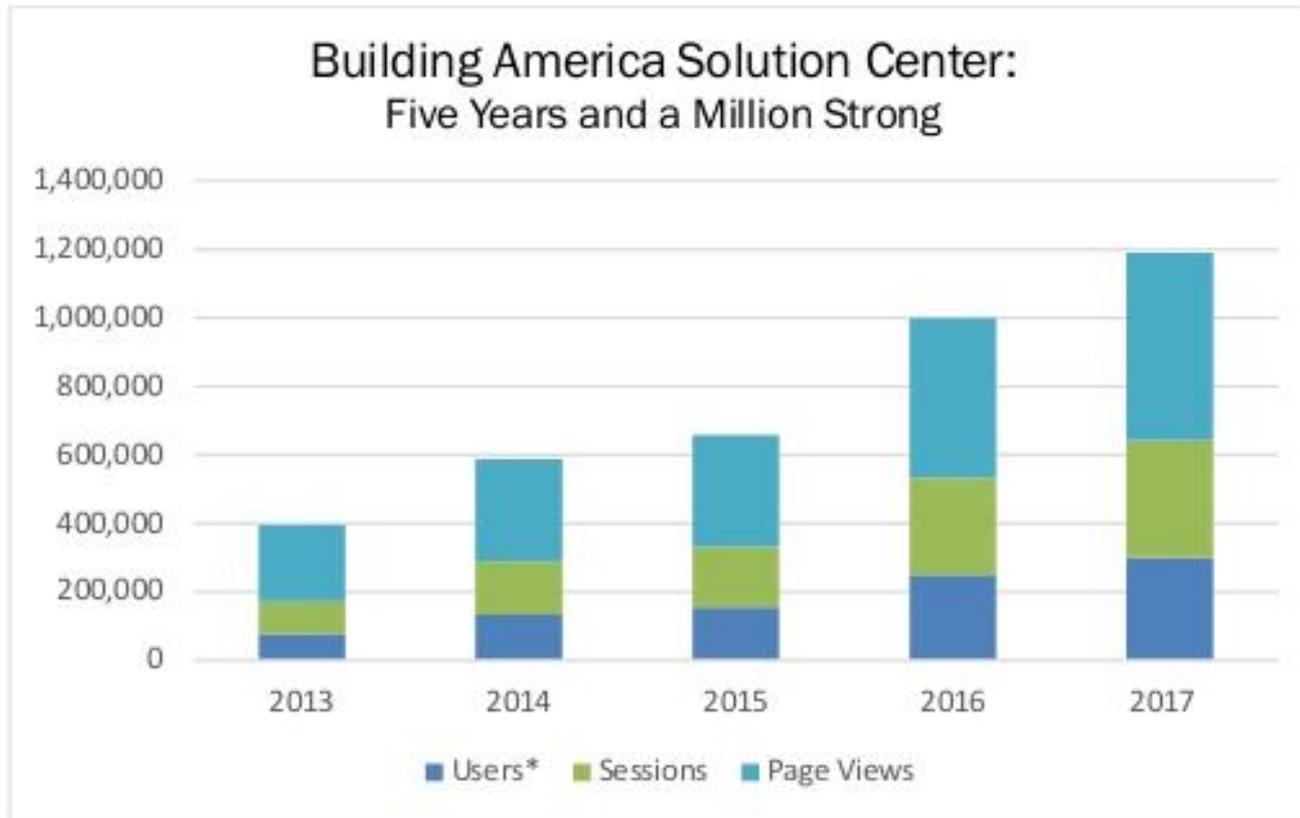
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Thank you!

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