

Advanced Framing: Insulated Corners

Last Updated: 03/14/2016

Scope



Advanced framing details include corners that are constructed with fewer studs or studs aligned so that insulation can be installed in the corner.

Construct framed walls using advanced framing details like insulated corners that reduce framing and thermal bridging and allow more space for insulation.

- Construct corners with two studs or three studs aligned to allow more room for insulation along the exterior wall.
- Use drywall clips as needed to hold drywall in place.
- ENERGY STAR requires that the space provided at the corner allow for at least R-6 of insulation ([ENERGY STAR 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

Exterior wall corners are typically framed with three studs. The third stud generally only provides a nailing edge for interior gypsum board and its typical placement blocks off the wall cavity, preventing insulation from being installed. If the third stud can be eliminated, there is more room inside the wall for insulation. Drywall clips, a 1x nailing strip, or a recycled plastic nailing strip can be used to create a two-stud corner that still provides a surface on which to hang the drywall. Using drywall clips also reduces opportunities for drywall cracking and nail popping, frequent causes of builder callbacks.

The designer should include the corner detail on building plans. It should be installed by the framer. If two-stud corners are used, they can be insulated by the insulation contractor. This task should be included in the contract for the appropriate trade, depending on the workflow at a specific job site. ENERGY STAR Version 3.0 requires that all exterior corners shall be constructed to allow access for the installation of \geq R-6 insulation that extends to the exterior wall sheathing. See the “compliance” tab for 2009 IECC-specified wall insulation levels.

How-To Insulate Corners

Construct exterior corners to allow access for the installation of $>$ R-6 insulation that extends to the exterior wall sheathing in one of the following ways:

1. Construct a two-stud corner using a nailing strip or drywall clips, which allows the wall cavity at the corner to be insulated in sequence with the rest of the installation at full wall thickness.
 - When drywall clips are used, they should be installed above the level of the interior trim so trim nails will not interfere.
 - If installing trim, the noncoped trim piece should be installed first, against the drywall that bears on the clip, so that the coped trim piece can be nailed to the stud.
 - If rigid foam is used as the sheathing instead of OSB or another solid nailable sheathing, install a wood nailer strip behind the sheathing if necessary for attaching exterior trim or siding at the corner on the side that does not have a stud.

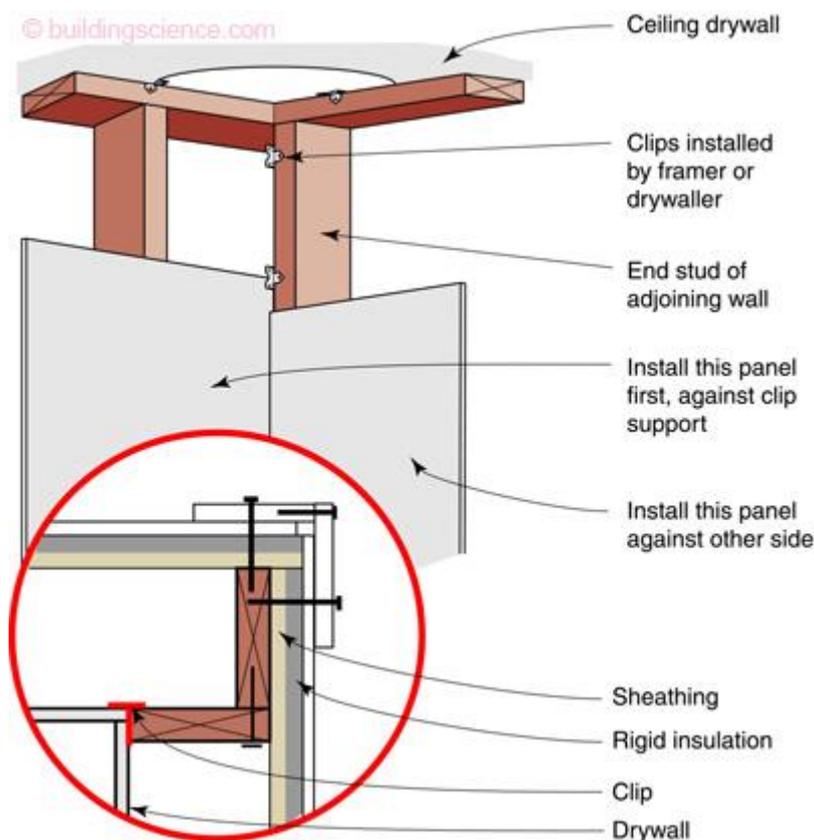


Figure 1 - This side view shows drywall clips installed on studs at a two-stud corner (the second stud is not visible behind the first corner stud). The plan view in the detail shows the placement of nails for fastening exterior corner trim. 

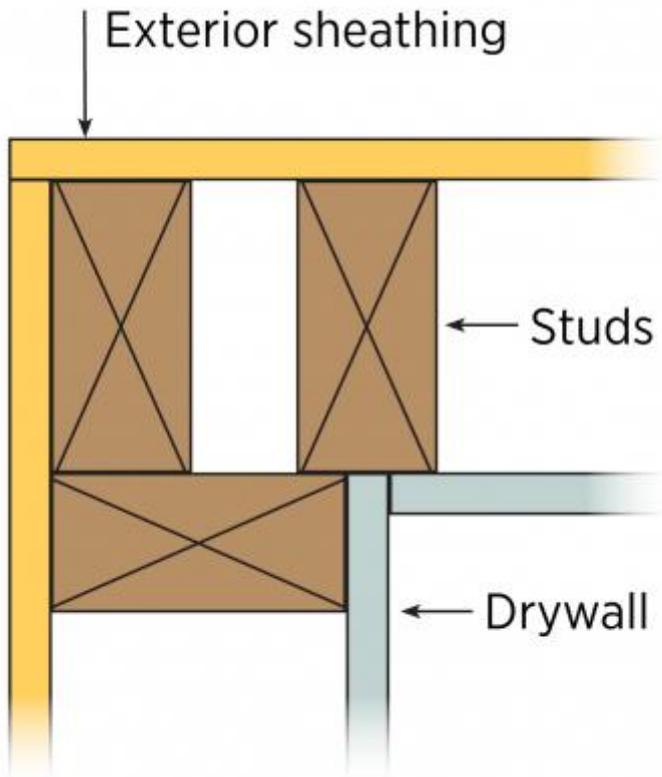


Figure 2 - Conventional three-stud corners leave a cavity that must be insulated by the framers—not good 

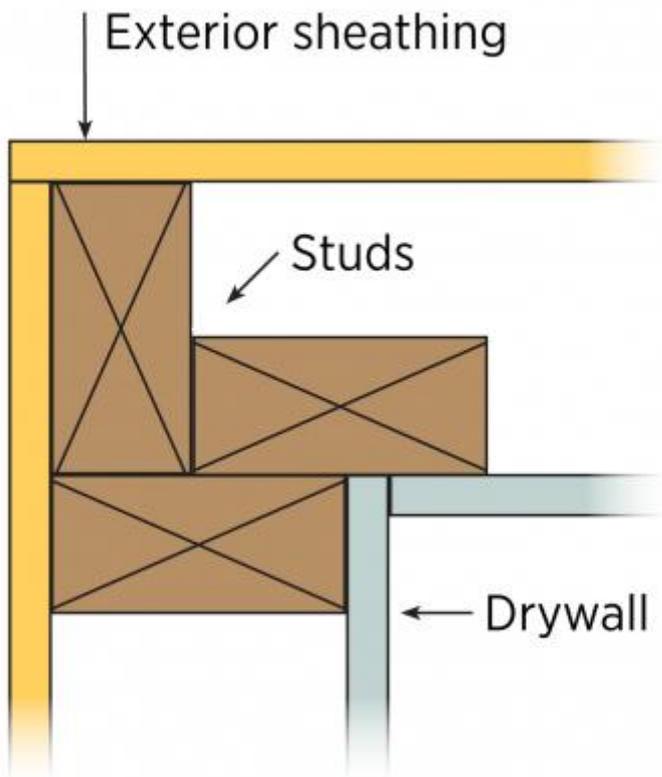


Figure 3 - The improved three-stud corner allows insulation to be installed later, in sequence 

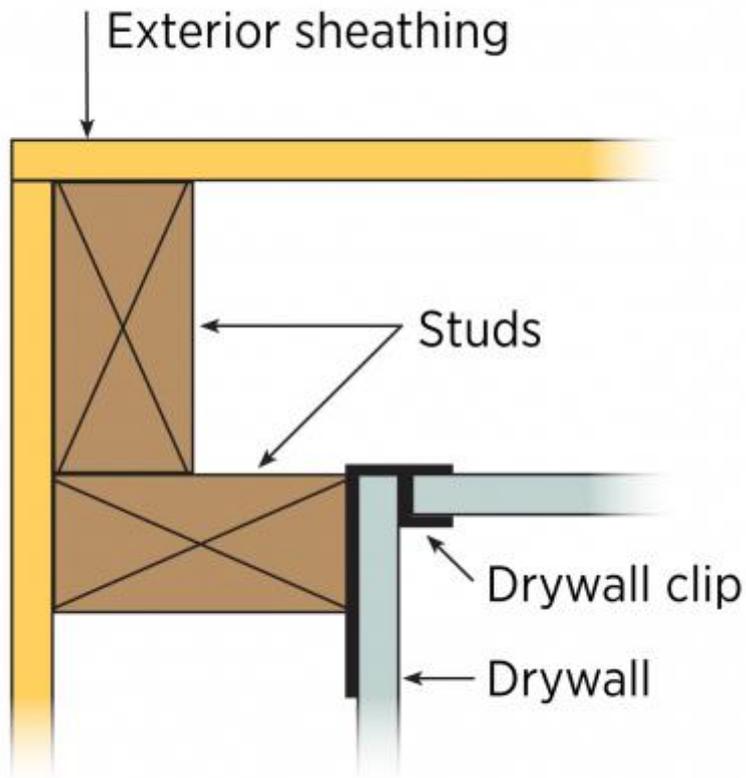


Figure 4 - Two-stud corners with drywall clips use the least wood and give the best thermal performance 

Ensuring Success

The quality of the insulation installation should be visually inspected by the site supervisor before the drywall is installed. It may be possible to detect heat loss at the corners of exterior walls with an infrared camera, if a sufficient temperature difference exists between the outside and the conditioned space of the house.

Climate

No climate specific information applies.

Training

Right and Wrong Images



Display Image: [ES_TESRC_4.4.5_PG106_198b_102811_0.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_4.4.5_PG106_198b_102811_0.jpg](#)

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Organization(s): EPA

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

Author(s): EPA

Organization(s): EPA

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

Author(s): EPA

Organization(s): EPA

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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_4.4.5_PG106_202f_102811_0.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.



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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.



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

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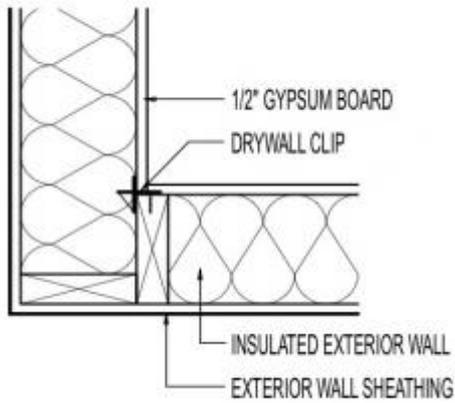
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Author(s): EPA

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.

CAD



CAD FILE: [445a_CAD_5af_2_Stud_Corner_with_Drywall_Clips_5-00005_GBA_3-6-12.dwg](#)

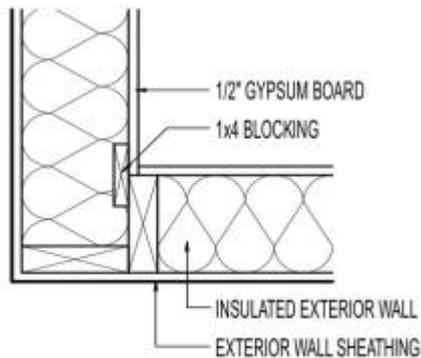
PDF: [445a_CAD_5af_2_Stud_Corner_with_Drywall_Clips_5-00005_GBA_3-6-12.pdf](#)

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

Author(s): Green Building Advisor

Organization(s): Green Building Advisor

Information sheets containing plans and details for advanced framing.



CAD FILE: [445a_CAD_5af_2_Stud_Corner_with_1x4_Backer_5-00006_GBA_3-6-12.dwg](#)

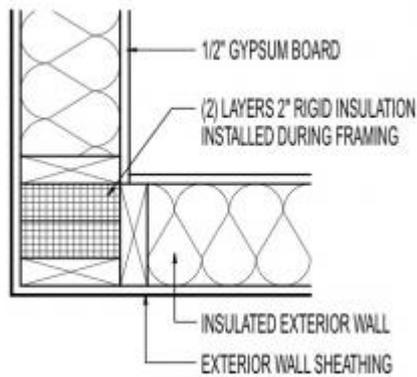
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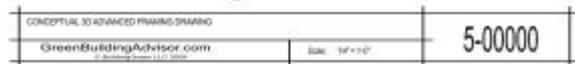
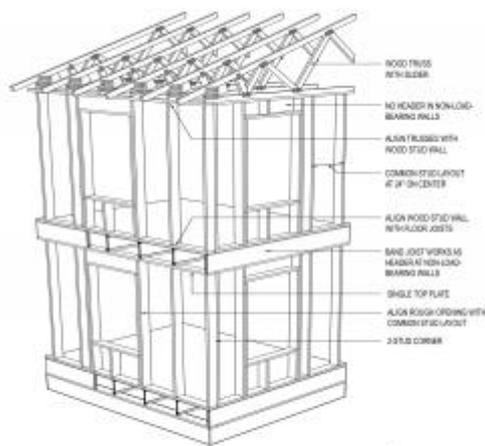
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 PDF: [445a CAD 5af 3 Stud Corner with Rigid insulation 5-00007_GBA_3-6-12.pdf](#)

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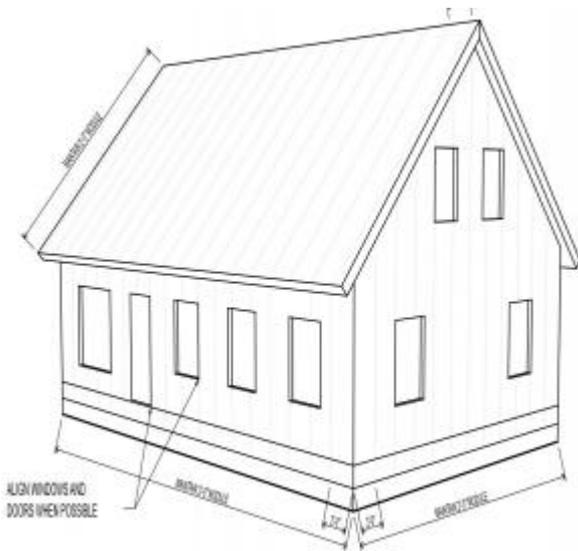
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Reference: [Building Plans for Advanced Framing](#)

Author(s): Green Building Advisor

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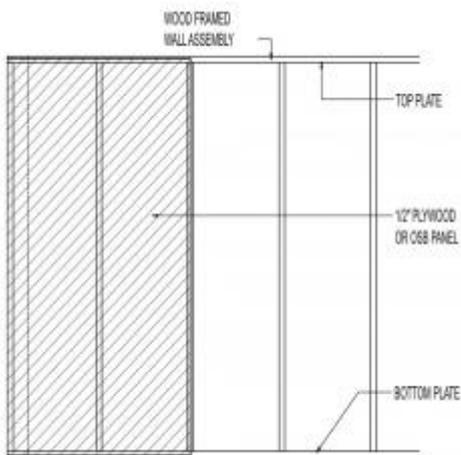
CAD FILE: [445 CAD 1-6 2-ft 0 in module house 500001_GBA_1-31-12.dwg](#)
 PDF: [445 CAD 1-6 2-ft 0 in module house 500001_GBA_1-31-12.pdf](#)

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

Author(s): Green Building Advisor

Organization(s): Green Building Advisor

Information sheets containing plans and details for advanced framing.



CAD FILE: [455 CAD 3af Corner Insulated OSB Shear Bracing 5-00052_GBA_3-6-12.dwg](#)
 PDF: [455 CAD 3af Corner Insulated OSB Shear Bracing 5-00052_GBA_3-6-12.pdf](#)

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

Author(s): Green Building Advisor

Organization(s): Green Building Advisor

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Compliance

The Compliance tab contains both program and code information. Exact code language is copyrighted and 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 Certified Homes (Version 3/3.1, Revision 08), Rater Field Checklist

Thermal Enclosure System:

3. Reduced Thermal Bridging:

3.4.3a Corners insulated ? R-6 to edge²¹

Footnotes:

(21) All exterior corners shall be constructed to allow access for the installation of ? R-6 insulation that extends to the exterior wall sheathing. Examples of compliance options include standard-density insulation with alternative framing techniques, such as using three studs per corner, or high-density insulation (e.g., spray foam) with standard framing techniques.

ENERGY STAR Revision 08 requirements are required for homes permitted starting 07/01/2016.

[DOE Zero Energy Ready Home](#)

Exhibit 1: Mandatory Requirements. Certified under ENERGY STAR Qualified Homes Version 3. Ceiling, wall, floor, and slab insulation shall meet or exceed 2012 IECC levels and achieve Grade 1 installation, per RESNET standards.

[2009 IECC](#)

Table 402.4.2 Air Barrier and Insulation Inspection Component Criteria, Walls: Corners, headers, narrow framing cavities, and rim joists are insulated.* 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, Walls: Corners, headers, narrow framing cavities, and rim joists are insulated.* 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, Walls: Corners, headers, and rim joists making up the thermal envelope are insulated.* 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, Walls: Corners, headers, and rim joists making up the thermal envelope are insulated.* 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.

[2015 IECC](#)

[2015 IRC](#)

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

1. [New Whole-House Solutions Case Study: Insight Homes: Deep Creek, Seaford, Delaware](#)

(867 KB)

Author(s): PNNL

Organization(s): PNNL

Publication Date: April, 2012

Case study about a home builder that has refined its home designs to achieve HERS scores of 49 to 56 on 40 to 70 homes per year.

References and Resources*

1. [Advanced Framing Construction Guide](#)

Author(s): APA - The Engineered Wood Association

Organization(s): APA - The Engineered Wood Association

Publication Date: January, 2014

Detailed guide to advanced framing, a system of construction framing techniques designed to optimize material usage and increase energy efficiency.

2. [Advanced Wall Framing](#)

Author(s): NAHB, Southface Energy Institute, ORNL, NREL

Organization(s): NAHB, Southface Energy Institute, ORNL, NREL

Publication Date: January, 2002

Information sheet about advanced wall framing.

3. [Building America Best Practices Series Volume 12: 40% Whole-House Energy Savings in the Cold and Very Cold Climates](#)

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

Organization(s): PNNL, ORNL

Publication Date: February, 2011

Guide describing measures that builders in the cold and very cold climates can take to build homes that have whole-house energy savings of 40% over the Building America benchmark with no added overall costs for consumers.

4. [Building Science Insights: Advanced Framing](#)

Author(s): Lstiburek

Organization(s): BSC

Publication Date: February, 2010

Report detailing advanced framing techniques, including discussion of cost and energy savings.

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

Author(s): DOE

Organization(s): DOE

Publication Date: August, 2015

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

6. [ENERGY STAR Certified Homes, Version 3 \(Rev. 08\) National Program Requirements](#)

Author(s): EPA

Organization(s): EPA

Publication Date: September, 2015

Document outlining the program requirements for ENERGY STAR Certified Homes, Version 3 (Rev. 08).

7.

[Thermal Enclosure System Rater Checklist Guidebook](#)

Author(s): EPA

Organization(s): EPA

Publication Date: October, 2011

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*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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