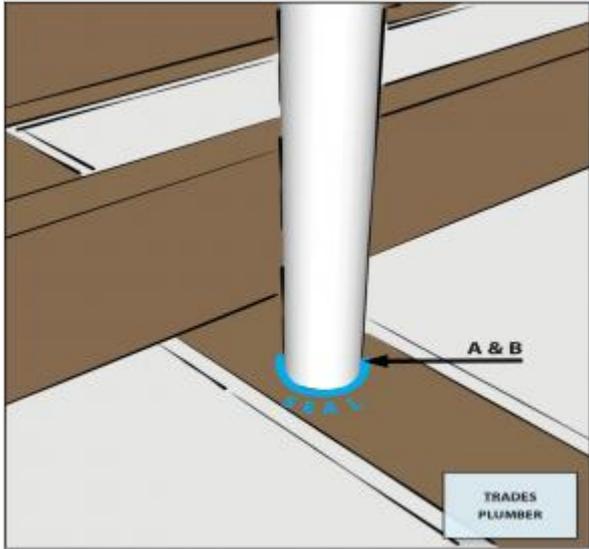


Air Sealing Plumbing and Piping

Last Updated: 03/14/2016

Scope



Air seal around all plumbing and piping installed through walls, ceilings, and flooring to keep conditioned air from leaking into unconditioned space.

Air seal around all plumbing and piping installed through walls, ceilings, and flooring to keep conditioned air from leaking into unconditioned space.

- Using a saw or drill, cleanly cut all holes no more than 1 inch larger in diameter than the diameter of the pipe.
- Seal all gaps and holes to unconditioned space with caulk or canned spray foam. For larger gaps, rigid blocking material can be cut to fit over the gap and sealed in place with caulk or spray foam.

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

Generous holes are often cut through subflooring, walls, bottom plates, and top plates for plumbing pipes and vent stacks. These gaps are often hidden from view in under-sink cabinets, beneath tubs, behind shower enclosures, behind washing machines and dishwashers, or within wall cavities. If not properly closed up, large amounts of air can pass through these gaps, encouraged by pressure and temperature differences between conditioned and unconditioned spaces. These air leaks represent energy losses; they could also potentially allow warm, moisture-laden air into wall cavities or attics where it can condense on cold surfaces, creating moisture problems. Conversely, air leaking into the house from unconditioned sources such as the garage or crawlspace can affect indoor air quality and cause drafts. Air barriers need to be continuous to be effective; this means sealing all penetrations in exterior walls and in walls and floors adjoining unconditioned spaces.

Be sure to schedule sealing of plumbing holes after the pipes and plumbing have been installed and before the drywall is completed. Responsibility for sealing air leaks around plumbing should be included in the contract for the appropriate trade, depending on the workflow at a specific job site.

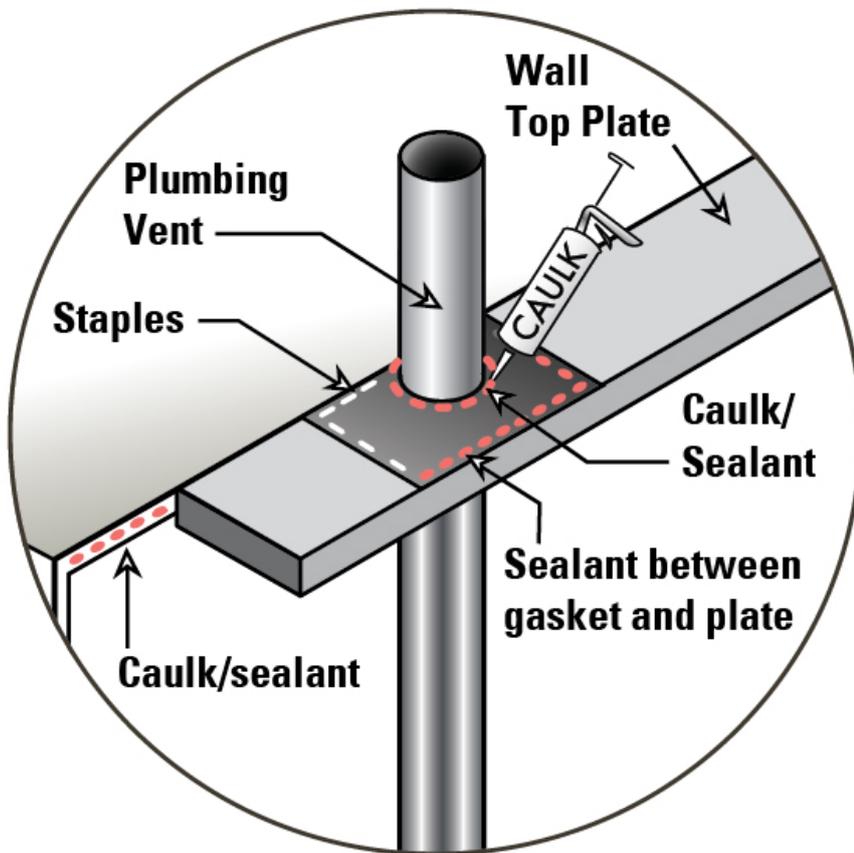
How to Air Seal Holes around Plumbing

1. Use caulk or canned spray foam to seal piping holes through the top plates, bottom plates, and subfloor. Avoid running water pipes along exterior walls. Run piping next to floor joists in floors if insulating with batts to minimize disruption of cavity insulation. Water pipes should be insulated to R-3 ([2012 IECC](#)) even when they are installed in interior walls, to conserve the heat in hot water and to minimize the potential for condensation.

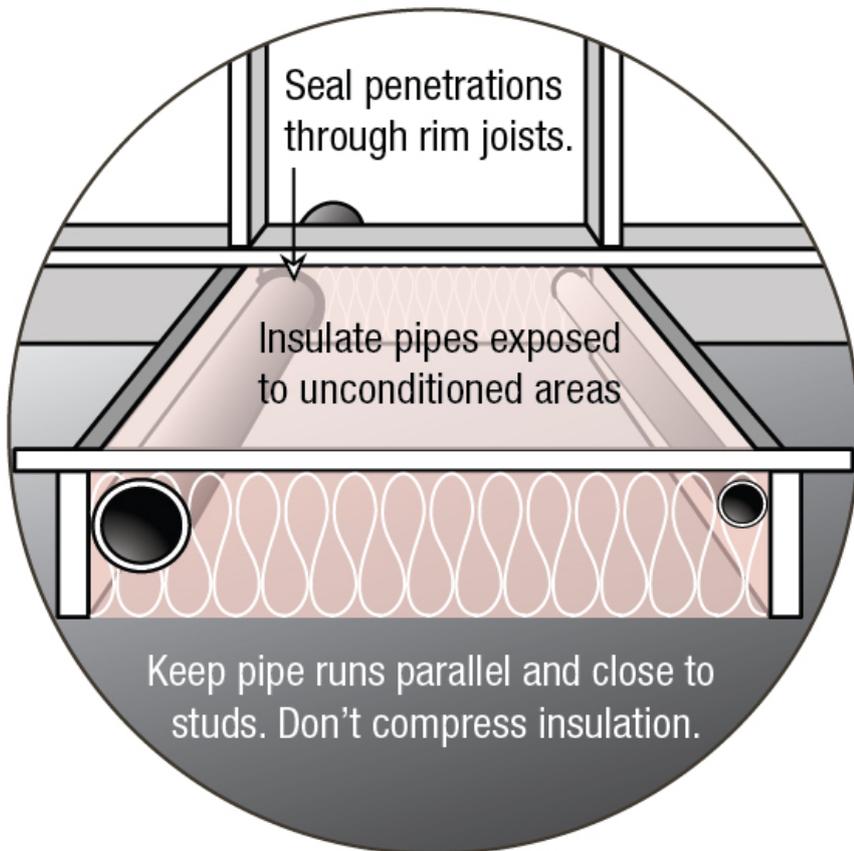


2. For larger holes in the top or bottom plate, use a rubber gasket. Use of a flexible gasket allows some movement of the vent stack without loosening the air seal ([Lstiburek 2009](#)).

1. Cut a hole in the gasket to just fit the width of the pipe.
2. Apply caulk to the top plate.
3. Fit the gasket over the pipe and press down to adhere the gasket to the caulk.
4. Staple the gasket in place.
5. Apply more caulk around the pipe.

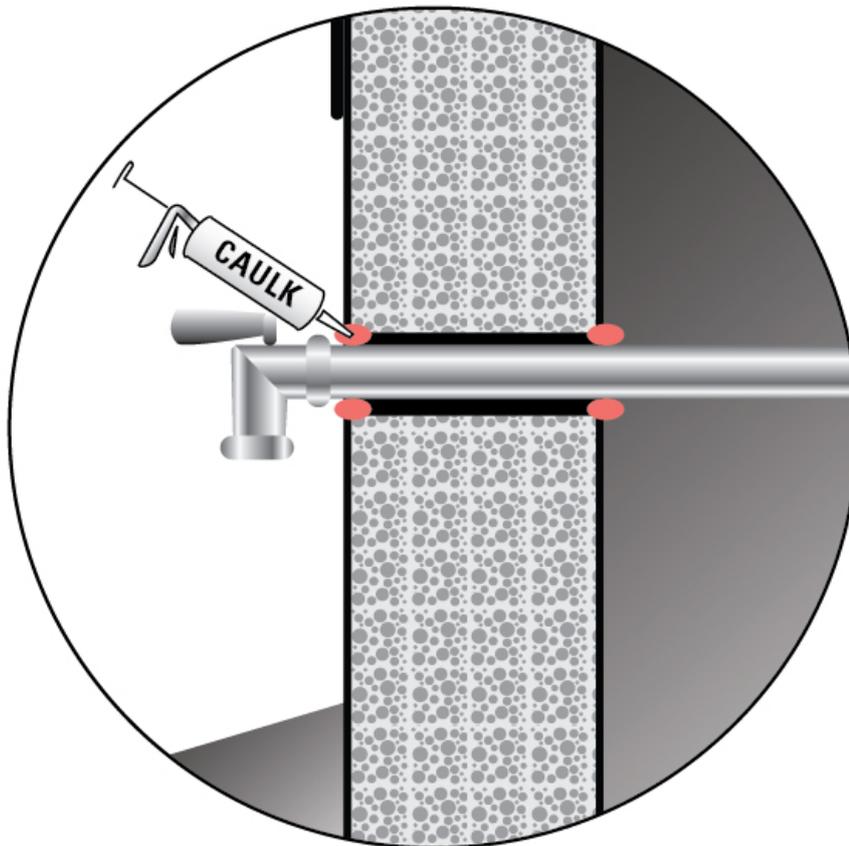


3. Use caulk or canned spray foam to seal the holes made in rim joists for plumbing pipes. Keep the pipe runs close to the floor joists to avoid compressing the insulation.



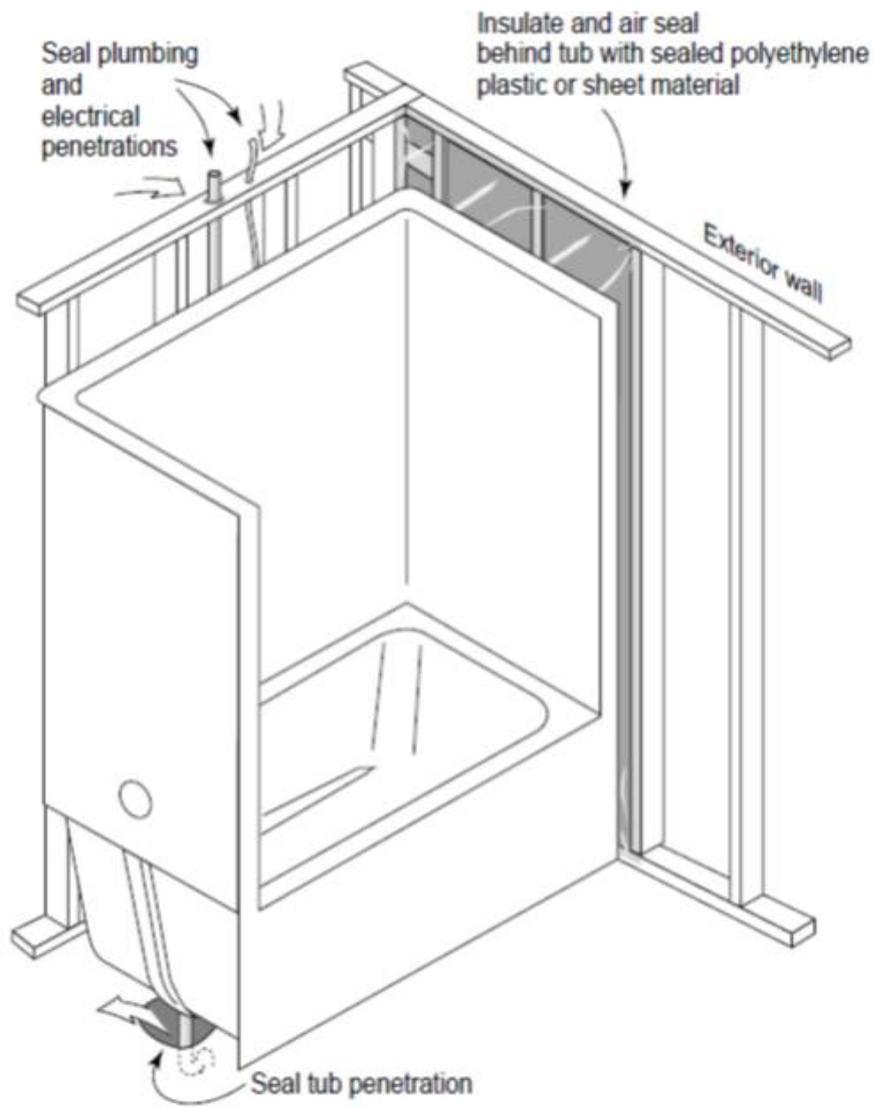
Keep pipes out of exterior walls and seal penetrations through floor.

4. Use caulk or pre-fabricated gaskets to seal around the plumbing pipe penetrations in exterior walls. Make sure the gasket is properly integrated with the house wrap and that cuts in the house wrap around the gasket are taped or caulked.



5. For bath tubs on outside walls, avoid running the water pipes along the exterior walls, if possible. Install piping, then air seal any holes in the exterior wall framing or subfloor.

1. If the tub or shower is installed on an exterior wall, insulate and air seal the exterior wall behind the tub with sheet goods before the tub is installed. [See [Walls behind Showers and Tubs](#) for insulating and air sealing exterior walls behind showers and tubs.]
2. After the drain is installed, seal the hole around the tub drain pipe with canned spray foam. For larger holes, seal the hole with pieces of water-resistant sheet goods such as rigid foam or cement backer board that is cut to fit around the pipe and caulked or foamed in place.



Ensuring Success

Holes around plumbing pipes should be visually checked to see if caulk, canned spray foam, and air blocking materials have been applied before insulation and drywall are installed. Blower door testing, which is conducted as part of the whole-house energy performance test-out, may help indicate whether holes for plumbing in exterior walls and floors have been successfully sealed.

Climate

No climate specific information applies.

Training

Right and Wrong Images



Display Image: [ES_TESRC_5.1.2_PG130_238b_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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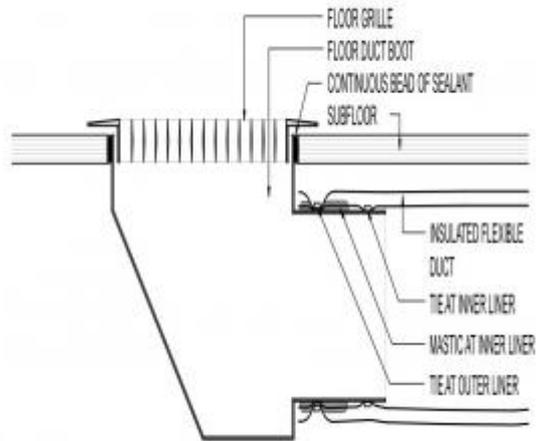


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Courtesy Of: Jim Mackovyak



Display Image: [JM_plumbing-air-sealing_wrong_TE.jpg](#)
Courtesy Of: Jim Mackovyak

CAD



CAD FILE: [511_CAD_4-1_sealed_duct_shaft_5-01033_GBA_1-31-12.dwg](#)

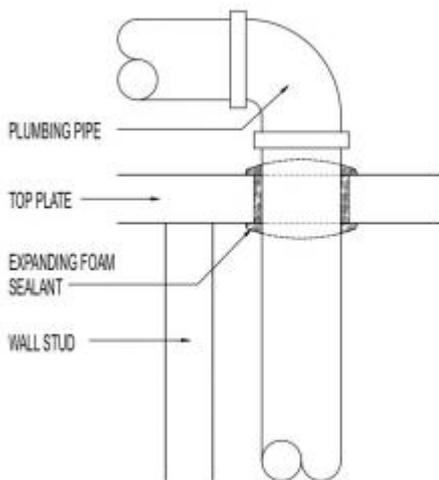
PDF: [511_CAD_4-1_sealed_duct_shaft_5-01033_GBA_1-31-12.pdf](#)

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: [512_CAD_4-2_pipe_thr_top_plate_5-01023_GBA_1-31-12.dwg](#)

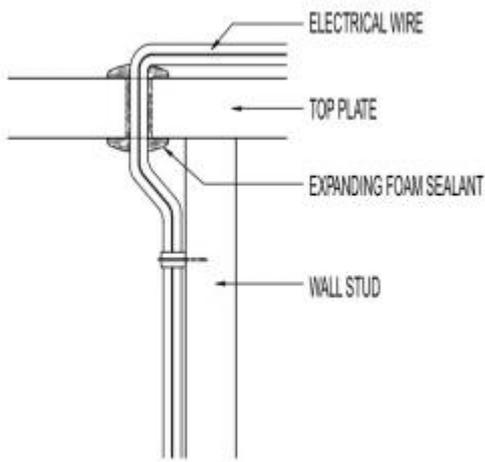
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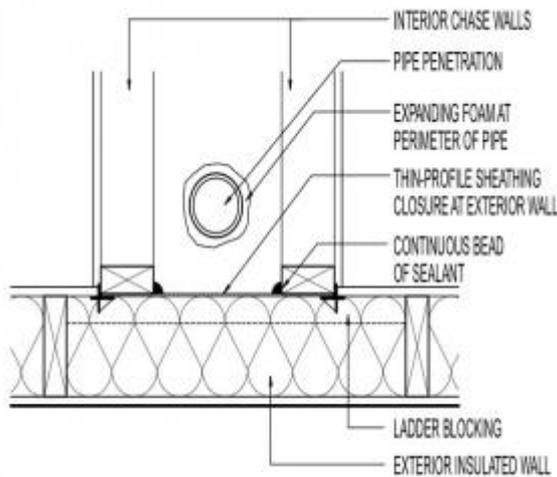
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 PDF: [513 CAD 4-2 wire thr top plate 5-01024_GBA_1-31-12.pdf](#)

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

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Website providing CAD files and drawings of advanced framing details.



CAD FILE: [511 CAD 4-3 flue shaft at chase wall plan view 5-01031_GBA_1-31-12.dwg](#)
 PDF: [511 CAD 4-3 flue shaft at chase wall plan view 5-01031_GBA-1-31-12.pdf](#)

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Website providing CAD files and drawings of advanced framing details.

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:

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

4.1 Ducts, flues, shafts, plumbing, piping, wiring, exhaust fans, & other penetrations to unconditioned space sealed, with blocking / flashing as needed

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.

[2009 IECC](#)

Table 402.4.2 Air Barrier and insulation Inspection Component Criteria, Shafts, penetrations: Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space are air sealed.* Table 402.4.2 Air Barrier and insulation Inspection Component Criteria, Plumbing and wiring: Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.*

[2009 IRC](#)

Section P2606.1 General. Roof and exterior wall penetrations to be made water tight. Joints at the roof, around vent pipes, to have lead, copper or galvanized iron flashings or approved elastomeric material.* Table N1102.4.2 Air Barrier and insulation Inspection Component Criteria, Shafts, penetrations: Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space are air sealed.* Table N1102.4.2 Air Barrier and insulation Inspection Component Criteria, Plumbing and wiring: Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.*

[2012 IECC](#)

Table R402.4.1.1 Air Barrier and Insulation Installation, Shafts/penetrations: Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space are air sealed. Table R402.4.1.1 Air Barrier and Insulation Installation, Plumbing and wiring: Insulation is placed between the exterior of the wall assembly and pipes. Batt insulation is cut and fitted around wiring and plumbing, or for insulation that on installation readily conforms to available space such insulation shall fill all space between wall and piping/wiring.*

[2012 IRC](#)

Section P2607.1 General. Roof and exterior wall penetrations to be made water tight. Joints at the roof, around vent pipes, to have lead, copper or galvanized iron flashings or approved elastomeric material.* Table N1102.4.1.1 Air Barrier and Insulation Installation, Shafts/penetrations: Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space are air sealed. Table N11402.4.1.1 Air Barrier and Insulation Installation, Plumbing and wiring: Insulation is placed between the exterior of the wall assembly and pipes. Batt insulation is cut and fitted around wiring and plumbing, or for insulation that on installation readily conforms to available space such insulation shall fill all space between wall and piping/wiring.*

*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

None Available

References and Resources*

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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.
2. [DOE Zero Energy Ready Home National Program Requirements](#)
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Organization(s): DOE
Publication Date: August, 2015
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3. [ENERGY STAR Certified Homes, Version 3 \(Rev. 08\) National Program Requirements](#)
Author(s): EPA
Organization(s): EPA
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4. [Sealing Air Barrier Penetrations](#)
Author(s): Lstiburek
Organization(s): BSC
Publication Date: May, 2009
Information sheet about air sealing.
5. [Technology Fact Sheet - Air Sealing](#)
Author(s): Southface Energy Institute, ORNL
Organization(s): DOE
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Brochure with information for homeowners about the benefits of air sealing.
6. [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.

Contributors to this Guide

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