

Walls Behind Showers and Tubs

Last Updated: 08/15/2013

Scope



Fully Aligned Air Barriers

Walls Behind Showers and Tubs

- A. Install insulation without misalignments, compressions, gaps, or voids in all exterior wall cavities behind all tubs and showers.
- B. Back with a rigid air barrier or other supporting material to prevent insulation from sagging and create a continuous thermal barrier.
- C. Seal all seams, gaps, and holes of the air barrier with caulk or foam before tub/shower installation.

ENERGY STAR Notes:

ENERGY STAR recommends using a rigid air barrier, but it is not a requirement.

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 ≥ 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 ≥ 1 inch 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 ≥ 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

When tubs and showers are installed on exterior walls, builders sometimes forget to insulate and air seal the exterior wall behind the tub or shower surround. Neglecting to insulate and air seal here can result in significant heat loss and complaints from homeowners about tubs, showers, and bathrooms that are always cold. The insulation behind the tub or shower should be equivalent to the insulation in the rest of the exterior walls and should be covered with an air barrier of cement backer board, rigid foam insulation, or non-paper-faced drywall that is sealed at the edges and seams to provide a continuous air seal. Any type of insulation may be installed as long as it completely fills the void and will be in full contact with the air barrier. These materials may be installed by insulators, framers, or subcontractors or vendors hired specifically to install the tub or shower. This task should be included in the contract for the appropriate trade depending on the workflow at specific job sites.

Air barrier effectiveness is measured at the whole-house level. High-performance branding programs and the IECC code require that builders meet specified infiltration rates at the whole-house level. See the “compliance” tab for these specified infiltration rates.

How to Install a Fully Aligned Air Barrier on the Walls behind Showers and Tubs

1. Install exterior rigid foam sheathing. Fill the entire wall cavity with insulation to the R-value required by local code or higher.
2. Install 2x4 blocking between the wall studs, if needed, to support the air barrier.
3. Cut cement board, fiber cement board, paperless gypsum board, Thermo-Ply, or other thin barrier material to size to cover area behind tub. Apply a thick bead of caulk to the surface of exposed studs, wood blocking, and bottom plate. Nail or screw the thin-profile air barrier material to the studs.

Note: moisture-resistant gypsum board or “green board” is not recommended. Cement board is not waterproof; it must be coated with a fluid-applied waterproofing, or a water-resistive barrier must be applied behind it that allows drainage.

1. Use caulk or foam to seal seams and any holes made through the air barrier material.
2. Install the new tub.
3. Block holes around the tub drain with sheet goods and spray foam.
4. Finish the walls by installing fiberglass wall panels or tiling the surface.

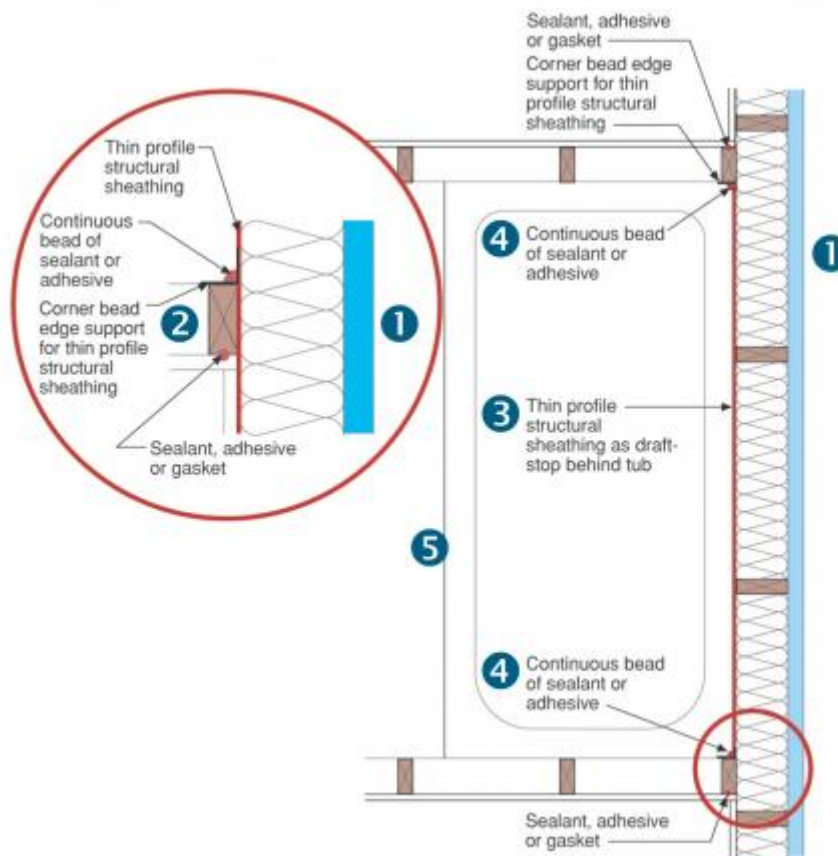


Figure 1 - Draft stopping and air barrier at tub enclosure ? side view 

Figure 2 - Draft stopping and air barrier at tub enclosure ? plan view

Ensuring Success

Blower door testing conducted as part of building performance testing may help indicate whether air leakage behind a bathtub or shower has been successfully sealed. An infrared camera can be used in conjunction with the blower door testing to inspect the insulation and to detect air leakage behind the tub or shower, if the tub or shower is installed on an exterior wall and if a sufficient temperature difference exists between the outside and the conditioned space of the house. Insulation and air barrier installation should be inspected by the site supervisor before the tub or shower is installed.

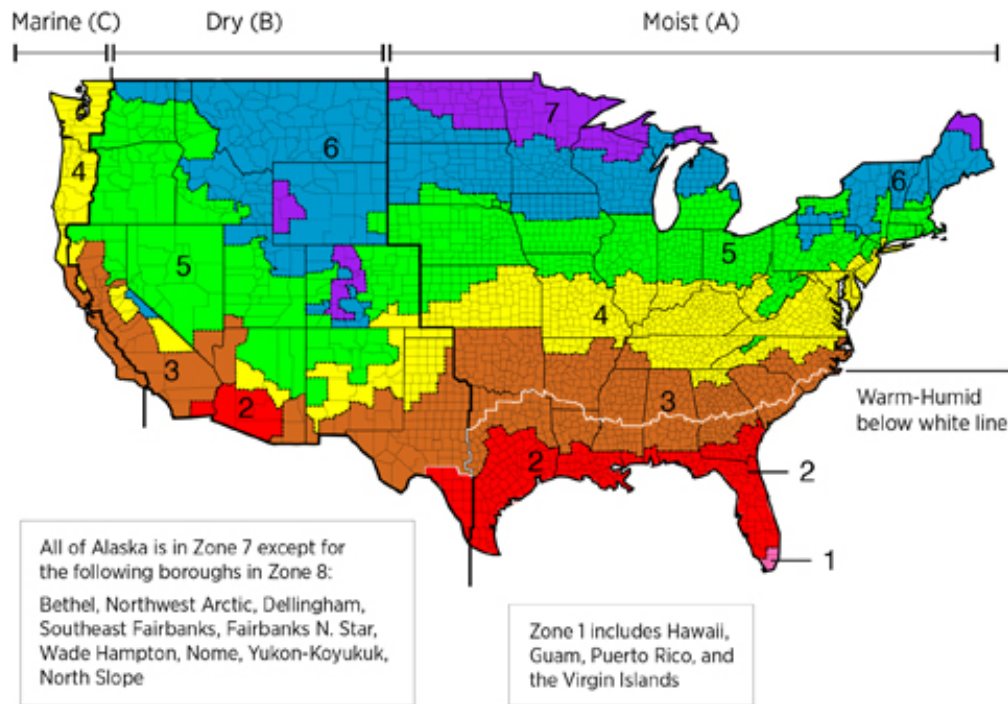
Climate

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. 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.



Training

Right and Wrong Images



Display Image: [ES TESRC 3.1.1 PG56_25b_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 3.1.1 PG56_26c_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 3.1.1 PG56_27d_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 3.1.1 PG56_28e_102811.jpg](#)

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

Author(s): EPA

Organization(s): EPA

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Display Image: [ES TESRC 3.1.1 PG56 29f 102811.jpg](#)

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

Author(s): EPA

Organization(s): EPA

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Display Image: [ES TESRC 3.1.1 PG56 30g 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 3.1.1 PG56_31h_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 3.1.1 PG56_32i_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: [JM_behind-tub-missing-air-barrier-1_wrong_TE.jpg](#)
Courtesy Of: Jim Mackovyak

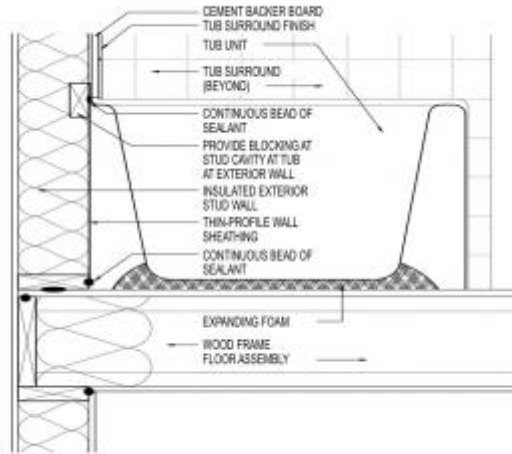


Display Image: [JM_behind-tub-missing-air-barrier-2_wrong_TE.jpg](#)
Courtesy Of: Jim Mackovyak



Display Image: [JM_behind-tub-missing-air-barrier-3_wrong_TE.jpg](#)
Courtesy Of: Jim Mackovyak

CAD



CAD FILE: [311 CAD 2-1 Air seal tub thin profile sheathing 5-01009 GBA 1-31-12 \(2\).dwg](#)

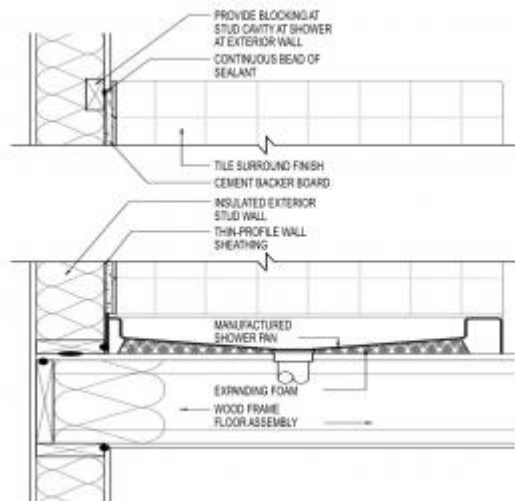
PDF: [311 CAD 2-1 Air seal tub thin profile sheathing 5-01009 GBA 1-31-12.pdf](#)

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.



CAD FILE: [311 CAD 2-1 Air Seal shower thin profile 5-01007 GBA 1-31-12.dwg](#)

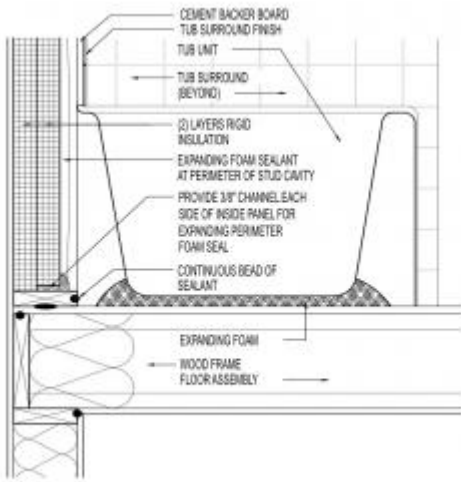
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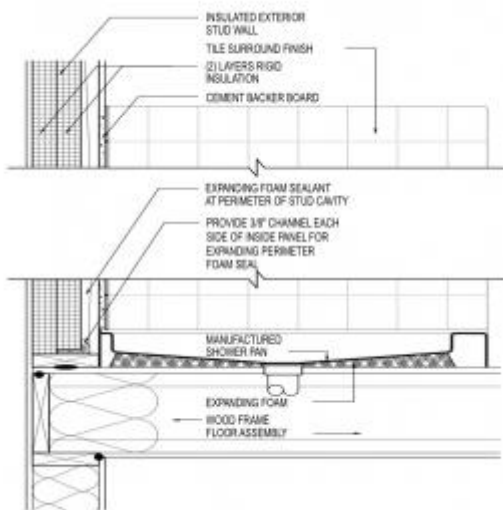
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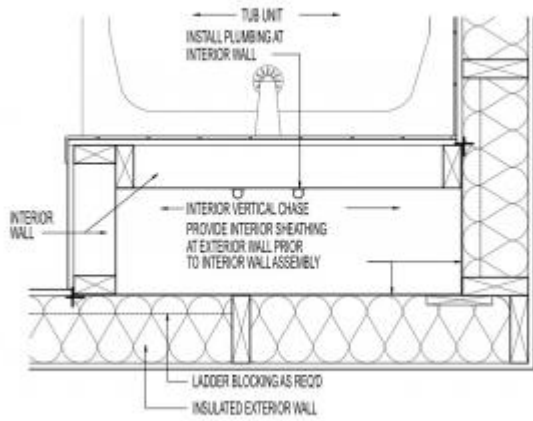
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PDF: [311 CAD 2-1 air seal shower cavity rigid insulation 5-01008 GBA 1-31-12.pdf](#)

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

Author(s): Green Building Advisor

Organization(s): Green Building Advisor

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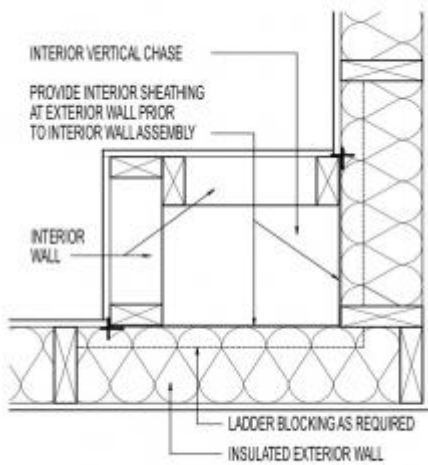
CAD FILE: [311 CAD 2-1 Air seal corner vertical bathtub chase 5-02021_GBA_1-31-12.dwg](#)
PDF: [311 CAD 2-1 Air seal corner vertical bathtub chase 5-02021_GBA_1-31-12.pdf](#)

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

Author(s): Green Building Advisor

Organization(s): Green Building Advisor

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CAD FILE: [311 CAD 2-1 Air seal corner vertical chase 5-02020_GBA_1-31-12.dwg](#)
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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.

[ABAA 07261](#)

Self-Adhered Sheet Air Barrier. 2006. Air Barrier Association of America, Walpole, MA. This specification for self-adhered sheet air barriers is developed by a professional association, the Air Barrier Association of America, to provide guidance to the design professional.

[ABAA 07262](#)

Fluid-Applied Air and Vapor Barrier. 2012. Air Barrier Association of America, Walpole, MA. This specification for air barriers that are fluid-applied and also act as vapor barriers is developed by a professional association, the Air Barrier Association of America, to provide guidance to the design professional.

[ABAA 07263](#)

Closed Cell, Medium-Density Spray Polyurethane Foam Air Barrier. 2011. Air Barrier Association of America, Walpole, MA. This specification for closed cell, medium-density spray polyurethane foam air barriers is developed by a professional association, the Air Barrier Association of America, to provide guidance to the design professional.

[ABAA 07265](#)

Fluid-Applied Vapor Permeable Air Barrier. 2012. Air Barrier Association of America, Walpole, MA. This specification for fluid-applied vapor permeable air barriers is developed by a professional association, the Air Barrier Association of America, to provide guidance to the design professional.

[2009 IECC](#)

Table 402.4.2 Air Barrier and Insulation Inspection Component Criteria, Fireplace: Walls with fireplaces include air barriers.*
Table 402.4.2, 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, Shower/tub on exterior wall: Insulation exists between showers/tubs and exterior wall. Air barrier and sealing exists on common walls between dwelling units, on exterior walls behind tubs/showers, and in openings between window/door jambs and framing.*
Table N1102.4.2, 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](#)

Table R402.4.1.1 Air Barrier and Insulation Installation, Fireplace: Fireplace walls have air barrier and closure doors are gasketed.*
Table R402.4.1.1, 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](#)

Table N1102.4.1.1 Air Barrier and Insulation Installation, Shower/tub on exterior wall: Exterior walls adjacent to showers and tubs are insulated and have air barrier separating the wall from the shower and tubs.*
Table N1102.4.1.1, 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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