Walls Behind Fireplaces

Last Updated: 03/14/2016

Scope

Install an air barrier behind fireplaces installed on exterior walls.

Install insulation without misalignments, compressions, gaps, or voids in all exterior wall cavities behind fireplaces.

Cover the wall cavities with a fire-proof rigid air barrier or other supporting material to create a continuous thermal barrier and prevent a fire hazard.

Seal any seams, gaps, and holes in the air barrier with fire-rated caulk or foam before fireplace installation.

Maintain clearances between combustible materials and the firebox and flue as required by the International Residential Code and/or other applicable codes (IRC 2009, 2012, 2015).

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.
Description

When a fireplace is installed on an exterior wall, it is important to install an air barrier behind it after installing insulation but before the fireplace is installed. 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. Air barrier material behind fireplaces must tolerate heat. Air barrier material can include thin sheet goods such as rigid insulation, sheet metal, or dry wall. These materials may be installed by insulators, framers, or subcontractors or vendors hired specifically to install the fireplace. This task should be included in the contract for the appropriate trade depending on the workflow at the specific job sites.

Note when designing the fireplace location, adequate clearance must be provided between the chimney and firebox and the insulation and air barrier material, as required by local codes and the manufacturer’s recommendations.

How to Insulate and Air Seal the Wall behind Your Fireplace

1. Insulate the exterior wall enclosing the fireplace and chimney to the top of the second floor ceiling with rigid foam exterior sheathing taped at the seams and sealed at the edges. (See Figures 1 and 2.)
2. Install fire stop blocking.
3. Install support blocking for thin-profile structural sheathing.
4. Apply insulation (batt or spray foam) within the framing of the wall up to the ceiling or roof line.
5. Install a thin structural sheathing material (e.g., drywall, rigid insulation, lightweight steel or aluminum sheeting). Bend the liner at the corners or seal seams with a bead of adhesive.
6. Tape the liner to the enclosure opening on both the sides and at the top of the fireplace enclosure.
7. Install the fireplace and chimney and closure framing.
8. After the new fireplace insert and chimney are installed, seal the enclosure by placing a sheet-metal fire stop around the chimney pipe where it enters the firebox.
9. Seal the joints and seams of the fire stop with an approved high-temperature sealant.

Figure 1 - Draft stopping and air barrier at fireplace enclosure, plan view
Figure 2 - Draft stopping and air barrier at fireplace enclosure, side view
Ensuring Success

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. Blower door testing may help indicate whether air leakage behind a fireplace 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 fireplace from the outside.
Rater Field Checklist

Thermal Enclosure System.

2. Fully-Aligned Air Barriers. At each insulated location below, a complete air barrier is provided that is fully aligned as follows:
- Walls: At exterior vertical surface of wall insulation in all climate zones; also at interior vertical surface of wall insulation in Climate Zones 4-8.
- 2.2 Walls behind showers, tubs, staircases, and fireplaces.

DOE Zero Energy Ready Home (Revision 07)

Exhibit 2 DOE Zero Energy Ready Home Target Home.

The U.S. Department of Energy’s Zero Energy Ready Home program allows builders to choose a prescriptive or performance path. The DOE Zero Energy Ready Home prescriptive path requires builders to meet or exceed the minimum HVAC efficiencies listed in Exhibit 2 of the National Program Requirements (Rev 07), as shown below. The DOE Zero Energy Ready Home performance path allows builders to select a custom combination of measures for each home that is equivalent in performance to the minimum HERS index of a modeled target home that meets the requirements of Exhibit 2 as well as the mandatory requirements of Zero Energy Ready Home Exhibit 1.

Exhibit 2, Insulation and Infiltration: Insulation levels shall meet the 2015 IECC and achieve Grade 1 installation, per RESNET standards. Whole house leakage must be tested and meet the following infiltration limits:

- Zones 1-2: ≤ 3 ACH50;
- Zones 3-4: ≤ 2.5 ACH50;
- Zones 5-7: ≤ 2 ACH50;
- Zone 8: ≤ 1.5 ACH50;
- Attached dwellings: ≤ 3 ACH50.

International Energy Conservation Code (IECC) Climate Regions
Training

Right and Wrong Images

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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, Version 3/3.1 (Rev. 09)

Rater Field Checklist

Thermal Enclosure System.

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

- Walls: At exterior vertical surface of wall insulation in all climate zones; also at interior vertical surface of wall insulation in Climate Zones 4-8.

2.2 Walls behind showers, tubs, staircases, and fireplaces.

Footnote 6) 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 \( \geq 5.5 \text{ in. or 1.5 in.} \), 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 \( \geq 1 \text{ in. diameter} \) unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of Kraft paper, paperbased products, or other materials that are easily torn. If polyethylene is used, its thickness shall be \( \geq 6 \text{ mil.} \).

Footnote 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. The following exceptions apply: air barriers recommended, but not required, in adiabatic walls in multifamily dwellings; and, in Climate Zones 4 through 8, an air barrier at the interior vertical surface of insulation is recommended but not required in basement walls or crawlspace walls. For the purpose of these exceptions, a basement or crawlspace is a space for which \( \geq 40\% \) of the total gross wall area is below-grade.

Please see the ENERGY STAR Certified Homes Implementation Timeline for the program version and revision currently applicable in your state.

DOE Zero Energy Ready Home (Revision 07)

Exhibit 1 Mandatory Requirements.

Exhibit 1, Item 1) Certified under the ENERGY STAR Qualified Homes Program or the ENERGY STAR Multifamily New Construction Program.

Exhibit 1, Item 2) Ceiling, wall, floor, and slab insulation shall meet or exceed 2015 IECC levels and achieve Grade 1 installation, per RESNET standards. See the guide 2015 IECC Code Level Insulation – DOE Zero Energy Ready Home Requirements for more details.

Exhibit 2 DOE Zero Energy Ready Home Target Home.

The U.S. Department of Energy’s Zero Energy Ready Home program allows builders to choose a prescriptive or performance path. The DOE Zero Energy Ready Home prescriptive path requires builders to meet or exceed the minimum HVAC efficiencies listed in Exhibit 2 of the National Program Requirements (Rev 07), as shown below. The DOE Zero Energy Ready Home performance path allows builders to select a custom combination of measures for each home that is equivalent in performance to the minimum HERS index of a modeled target home that meets the requirements of Exhibit 2 as well as the mandatory requirements of Zero Energy Ready Home Exhibit 1.

Exhibit 2, Insulation and Infiltration) Insulation levels shall meet the 2015 IECC and achieve Grade 1 installation, per RESNET standards. Whole house leakage must be tested and meet the following infiltration limits:

- Zones 1-2: \( \leq 3 \text{ ACH50} \);
- Zones 3-4: \( \leq 2.5 \text{ ACH50} \);
- Zones 5-7: \( \leq 2 \text{ ACH50} \);
- Zone 8: \( \leq 1.5 \text{ ACH50} \);
- Attached dwellings: \( \leq 3 \text{ ACH50} \).

Footnote 23) Envelope leakage shall be determined by an approved verifier using a RESNET-approved testing protocol.

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.

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.

2015 and 2018 IECC
Table R402.4.1.1 Air Barrier and Insulation Installation, General requirements: 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.

Section R101.4.3 (Section R501.1.1 in 2015 and 2018 IECC). Additions, alterations, renovations, or repairs shall conform to the provisions of this code, without requiring the unaltered portions of the existing building to comply with this code. (See code for additional requirements and exceptions.)

2009 IRC
Table N1102.4.2 Air Barrier and Insulation Inspection Component Criteria, Fireplace: Walls with fireplaces include air barriers. 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 IRC
Table N1102.4.1.1 Air Barrier and Insulation Installation, Fireplace: Firewall walls have air barrier and closure doors are gasketed. 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.

2015 and 2018 IRC
Table N1102.4.1.1 Air Barrier and Insulation Installation, General requirements: 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.

Section N1101.3 (Section N1107.1.1 in 2015 and 2018 IRC). Additions, alterations, renovations, or repairs shall conform to the provisions of this code, without requiring the unaltered portions of the existing building to comply with this code. (See code for additional requirements and exceptions.)

Appendix J regulates the repair, renovation, alteration, and reconstruction of existing buildings and is intended to encourage their continued safe use.
References and Resources*

1. **2009 IECC - International Energy Conservation Code**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2009  
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

2. **2009 IRC - International Residential Code for One and Two Family Dwellings**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2009  
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2012  
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

4. **2012 IRC - International Residential Code for One and Two Family Dwellings**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2012  
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

5. **2015 IECC - International Energy Conservation Code**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** May, 2014  
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

6. **2015 IRC - International Residential Code for One and Two Family Dwellings**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** May, 2014  
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2012  
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.
2018 IECC - International Energy Conservation Code
Author(s): International Code Council
Organization(s): ICC
Publication Date: November, 2017
Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems, and service water heating systems in homes and commercial businesses.

8. 2018 IRC - International Residential Code for One and Two Family Dwellings
Author(s): International Code Council
Organization(s): ICC
Publication Date: August, 2017
Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

9. Air Barriers - Tub, Shower and Fireplace Enclosures
Author(s): Building Science Corporation
Organization(s): Building Science Corporation
Publication Date: May, 2009
Brochure about creating an air barrier at tub, shower and fireplace walls.

10. DOE Zero Energy Ready Home National Program Requirements (Rev. 07)
Author(s): U.S. Department of Energy
Organization(s): DOE
Publication Date: May, 2019
Standard requirements for DOE’s Zero Energy Ready Home national program certification.

11. ENERGY STAR Certified Homes, Version 3/3.1 (Rev. 09) National Program Requirements
Author(s): U.S. Environmental Protection Agency
Organization(s): EPA
Publication Date: September, 2018
Webpage with links to documents providing the program requirements and checklists for ENERGY STAR Certified Homes (Ver. 3/3.1, Rev. 09).

12. High Performance Building Details: Insulation and Air Sealing II
Author(s): Steven Winter Associates
Organization(s): CARB, Steven Winter Associates, SWA
Publication Date: July, 2010
Brochure with details on insulation and air sealing.

13. Thermal Enclosure System Rater Checklist Guidebook
Author(s): U.S. Environmental Protection Agency
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.

Contributors to this Guide
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