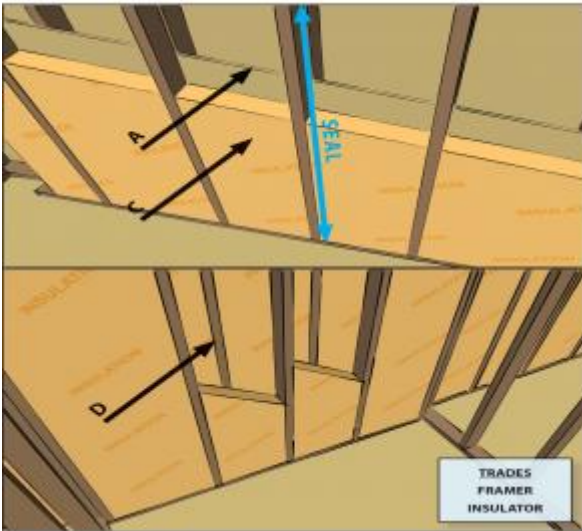


# Double Walls

Last Updated: 08/15/2013

## Scope



## Fully Aligned Air Barriers

- A. Install a continuous air barrier on the exterior of the interior wall.
- B. Seal all seams, gaps, and holes of the air barrier with caulk or foam.
- C. Install insulation without misalignments, compressions, gaps, or voids.

OR

- D. Completely fill entire cavity of the double wall assembly without misalignments, compressions, gaps, or voids.

### ENERGY STAR Notes:

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. ENERGY STAR recommends, but does not require, rigid air barriers. Open-cell or closed-cell foam shall have a finished thickness  $\geq 5.5$  inches or 1.5 inches, 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  $\geq 1$  inch in diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be  $\geq 6$  mil.

ENERGY STAR highly recommends, but does not require, inclusion of an interior air barrier at band joists in [Climate Zone 4 through 8](#).

All insulated vertical surfaces are considered walls (e.g., above and below grade exterior walls, knee walls) and must meet the air barrier requirements for walls, with the exception of adiabatic walls in multifamily dwellings. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings.

## Description

The double walls described here are half or full walls included in a home design as an architectural feature that provides a more dimensional appearance. This is not the same as the double-wall construction technique used to provide deeper wall cavities for more insulation on all of the exterior walls of a home. That technique is described in [Double Wall Framing](#).

The important thing to keep in mind about a double wall used as an architectural feature is that if it is located on the exterior wall of a home, it is part of the home's thermal envelope. So, the wall must be insulated to at least the level of the home's other exterior walls, and the insulation in the wall must be aligned with and enclosed by air barriers on all six sides.


There are three ways to insulate a double wall and achieve a fully aligned air barrier:

1. Fill the entire cavity with blown insulation,
2. Separate the interior cavity from the exterior cavity and fill the interior cavity, or
3. Insulate with spray foam.

These three ways are described in the steps below. The insulation and fully aligned air barrier for an accent double wall may be installed by insulators, framers, or drywallers. This task should be included in the contract for the appropriate trade, depending on the workflow at the specific job site.


## How to Air Seal and Insulate a Double Wall Using Blown-In Insulation

1. Frame the exterior wall using the same stud framing as the rest of the exterior wall, preferably 2x6, 24-inch on-center. See [Minimum Wall Studs](#). Sheathe with the same exterior sheathing as is used on the rest of the exterior walls.
2. Install a second section of framing to the inside of the exterior wall framing, where the thicker wall is desired, using 2x4 or 2x6, 24-inch on-center framing.
3. Tack netting to the interior face of the interior wall studs and blow in loose fiberglass or cellulose insulation when the rest of the walls are insulated. Ensure that the wall is completely filled to the proper density to minimize settling.
4. Drywall when the rest of the walls are drywalled. Caulk the drywall to the framing at the top plate, bottom plate, and studs. Mud and tape seams and corners. The interior drywall and exterior sheathing serve as the interior and exterior air barriers.

**Figure 1** - Blown-in insulation fills the double-stud cavity. The mudded, taped, and caulked drywall and the taped rigid foam exterior sheathing serve as the interior and exterior air barriers. 


## How to Air Seal and Insulate a Double Wall Using Batt Insulation

1. Frame the exterior wall using the same stud framing as the rest of the exterior wall, preferably 2x6, 24-inch on-center. See [Minimum Wall Studs](#). Sheathe with the same sheathing as is used on the rest of the exterior walls.
2. Install an air barrier over the studs on the section of wall that will be double framed. This air barrier can consist of drywall, OSB, plywood, or rigid foam. The use of polyethylene or any other material that is a Class 1 vapor barrier is not recommended.
3. Caulk along the front side of the air barrier at all four edges.
4. Install the second wall framing, using 2x4 or 2x6, 24-inch on-center framing. Push the second framing members against the caulk to seal the framing to the air barrier along all four sides.
5. Fill the interior wall cavity with batt insulation to the R-value required for exterior walls in your climate zone.
6. Drywall when the rest of the walls are drywalled. Caulk the drywall to the framing at the top plate, bottom plate, and studs. Mud and tape seams and corners. The interior drywall and exterior sheathing serve as the interior and exterior air barriers.

**Figure 2** - OSB is sealed with caulk to the exterior side of interior wall studs to serve as an exterior barrier for the batt insulation which is installed to align with the drywall which serves as the wall's interior air barrier. 

## How to Air Seal and Insulate a Double Wall Using Spray Foam Insulation

1. Frame the exterior wall using the same stud framing as the rest of the exterior wall, preferably 2x6, 24-inch on-center (see [Minimum Wall Studs](#)). Sheathe with the same sheathing as is used on the rest of the exterior walls.
2. Install the second wall framing, using 2x4 or 2x6, 24-inch on-center framing.
3. Fill the double-stud wall cavity with spray foam along inside of exterior sheathing to the desired depth.
4. Drywall when the rest of the walls are drywalled. The foam does not need to touch the interior drywall, because the foam serves as its own air barrier. The exterior sheathing serves as the exterior air barrier.

**Figure 3** - Spray foam insulates and air seals this double wall. The spray foam serves as an air barrier as well so it does not need to be touching the interior drywall. 

## Ensuring Success

The site supervisor should visually inspect the exterior wall to confirm that insulation has been fully aligned with the air barrier. Blower door testing used in conjunction with an infrared camera may help indicate areas of thermal bypass or lack of alignment between insulation and air barrier layers in walls after drywall is installed.

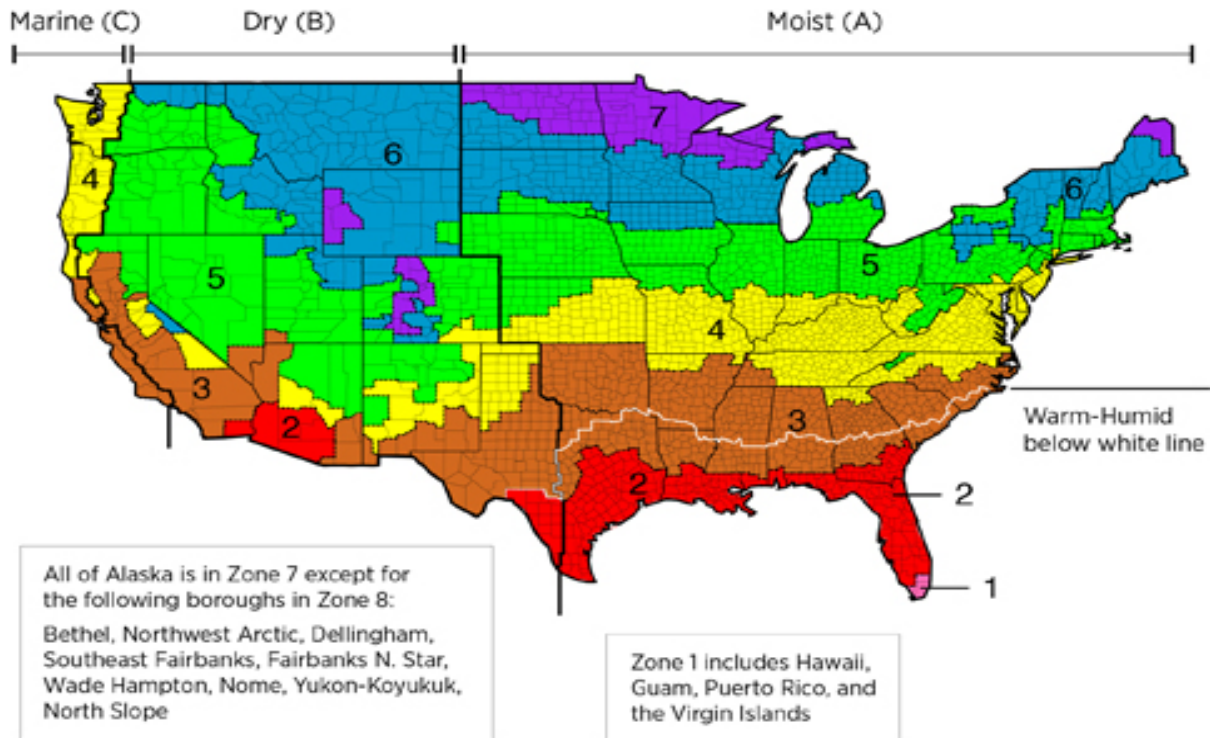
# Climate

## ENERGY STAR Version 3, (Rev. 07)

Thermal Enclosure Checklist, Fully-Aligned Air Barriers. A complete air barrier that is fully aligned with insulation is to be provided at exterior surface of walls in all climate zones and at interior surface of walls for Climate Zones 4-8.

## DOE Zero Energy Ready Home

Exhibit 2: DOE Zero Energy Ready Home Target Home. Certified under ENERGY STAR Qualified Homes Version 3. Infiltration (ACH50): Zones 1-2: 3; Zones 3-4: 2.5; Zones 5-7: 2; Zone 8: 1.5. Envelope leakage shall be determined by an approved verifier using a RESNET-approved testing protocol.



International Energy Conservation Code (IECC) Climate Regions

# Training

## Right and Wrong Images



Display Image: [ES TESRC 3.1.7 PG68 79b 102811.jpg](#)

Reference: [Thermal Enclosure System Rater Checklist Guidebook](#)

Author(s): EPA

Organization(s): EPA

*Guide describing details that serve as a visual reference for each of the line items in the Thermal Enclosure System Rater Checklist.*



Display Image: [ES TESRC 3.1.7 PG68 80c 102811.jpg](#)

Reference: [Thermal Enclosure System Rater Checklist Guidebook](#)

Author(s): EPA

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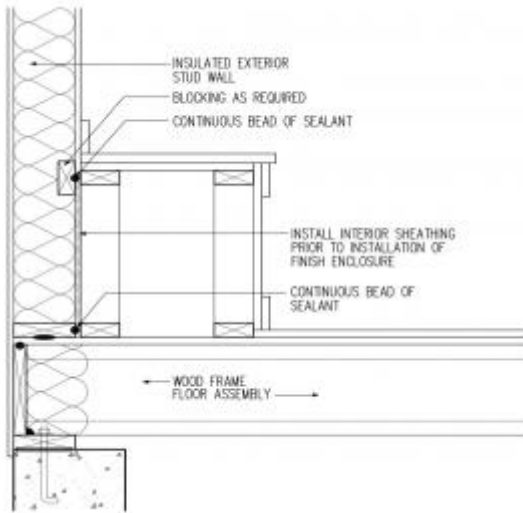
Reference: [Thermal Enclosure System Rater Checklist Guidebook](#)

Author(s): EPA

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*Guide describing details that serve as a visual reference for each of the line items in the Thermal Enclosure System Rater Checklist.*

## CAD



**CAD FILE:** [317 CAD 2-8 Air seal double walls 5-02043 GBA 1-31-12.dwg](#)

**PDF:** [317 CAD 2-8 Air seal double walls 5-02043 GBA 1-31-12.pdf](#)

**Reference:** [Building Plans for Advanced Framing](#)

**Author(s):** Green Building Advisor

**Organization(s):** Green Building Advisor

*Website providing CAD files and drawings of advanced framing details.*



# Compliance

## [ENERGY STAR Version 3, \(Rev. 07\)](#)

Thermal Enclosure Checklist, Fully-Aligned Air Barriers. A complete air barrier shall be provided that is fully aligned with the insulation at exterior surface of walls in all climate zones; and also at interior surface of walls for Climate Zones 4-8. All insulated vertical surfaces are considered walls (e.g., above and below grade exterior walls, knee walls) and must meet the air barrier requirements for walls, with the exception of adiabatic walls in multifamily dwellings.

## [DOE Zero Energy Ready Home](#)

Exhibit 2: DOE Zero Energy Ready Home Target Home. Certified under ENERGY STAR Qualified Homes Version 3. Infiltration (ACH50): Zones 1-2: 3; Zones 3-4: 2.5; Zones 5-7: 2; Zone 8: 1.5. Envelope leakage shall be determined by an approved verifier using a RESNET-approved testing protocol. Building envelope assemblies, including exterior walls and unvented attic assemblies (where used), shall comply with the relevant vapor retarder provisions of the 2012 International Residential Code.

## [ASTM E1677-11](#)

Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls. This specification covers minimum performances and specification criteria for an air barrier material or system for framed, opaque walls of low-rise buildings. The provisions are intended to allow the user to design the wall performance criteria and increase air barrier specifications for a particular climate location, function, or design.

## [2009 IECC](#)

Table 402.4.2 Air Barrier and Insulation Inspection Component Criteria, Air barrier and thermal barrier: Exterior wall insulation is installed in substantial contact and continuous alignment with the air barrier. Air permeable insulation is not used as a sealing material.\*

## [2009 IRC](#)

Table N1102.4.2 Air Barrier and Insulation Inspection Component Criteria, Air barrier and thermal barrier: Exterior wall insulation is installed in substantial contact and continuous alignment with the air barrier. Air permeable insulation is not used as a sealing material.\*

## [2012 IECC](#)

Exterior insulation for framed walls is in substantial contact and continuous alignment with the air barrier.\* Table R402.4.1.1 Air Barrier and Insulation Installation, Air barrier and thermal barrier: A continuous air barrier is installed in the building envelope including rim joists and exposed edges of insulation. Breaks or joints in the air barrier are sealed. Air permeable insulation is not used as a sealing material.\*

## [2012 IRC](#)

Exterior insulation for framed walls is in substantial contact and continuous alignment with the air barrier.\* Table N1102.4.1.1 Air Barrier and Insulation Installation, Air barrier and thermal barrier: A continuous air barrier is installed in the building envelope including rim joists and exposed edges of insulation. Breaks or joints in the air barrier are sealed. Air permeable insulation is not used as a sealing material.\*

\*Due to copyright restrictions, exact code text is not provided. For specific code text, refer to the applicable code.

## More Info.

### Case Studies

None Available

### References and Resources\*

1. [DOE Zero Energy Ready Home National Program Requirements](#)

**Author(s):** DOE

**Organization(s):** DOE

**Publication Date:** April, 2014

*Standard requirements for DOE's Zero Energy Ready Home national program certification.*

2. [ENERGY STAR Certified Homes, Version 3 \(Rev. 07\) Inspection Checklist for National Program Requirements](#)

**Author(s):** EPA

**Organization(s):** EPA

**Publication Date:** June, 2013

*Standard document containing the rater checklists and national program requirements for ENERGY STAR Certified Homes, Version 3 (Rev. 7).*

3. [Thermal Enclosure System Rater Checklist Guidebook](#)

**Author(s):** EPA

**Organization(s):** EPA

**Publication Date:** October, 2011

*Guide describing details that serve as a visual reference for each of the line items in the Thermal Enclosure System Rater Checklist.*

\*Publication dates are shown for formal documents. Dates are not shown for non-dated media. Access dates for referenced, non-dated media, such as web sites, are shown in the measure guide text.

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