**Scope**

Air seal drywall to top plates at all attic/wall interfaces to minimize air leakage.

- Install drywall then seal the seam from the attic side with caulk, foam, or drywall adhesive (but not other construction adhesives).
- OR
- Before installing drywall, install caulk or other sealant or a foam gasket to the face of the top plate then install the drywall. If this method is used, make sure the sealant or gasket remains intact during the drywall installation.

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.
In simplest terms, a wall is a six-sided box consisting of a horizontal top plate, a horizontal bottom plate, and vertical side studs, with a gypsum board and wall sheathing back, all fastened together to create a wall cavity that is typically filled with insulation when this wall is part of the building’s exterior shell. If air is allowed to flow through the wall cavity, i.e., if the wall cavity is not air tight, the flowing air can reduce the insulation’s effectiveness. If the wall cavity is not airtight, convective loops can also develop within wall cavities, due to temperature differences between the inside and outside surfaces and top and bottom sections of the wall. These convective loops can encourage more air flow, further reducing insulation effectiveness and potentially resulting in moisture problems.

To ensure the optimum energy performance and moisture management of the whole house, all of the wall components should be connected to each other and to the ceiling and floor in a way that creates a continuous and complete air barrier system.

Gypsum board drywall is an air barrier material (BSC 2009). The taping of drywall seams results in a plane of airtightness at the field of the wall. However, several steps must be taken to use this material properly to create a continuous and complete air barrier system. To do this, it is important to create air barrier continuity at the perimeter of drywall assemblies as well as at all penetrations through the drywall. Air barrier continuity at the perimeter of drywall assemblies is achieved by sealing the edges of the drywall to solid framing materials. This requires a continuous sealant along:

- all exterior wall bottom and top plates,
- all top plates at insulated ceilings,
- rough opening perimeters,
- both sides of the first interior stud of partition walls (BSC 2009).

This air sealing can be achieved by applying caulk, glue, sprayer-applied sealant, or strips of foam gasket material to the surface of the top plates, bottom plates, and framing around doors and windows before installing the drywall. This would typically be done by the drywall installer. Other methods not described below for air sealing the top plates include installing spray foam insulation on the attic side of the ceiling at the eaves, which serves to both air seal the top plate and insulate this sometimes difficult-to-insulate area (although this will not address interior wall seams) or spray foam insulating the entire ceiling deck. Canned or one-part spray foam or sealant can be applied to all top plate seams from the attic side, although limited attic space can make this challenging. Another option is to use an air-borne aerosol sealant process, which will airseal all leaks in the home including air leaks at top plates (see Field Trial of an Aerosol-Based Enclosure Sealing Technology).

**How to Air Seal the Drywall to the Top Plate**

1. Apply a continuous bead of caulk or glue or staple a strip of compressible foam gasket material (Figure 1) along the top plate and bottom plates and door and window framing along all exterior walls and all interior walls (Figure 2).

2. Install drywall over caulk, glue, or gasket material. Mud and tape drywall.
**Figure 1** - A pliable foam gasket material is stapled along the top plate prior to installing drywall.

- Seal around rough openings of windows and doors
- Seal along top plates on exterior walls
- Seal along bottom plate on exterior walls
- Seal drywall to first stud in the wall
- Partitions: Seal at top plate where adjacent to an unconditioned space
- Seal along inside of bottom of first stud in interior wall or hold back first stud to pass drywall behind stud.

**Figure 2** - A continuous bead of caulk or glue is applied to the top and bottom plates on exterior walls and interior walls that intersect insulated ceilings, as well as rough openings around doors and windows, prior to installing drywall.
Figure 3 - Sealing the drywall to the top plate is one step in forming a continuous, complete air barrier in the home’s exterior shell.
Ensuring Success

When drywall is installed, visually inspect that drywall installer is applying caulk or a foam gasket along surface of top plate before hanging drywall. After drywall installation it may be possible to detect air leakage at this location with an IR camera or smoke pencil during a blower door pressure test. Although taped, mudded drywall should provide some air barrier as well.
Climate

No climate-specific information applies.
Training

Right and Wrong Images

Display Image: ES_TESRC_5.2.3_P144_299b_102811_0.jpg
CAD FILE: 445_CAD_7af_Single_Top_Plate_Interior_Wall_with_Gusset_5-00017_GBA_3-6-12.dwg
PDF: 445_CAD_7af_Single_Top_Plate_Interior_Wall_with_Gusset_5-00017_GBA_3-6-12.pdf
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)**

National Rater Field Checklist

Thermal Enclosure System.

4. Air Sealing (Unless otherwise noted below, “sealed” indicates the use of caulk, foam, or equivalent material).

4.5 Drywall sealed to top plate at all unconditioned attic / wall interfaces using caulk, foam, drywall adhesive (but not other construction adhesives), or equivalent material. Either apply sealant directly between drywall and top plate or to the seam between the two from the attic above.

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.

**2009 IECC**

Table 402.4.2 Air Barrier and Insulation Inspection Component Criteria, Walls: Corners, headers, narrow framing cavities, and rim joists are insulated.

**2012 IECC**

Table R402.4.1.1 Air Barrier and Insulation Installation, Walls: Junction of foundation and wall sill plates, wall top plate and top of wall, sill plate and rim-band, and rim band and subfloor are sealed. Corners, headers, and rim joists making up the thermal envelope are insulated.

**2015 and 2018 IECC**

Table R402.4.1.1 Air Barrier and Insulation Installation, Walls: Junction of foundation and wall sill plates, wall top plate and top of wall, sill plate and rim-band, and rim band and subfloor are sealed. Corners, headers, and rim joists making up the thermal envelope are insulated. Cavities within wall corners and headers to be completely filled with insulation at least R-3 per inch.


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, Walls: Corners, headers, narrow framing cavities, and rim joists are insulated.

**2012 IRC**

Table N1102.4.1.1 Air Barrier and Insulation Installation, Walls: Junction of foundation and wall sill plates, wall top plate and top of wall, sill plate and rim-band, and rim band and subfloor are sealed. Corners, headers, and rim joists making up the thermal envelope are insulated.

**2015 and 2018 IRC**

Table N1102.4.1.1 Air Barrier and Insulation Installation, Walls: Junction of foundation and wall sill plates, wall top plate and top of wall, sill plate and rim-band, and rim band and subfloor are sealed. Corners, headers, and rim joists making up the thermal envelope are insulated. Cavities within wall corners and headers to be completely filled with insulation at least R-3 per inch.


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.
More Info.

Access to some references 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.

Case Studies
None Available

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.

7.
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 - Airtight Drywall Approach**  
**Author(s):** Lstiburek  
**Organization(s):** Building Science Corporation  
**Publication Date:** May, 2009  
Brochure about creating an air barrier by sealing drywall assemblies.

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. **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**

The following authors and organizations contributed to the content in this Guide.

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