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Weatherization Single-Family Home Job Aids

Weatherization Single-Family Home Job Aids

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1-1

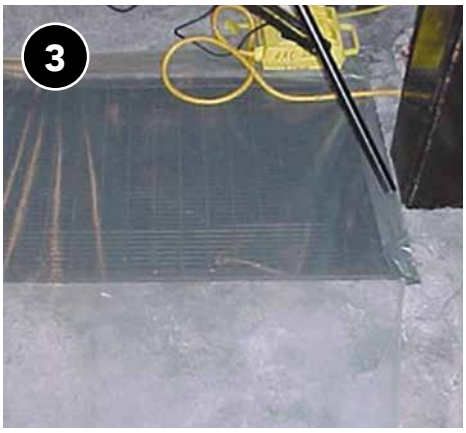
Interior Lead-Safe Weatherization

Job Aid for Work Lead-Safe Badge

Aligns with or exceeds Lead Renovation, Repair, and Painting Rule (RRP)

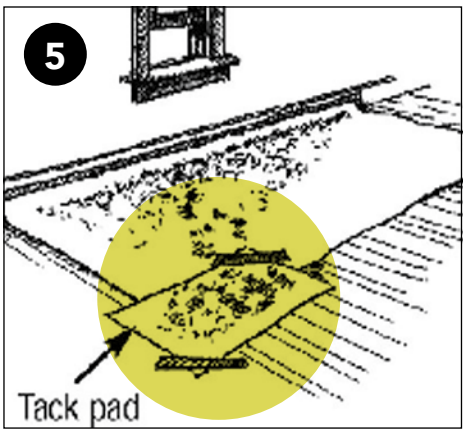
Move all objects out of work area or cover with plastic sheeting. Seal all edges and seams.

Use disposable physical barriers to mark out and contain work area dust and debris. Cover access doorways within the work area using two pieces of plastic sheeting.



Six feet in any direction from the work area, cover surfaces with plastic sheeting, taped in place, including HVAC access points. Close and cover windows.

Post warning signs outside the work area and at entry doors leading to the work area to prevent unauthorized personnel from entering. Note; the warning sign language should be in the primary language spoken by the occupants and comply with the authority having jurisdiction (e.g., Environmental Protection Agency (EPA), Weatherization Assistance Program, U.S. Department of Housing and Urban Development, etc.).



Use tack pads at access points to containment area to minimize dust and debris being tracked outside area.

Wear appropriate personal protective equipment (PPE), including disposable coveralls, gloves, and P-100 HEPA disposable or fit-tested respirator.

Utilize hand tools and/or shrouded tools attached to a HEPA vacuum that minimize dispersion of dust and debris.

Wipe down surfaces and vacuum work area, taking special care and attention with cracks and crevices where dust and debris might collect.

Carefully roll up disposable physical barriers, folding the dirty side inward and dispose of any plastic sheeting or other disposable materials in the work area.

After stepping on a tack pad and using a HEPA vacuum to clean residual dust; remove PPE outside, taking care to avoid contact with contaminated surfaces of the suit, gloves, etc. Dispose of PPE in a plastic waste bag.

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Checklist

Work lead-safe

DESIRED OUTCOME

Protect workers and occupants from potential lead hazards[1]

EPA's RRP job site requirements[2]

- [ ] Signs posted clearly define the work area and warn occupants and other persons not involved in renovation activities to remain outside of the work area.

  These signs are in the language of the occupants.

- [ ] Work area contained so that no dust or debris leaves the work area while the renovation is being performed.

- [ ] Worker can identify PPE requirements: P-100 respirator, disposable coveralls, gloves.

Interior job site setup requirements

- [ ] All objects removed from the work area or covered with plastic sheeting with all seams and edges sealed.

- [ ] All ducts opening into the work area closed and covered with taped-down plastic sheeting.

- [ ] Windows and doors in the work area closed.

- [ ] Doors in work area covered with plastic sheeting.

- [ ] Floor surface covered with taped-down plastic sheeting in the work area, a minimum of **six feet** beyond the perimeter of surfaces undergoing renovation or a sufficient distance to contain the dust, **whichever is greater.**

  Plastic sheeting is 6-mil OR two layers of 4-mil.

  If a vertical containment system is employed, floor covering may stop at the vertical barrier, providing it is impermeable; extends from floor to ceiling; and is tightly sealed at floors, ceilings, and walls.

1. *Relevant Standards: EPA RRP Standards.*
2. *EPA requirements include additional specifications for clean-up and record keeping. Those responsibilities typically fall to a crew leader or the certified renovator, not the entry-level installer this badge is intended for.*

The Weatherization Installer Job Aids were developed by Simonson Management Services under contract (GS-10F-0065U/89243422FEE400259) and published by the National Renewable Energy Laboratory under contract (DE-AC36-08GO28308) with the U.S. Department of Energy. These job aids were funded by the Weatherization Assistance Program with contributions from the weatherization training network.

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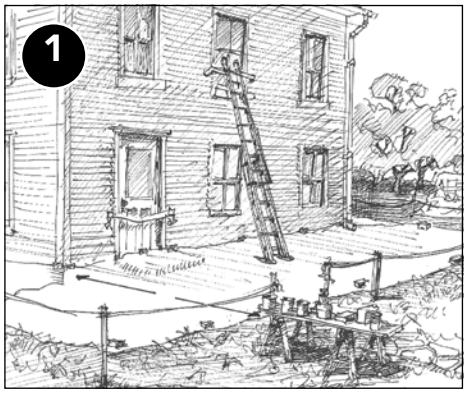
Exterior Lead-Safe Weatherization

Job Aid for Work Lead-Safe Badge

Aligns with Lead Renovation, Repair, and Painting Rule (RRP)



Create containment area with plastic sheeting 10 feet in any direction from work area and use barrier tape to define a perimeter 20 feet from work area to prevent unauthorized personnel from entering.

Post signs at least 20 feet from work area to prevent anyone from entering work area unintentionally.

Close all doors and windows within 20 feet of the work area. Note that doors used as entrances to the work area should be covered with plastic sheeting that allows workers to pass through while containing the spread of dust.

Where houses are located close together, vertical containment will be necessary. If vertical containment is not feasible, consider completing work from the interior.

Tape plastic up onto work surface and utilize systems to catch debris while limiting damage to exterior plantings.

Wear proper personal protective equipment (PPE), including disposable coveralls, P-100 respirator, gloves, and eye protection.

Use hand tools or shrouded power tools attached to a HEPA vacuum to limit the spread of dust and debris.

Clean work area and carefully fold and dispose of plastic sheeting in a plastic waste bag.

Remove PPE outside, avoiding contact with contaminated surfaces of suit, gloves, etc., and dispose of it immediately.

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Checklist

Work lead-safe

DESIRED OUTCOME

Protect workers and occupants from potential lead hazards[1]

EPA's RRP job site requirements[2]

- [ ] Signs posted clearly define the work area and warn occupants and other persons not involved in renovation activities to remain outside of the work area.

  These signs are in the language of the occupants.

- [ ] Work area contained so that no dust or debris leaves the work area while the renovation is being performed.

- [ ] Worker can identify PPE requirements: P-100 respirator, disposable coveralls, gloves.

Exterior job site setup requirements

- [ ] All doors and windows within 20 feet of the renovation are closed.

- [ ] Doors within the work area that will be used while the job is being performed are covered with plastic sheeting in a manner that allows workers to pass through while confining dust and debris.

- [ ] Ground is covered with plastic sheeting or other disposable impermeable material extending a minimum of **10 feet** beyond the perimeter or a sufficient distance to collect falling paint debris, **whichever is greater.**

  If a property line prevents 10 feet of such ground covering, ensure that vertical containment or equivalent extra precautions are in place to prevent contamination of adjacent buildings and property.

- [ ] In situations where, for example, work areas are in close proximity to other buildings, windy conditions, etc., take extra precautions such as vertical containment to contain the work area.

1. *Relevant Standards: EPA RRP Standards.*
2. *EPA requirements include additional specifications for clean-up and record keeping. Those responsibilities typically fall to a crew leader or the Certified renovator, not the entry-level installer this badge is intended for.*

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Air Seal Top Plates in Attic

Job Aid for Air Seal Attic Floor Badge

Aligns with Standard Work Specifications 3.0101.1, 3.0102.11

BEFORE

AFTER

SEAL TOP PLATES Seal perimeter at all gaps and extend sealant up onto adjacent materials.

CAULK
Apply caulk to areas with gap 1/4 inch or smaller. Note that a variety of caulks are available and the material should be rated for the task (e.g., high-temperature rated if in contact or close proximity to a heat source).

SPRAY FOAM MASTIC
Apply spray foam to gaps larger than 1/4 inch and up to 2 inches wide.

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Checklist

Air seal attic floor

DESIRED OUTCOME

Holes, penetrations, chases, cracks, gaps, and joints sealed to prevent air leakage and moisture movement between the attic and conditioned space.[1]

Job Site Requirements[2]

- [ ] Existing insulation was removed as needed to access air sealing locations.
- [ ] All wall cavities are enclosed on all sides (e.g., have top and bottom plates). Additional blocking was installed where necessary.
- [ ] The following cracks, penetrations, and chases are sealed according to the work order to prevent air movement with the appropriate materials based on hole sizes according to the MATERIALS GUIDELINES table at right:
  - [ ] Top plates of all walls
  - [ ] Tongue and groove ceilings
  - [ ] Chases
  - [ ] Dropped soffits
  - [ ] Recessed lights
  - [ ] Plumbing vent pipes
  - [ ] Electrical penetrations
  - [ ] Exhaust fans
  - [ ] Dropped ceilings
  - [ ] Stairwells
  - [ ] Chimney/flue
  - [ ] Ductwork penetrations into attic
  - [ ] Any other holes/penetrations in the attic plane/boundary
- [ ] Work area cleaned.

AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4" to 2" (medium)	One component foam or mastic
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

1. Relevant Standards: 3.0101.1, 3.0102.11

2. High-temp areas and attic hatches are addressed in separate badges.

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Air Seal an Attic Dropped Soffit or Large Opening

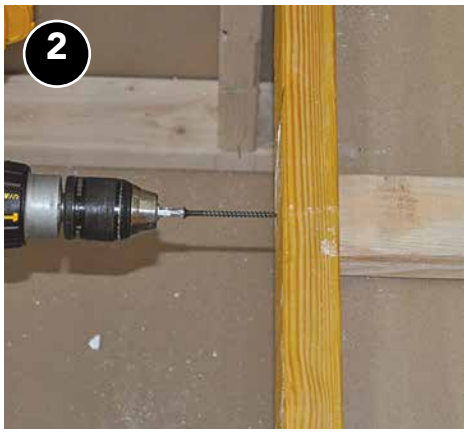
Job Aid for Air Seal Attic Floor Badge

Aligns with Standard Work Specifications 3.0101.1, 3.0102.9

Cap and seal openings from the attic

Soffits, coffered ceilings, and other design details can create lower sections in the ceiling line and often are not sealed or insulated properly.

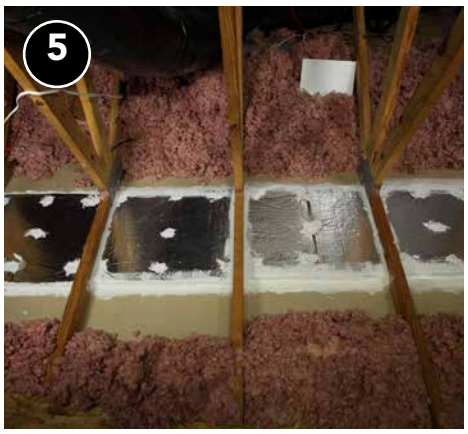
For openings larger than 24 inches, support braces will be necessary.



If necessary, attach bracing across joists securely, spacing no more than 24 inches apart.

Apply sealant along top plates, bracing, and framing members prior to attaching rigid material and secure in place with mechanical fasteners.

Seal seams, edges, and the tops of all mechanical fasteners.



The pressure boundary is now aligned and ready for insulation.

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Checklist

Air seal attic floor

DESIRED OUTCOME

Holes, penetrations, chases, cracks, gaps, and joints sealed to prevent air leakage and moisture movement between the attic and conditioned space.[1]

Job Site Requirements[2]

- [ ] Existing insulation was removed as needed to access air sealing locations.
- [ ] All wall cavities are enclosed on all sides (e.g., have top and bottom plates). Additional blocking was installed where necessary.
- [ ] The following cracks, penetrations, and chases are sealed according to the work order to prevent air movement with the appropriate materials based on hole sizes according to the MATERIALS GUIDELINES table at right:
  - [ ] Top plates of all walls
  - [ ] Tongue and groove ceilings
  - [ ] Chases
  - [ ] Dropped soffits
  - [ ] Recessed lights
  - [ ] Plumbing vent pipes
  - [ ] Electrical penetrations
  - [ ] Exhaust fans
  - [ ] Dropped ceilings
  - [ ] Stairwells
  - [ ] Chimney/flue
  - [ ] Ductwork penetrations into attic
  - [ ] Any other holes/penetrations in the attic plane/boundary
- [ ] Work area cleaned.

AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4" to 2" (medium)	One component foam or mastic
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

1. Relevant Standards: 3.0101.1, 3.0102.9

2. High-temp areas and attic hatches are addressed in separate badges.

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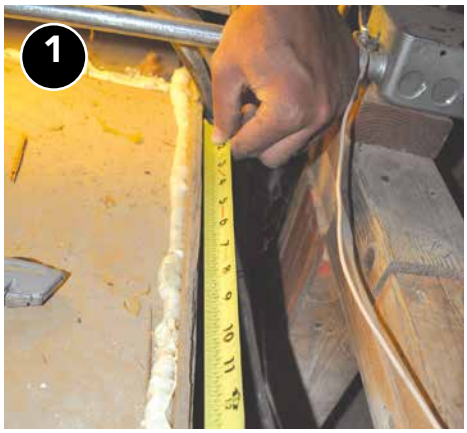
2-3

Air Seal an Attic Chase or Small Opening

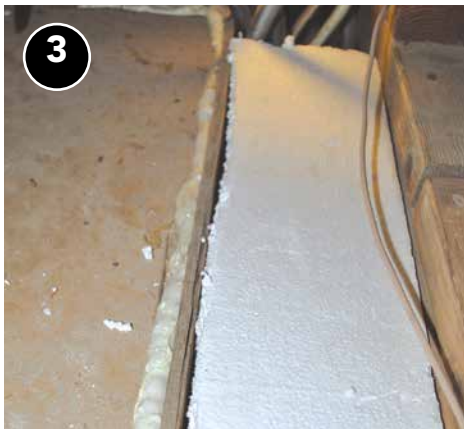
Job Aid for Air Seal Attic Floor Badge

Aligns with Standard Work Specifications 3.0101.1



Measure the opening of the chase in a location that will maintain the pressure plane.

Cut material to fit, paying attention to locations of wires and pipes.



Friction fit the piece and mechanically fasten where feasible.

Seal all edges with caulk, spray foam, or mastic.

Extend sealing to adjacent materials to ensure a complete air seal.

When properly sealed, air movement will cease through these spaces.

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Checklist

Air seal attic floor

DESIRED OUTCOME

Holes, penetrations, chases, cracks, gaps, and joints sealed to prevent air leakage and moisture movement between the attic and conditioned space.[1]

Job Site Requirements[2]

- [ ] Existing insulation was removed as needed to access air sealing locations.
- [ ] All wall cavities are enclosed on all sides (e.g., have top and bottom plates). Additional blocking was installed where necessary.
- [ ] The following cracks, penetrations, and chases are sealed according to the work order to prevent air movement with the appropriate materials based on hole sizes according to the MATERIALS GUIDELINES table at right:
  - [ ] Top plates of all walls
  - [ ] Tongue and groove ceilings
  - [ ] Chases
  - [ ] Dropped soffits
  - [ ] Recessed lights
  - [ ] Plumbing vent pipes
  - [ ] Electrical penetrations
  - [ ] Exhaust fans
  - [ ] Dropped ceilings
  - [ ] Stairwells
  - [ ] Chimney/flue
  - [ ] Ductwork penetrations into attic
  - [ ] Any other holes/penetrations in the attic plane/boundary
- [ ] Work area cleaned.

AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4" to 2" (medium)	One component foam or mastic
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

1. Relevant Standards: 3.0101.1

2. High-temp areas and attic hatches are addressed in separate badges.

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2-4

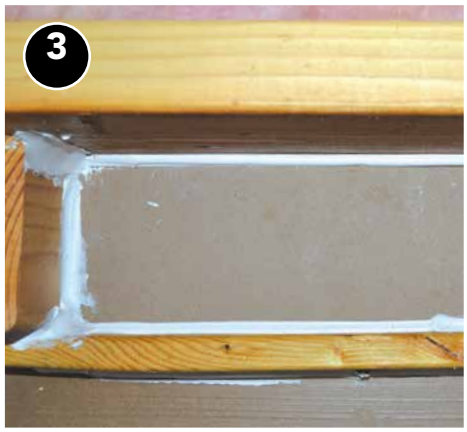
Air Seal Balloon Framing From Attic

Job Aid for Air Seal Attic Floor Badge

Aligns with Standard Work Specifications 3.0101.1, 3.0102.4

Block the opening of balloon framed sidewalls in alignment with the pressure boundary.

Blocking material options include lumber, gypsum board, XPS [extruded polystyrene], or bagged fiberglass batts.



Blocking material needs to be appropriate for potential weight load.

Securely fasten rigid material capable of withstanding air pressure if the wall cavities will be dense-packed.

Seal any remaining gaps with caulk, one-part foam, or mastic. Extend the sealant to adjacent materials.

By sealing at the top of the cavity, airflow is stopped and no air movement should be visible when checking your work with smoke at a test pressure of 50 pascals.

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Checklist

Air seal attic floor

DESIRED OUTCOME

Holes, penetrations, chases, cracks, gaps, and joints sealed to prevent air leakage and moisture movement between the attic and conditioned space.[1]

Job Site Requirements[2]

- [ ] Existing insulation was removed as needed to access air sealing locations.
- [ ] All wall cavities are enclosed on all sides (e.g., have top and bottom plates). Additional blocking was installed where necessary.
- [ ] The following cracks, penetrations, and chases are sealed according to the work order to prevent air movement with the appropriate materials based on hole sizes according to the MATERIALS GUIDELINES table at right:
  - [ ] Top plates of all walls
  - [ ] Tongue and groove ceilings
  - [ ] Chases
  - [ ] Dropped soffits
  - [ ] Recessed lights
  - [ ] Plumbing vent pipes
  - [ ] Electrical penetrations
  - [ ] Exhaust fans
  - [ ] Dropped ceilings
  - [ ] Stairwells
  - [ ] Chimney/flue
  - [ ] Ductwork penetrations into attic
  - [ ] Any other holes/penetrations in the attic plane/boundary
- [ ] Work area cleaned.

AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4" to 2" (medium)	One component foam or mastic
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

1. Relevant Standards: 3.0101.1, 3.0102.4

2. High-temp areas and attic hatches are addressed in separate badges.

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2-5

Seal Insulation-Contact Rated Recessed Lights

Job Aid for Air Seal Attic Floor Badge

Aligns with Standard Work Specifications 3.0101.1

BEFORE

Insulation-contact rated recessed lights are commonly installed in the ceiling between the upper story and the attic, meaning gaps around them allow for significant air leakage.

AFTER

Apply a bead of caulk to seal the gap between the fixture and ceiling. The small holes in the fixture itself can be sealed by installing a pre-made or commercially available cover over the fixture from the attic. The edges of the cover are then sealed to prevent conditioned air from entering the attic.

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Checklist

Air seal attic floor

DESIRED OUTCOME

Holes, penetrations, chases, cracks, gaps, and joints sealed to prevent air leakage and moisture movement between the attic and conditioned space.[1]

Job Site Requirements[2]

- [ ] Existing insulation was removed as needed to access air sealing locations.
- [ ] All wall cavities are enclosed on all sides (e.g., have top and bottom plates). Additional blocking was installed where necessary.
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  - [ ] Plumbing vent pipes
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  - [ ] Stairwells
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  - [ ] Ductwork penetrations into attic
  - [ ] Any other holes/penetrations in the attic plane/boundary
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AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4" to 2" (medium)	One component foam or mastic
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

1. Relevant Standards: 30101.1

2. High-temp areas and attic hatches are addressed in separate badges.

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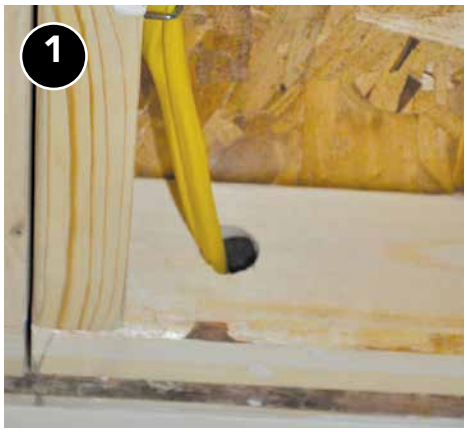
2-6

Seal Electrical and Other Penetrations in Attic

Job Aid for Air Seal Attic Floor Badge

Aligns with Standard Work Specifications 3.0101.1, 6.0201.1, 6.0201.2



Electrical, plumbing, and HVAC penetrations are often oversized.

For smaller gaps, caulk is enough to seal the hole.

Holes larger than 1/4 inch may require support for the sealant.

Inserting backer rod provides infill to support the sealant.

Seal to cover entire opening, including all backer rod.

Other penetrations such as plumbing vents can be sealed using foam or caulk with backer rod as described in step 4.

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Checklist

Air seal attic floor

DESIRED OUTCOME

Holes, penetrations, chases, cracks, gaps, and joints sealed to prevent air leakage and moisture movement between the attic and conditioned space.[1]

Job Site Requirements[2]

- [ ] Existing insulation was removed as needed to access air sealing locations.
- [ ] All wall cavities are enclosed on all sides (e.g., have top and bottom plates). Additional blocking was installed where necessary.
- [ ] The following cracks, penetrations, and chases are sealed according to the work order to prevent air movement with the appropriate materials based on hole sizes according to the MATERIALS GUIDELINES table at right:
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  - [ ] Plumbing vent pipes
  - [ ] Electrical penetrations
  - [ ] Exhaust fans
  - [ ] Dropped ceilings
  - [ ] Stairwells
  - [ ] Chimney/flue
  - [ ] Ductwork penetrations into attic
  - [ ] Any other holes/penetrations in the attic plane/boundary
- [ ] Work area cleaned.

AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4" to 2" (medium)	One component foam or mastic
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

1. Relevant Standards: 3.0101.1, 6.0201.1, 6.0201.2

2. High-temp areas and attic hatches are addressed in separate badges.

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DOE/GO-102023-5934 • June 2024

Air Seal a Floored Attic

Job Aid for Air Seal Attic Floor Badge

Aligns with SWS 3.0101.1

With property owner permission, remove flooring material to access cavities.

Remove only as much flooring as necessary to gain access to areas that require air sealing, electrical repair, or cavity insulation.

Place blocking material (sealed at edges) as needed to block open cavities and chases prior to adding insulation.

Air seal. Check for and air seal electrical, plumbing, and HVAC penetrations properly.

Reinstall the flooring after all work is complete.

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Checklist

Air seal attic floor

DESIRED OUTCOME

Holes, penetrations, chases, cracks, gaps, and joints sealed to prevent air leakage and moisture movement between the attic and conditioned space.[1]

Job Site Requirements[2]

- ☐ Existing insulation was removed as needed to access air sealing locations.
- ☐ All wall cavities are enclosed on all sides (e.g., have top and bottom plates). Additional blocking was installed where necessary.
- ☐ The following cracks, penetrations, and chases are sealed according to the work order to prevent air movement with the appropriate materials based on hole sizes according to the MATERIALS GUIDELINES table at right:
  - ☐ Top plates of all walls
  - ☐ Tongue and groove ceilings
  - ☐ Chases
  - ☐ Dropped soffits
  - ☐ Recessed lights
  - ☐ Plumbing vent pipes
  - ☐ Electrical penetrations
  - ☐ Exhaust fans
  - ☐ Dropped ceilings
  - ☐ Stairwells
  - ☐ Chimney/flue
  - ☐ Ductwork penetrations into attic
  - ☐ Any other holes/penetrations in the attic plane/boundary

AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4" to 2" (medium)	One component foam or mastic with backer/mesh
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

- ☐ Work area cleaned.

1. Relevant Standards: 3.0101.1
2. High temp areas and attic hatches are addressed in separate badges.

The Weatherization Installer Job Aids were developed by Simonson Management Services under contract (GS-10F-0065U/89243422FEE400259) and published by the National Renewable Energy Laboratory under contract (DE-AC36-08GO28308) with the U.S. Department of Energy. These job aids were funded by the Weatherization Assistance Program with contributions from the weatherization training network.

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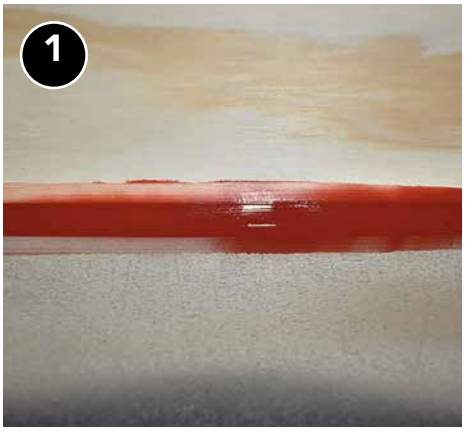
Seal Around Chimneys and Flues

Job Aid for Seal and Dam High-Temperature Heat Sources in Attic Badge

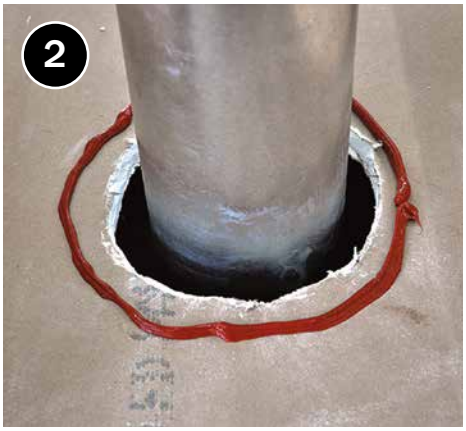
Aligns with Standard Work Specifications 3.0102.2

BEFORE

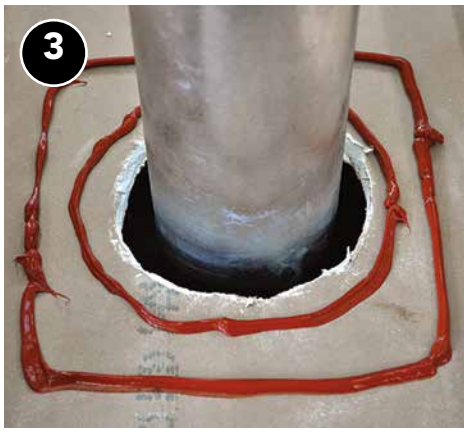
Clear insulation away from chimney or flue.



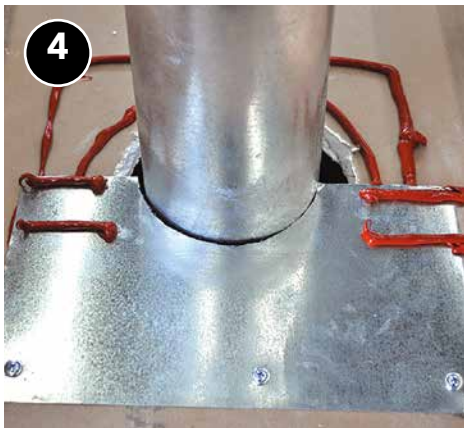
Select high-temperature caulk sealant that will remain flexible during temperature changes between materials.



Apply an unbroken ring of caulk directly to clean decking to match the perimeter of sheet metal backing.

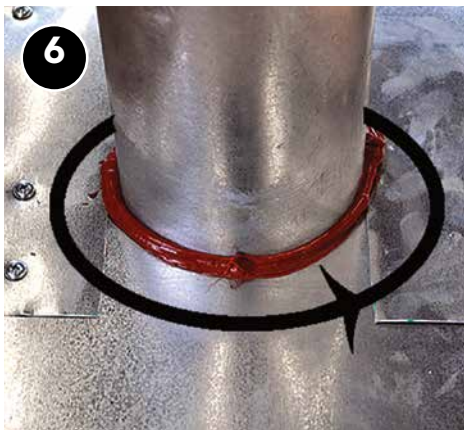


Install a second layer of caulk around the first.

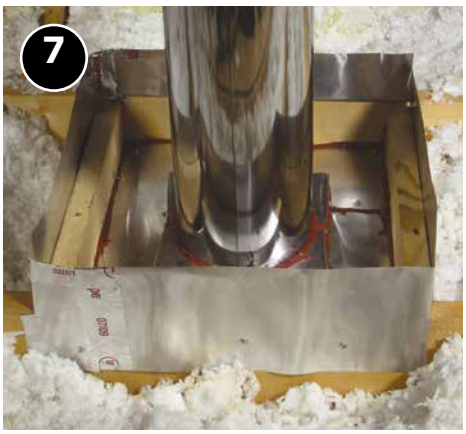


Set the first layer of sheet metal in place, leaving no more that a 1/4" gap around the chimney. Mechanically fasten the sheet metal to the adjacent framing and apply additional caulk where the second piece of sheet metal will overlap.

Set the second layer of sheet metal in place. Mechanically fasten the second piece of sheet metal to the first piece using 1/4" sheet metal screws, then secure the metal to the adjacent framing using longer screws.



Run bead of high-temperature caulk around the chimney and seal the edge of any remaining gaps to ensure an airtight seal.



Install a durable fixed dam, at least 2 inches higher than final insulation level, keeping all combustible materials at least 3 inches away from flue or chimney.

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Checklist

Seal and dam high-temp heat sources in attic

DESIRED OUTCOME

Ensure safety from fire and prevent air leakage[1]

Combustion Vents/Chimneys/Flues

- ☐ Worker can identify difference between high-temp flues and other vents (e.g., bath ventilation).
- ☐ Chases around high-temp flues are air sealed with approved materials.
- ☐ A durable fixed dam of approved materials is constructed around high-temp flues that:
  - ☐ Allows minimum 3" clearance (or the clearance specified by the authority having jurisdiction).
  - ☐ Stands at least 2" taller than final insulation levels.

1. Relevant Standards: 3.0102.2

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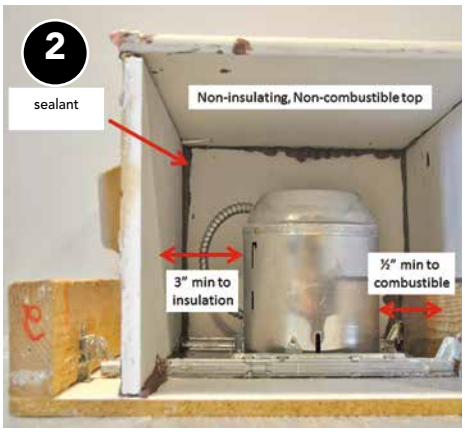
Seal and Dam Around Non-Insulation Contact-Rated (Non-IC) Recessed Lights

Job Aid for Seal and Dam High-Temperature Heat Sources in Attic Badge

Aligns with Standard Work Specifications 3.0102.1

Clear any debris and insulation from around non-IC rated can light.



Enclosure has 3 inches of clearance from lamp to insulation on all sides.

Premade boxes can make installation easier when installation site is clear of framing members.

Seal box on all sides and edges to make continuous barrier from attic.

Top of box must be R-1 or less and left free of insulation. Flag enclosure for added visibility.

When boxed with appropriate clearances and fire-rated materials, fire risk is mitigated and air leakage is reduced.

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Checklist

Seal and dam high-temp heat sources in attic

DESIRED OUTCOME

Ensure safety from fire and prevent air leakage[1]

Non-Insulation Contact (IC) Recessed Lights

- ☐ Where non-IC recessed lights will be left in place enclosures completely surround each fixture.
- ☐ Enclosures:
  - ☐ Are constructed of fire-rated materials (e.g., 5/8" gypsum wallboard).
  - ☐ Maintain 3" clearance between fixture (including wiring, box, and ballast) and insulation.
  - ☐ Are free of insulation on top.
  - ☐ Are flagged to visually identify the location of the enclosure.
- ☐ All edges, gaps, and cracks of the enclosure, and between the enclosure and attic floor, are sealed with caulk, mastic, foam, or other approved material.

1. Relevant Standards: 3.0102.1

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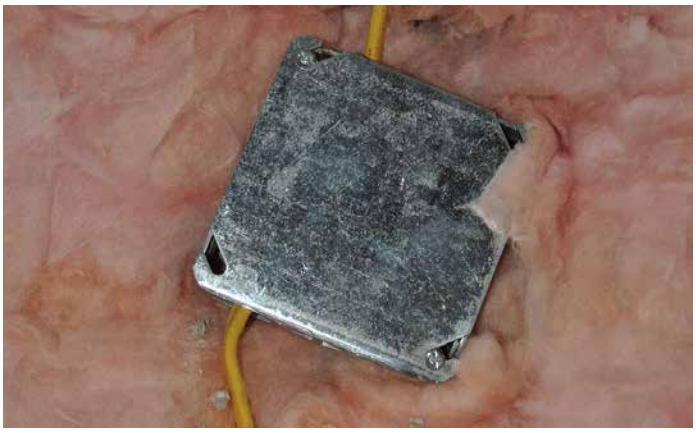
Prepare Attic Floor for Insulation

Job Aid for Prep Attic Floor for Insulation Badge

Aligns with Standard Work Specifications 4.0103.1, 4.0103.2, 4.0103.3, 4.0103.4, 4.0103.5, 4.0103.6, and 4.0103.8

BEFORE YOU BEGIN

- Check for live knob and tube wiring; dam off when possible, or replace with modern wiring.
- Cover junction boxes and attach flag for visibility.



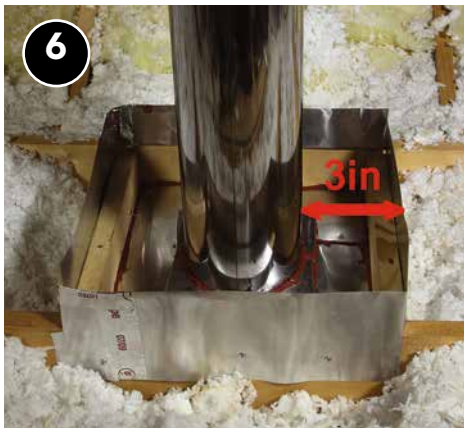
Remove stored materials.

Route exhaust fan ducts to outside, insulate the ducting to R-8.

Ensure air sealing work is complete prior to adding insulation.

Install baffles, if needed. Ensure 1–2 inches of space between the baffle and roof decking for airflow.

Insulation depth rulers installed, 1 per 300 square feet.



Dams are built around heat sources and air sealing is completed using approved materials (e.g., metal flashing, high-temperature rated sealants, etc.). The damming should be higher than the finished depth of any new insulation. Note that the clearance distance from damming to insulation can vary; follow guidance from the authority having jurisdiction.

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Checklist

Prep attic floor for insulation

DESIRED OUTCOME

Provide adequate access to the workspace, indicate location of electrical boxes for future servicing, prevent electrical hazards, maintain existing attic ventilation, and generally provide the groundwork for installation of a consistent thermal boundary between conditioned and unconditioned space.[1]

- ☐ Remove stored or miscellaneous materials that would prevent insulation from being installed level and in contact with the attic floor.
- ☐ Duct ventilation fans to the outside.
- ☐ Cover all wiring junction boxes and flag to be visible above final insulation levels.
- ☐ Seal holes between the attic and the outside.
- ☐ Install soffit vent baffles at all vented soffits.
  - ☐ Soffit vent baffles are installed to the exterior side of the top plate to allow for the highest possible R-value.
  - ☐ Soffit vent baffles maintain a minimum 1" clearance between roof deck and baffle.
- ☐ Remove drywall or subfloor as required to access cavities.
- ☐ Install insulation rulers at a minimum rate of minimum of 1 per 300 square feet of the work area.
- ☐ Install dams around attic access, mechanical equipment, and flues/chimneys.

1. Relevant Standards: 4.0103.1, 4.0103.2, 4.0103.3, 4.0103.4, 4.0103.5, 4.0103.6, and 4.0103.8.

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Dam, Seal, and Insulate an Attic Hatch

Job Aid for Treat Attic Hatch Badge

Aligns With Standard Work Specifications 3.0103.1

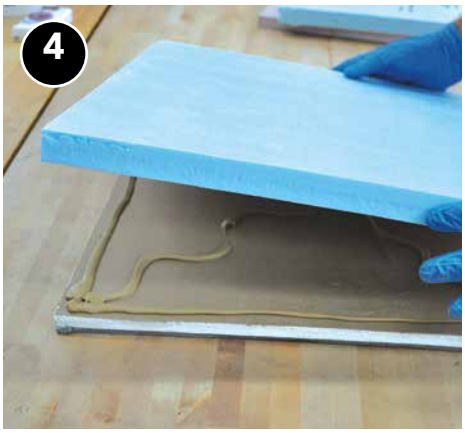
BEFORE

Uninsulated and unsealed attic access points allow conditioned air to escape the home in all seasons and reduce the overall R-value of the attic.

Rigid, durable damming is installed and mechanically fastened in place.

Dam is at least 2 inches taller than the final attic insulation depth.

If replacement is needed, cut a gypsum or plywood board to size and use a durable weatherstrip or closed cell foam tape to create a seal.

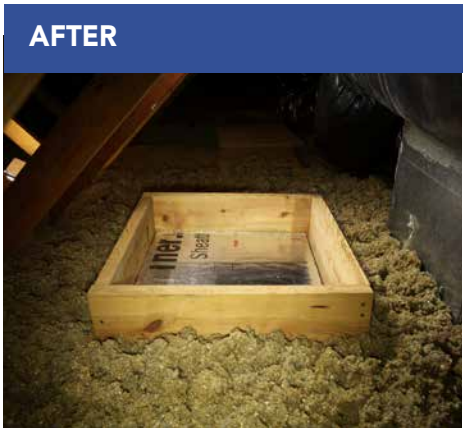


Cut and stack rigid foam insulation, gluing with appropriate adhesive, to build up R-value. Ensure the foam meets thermal or ignition barrier requirements of the authority having jurisdiction.

Hatch is insulated to proper R-value (the maximum R-value structurally allowable, up to the final insulation level of surrounding attic).

Trim is air sealed with appropriate material.

For vertical accesses, run weatherstripping or closed cell foam tape to air seal at these doorways too. Hold vertical accesses closed with latch if necessary.



Safely and durably sealing and insulating attic access doors prevents air movement and reduces heating and cooling loads.

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Checklist

Treat attic hatch

DESIRED OUTCOME

Attic access door or hatches properly sealed and insulated to minimize heat loss or gain and prevent insulation from falling out of attic when accessed.[1]

- ☐ Install rigid,[2] durable attic hatch blocking/dam in a permanent way.
- ☐ Dam will remain 2" taller than final attic insulation depth.
- ☐ Insulate hatch to proper R-value (the maximum R-value structurally allowable, up to the final insulation level of surrounding attic).
- ☐ Durably attach insulation to hatch.
- ☐ Weatherstrip or otherwise treat access to prevent air movement when hatch is closed.
- ☐ Ensure access closes with a tight fit or latch.
- ☐ Air seal trim with appropriate material.
- ☐ Verify air-tightness of hatch when closed with blower door and smoke (or infrared, if temperatures permit).

1. Relevant Standards: 3.0103.1

2. When height around access is limited and variance request has been approved, nonrigid materials may be used for damming attics, but to earn this badge, an appropriate attic must be found to display skills in constructing a rigid dam.

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Dam, Seal, and Insulate a Pull-Down Attic Stairway

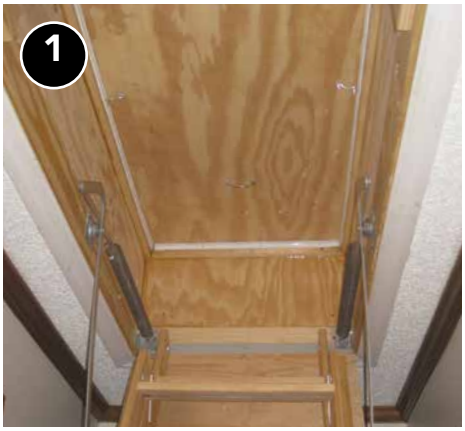
Job Aid for Treat Attic Hatch Badge

Aligns With Standard Work Specifications 3.0103.1

BEFORE

Pull-down stairs can be a weak point in thermal/pressure boundaries, and they can also allow insulation to fall into the home if not properly dammed.

1



Build cover above and around pull-down stair, taller than final insulation height.

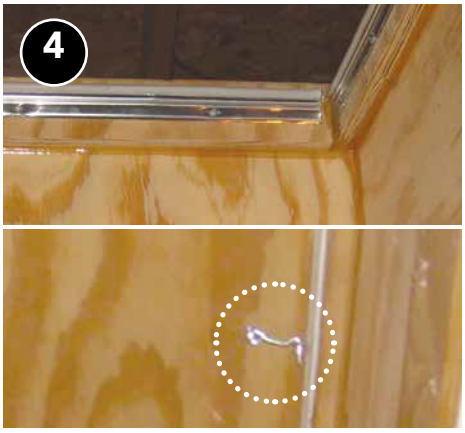
2

Insulate top and sides of dam cover, to appropriate R-value. Use materials that meet the requirements of the applicable fire safety code (e.g., thermal or ignition barriers).

3

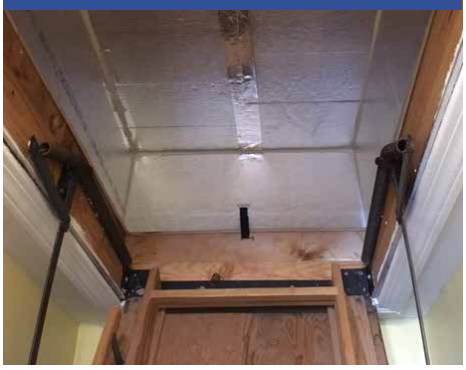
Air seal gaps in framing and edges of trim as needed.

4



Air seal with closed cell foam tape or weatherstripping. Install latches as needed to ensure the access door closes tight to the weatherstripping.

AFTER



Attic pull-down stairs are safely and durably sealed and insulated to prevent air movement and reduce heat transfer.

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Checklist

Treat attic hatch

DESIRED OUTCOME

Attic access door or hatches properly sealed and insulated to minimize heat loss or gain and prevent insulation from falling out of attic when accessed.[1]

- ☐ Install rigid,[2] durable attic hatch blocking/dam in a permanent way.
- ☐ Dam will remain 2" taller than final attic insulation depth.
- ☐ Insulate hatch to proper R-value (the maximum R-value structurally allowable, up to the final insulation level of surrounding attic).
- ☐ Durably attach insulation to hatch.
- ☐ Weatherstrip or otherwise treat access to prevent air movement when hatch is closed.
- ☐ Ensure access closes with a tight fit or latch.
- ☐ Air seal trim with appropriate material.
- ☐ Verify air-tightness of hatch when closed with blower door and smoke (or infrared, if temperatures permit).

1. Relevant Standards: 3.0103.1

2. When height around access is limited and variance request has been approved, nonrigid materials may be used for damming attics, but to earn this badge, an appropriate attic must be found to display skills in constructing a rigid dam.

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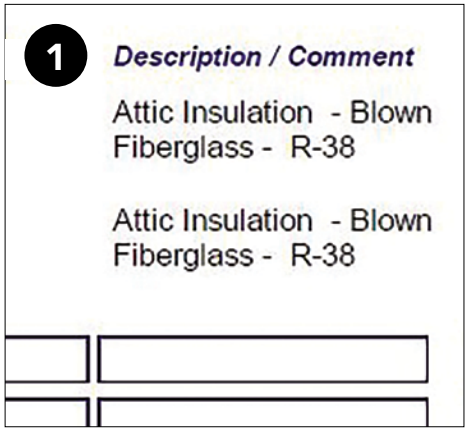
Insulate an Unfloored Attic

Job Aid for Insulate Attic Floor and Pass Inspection First Time Badge

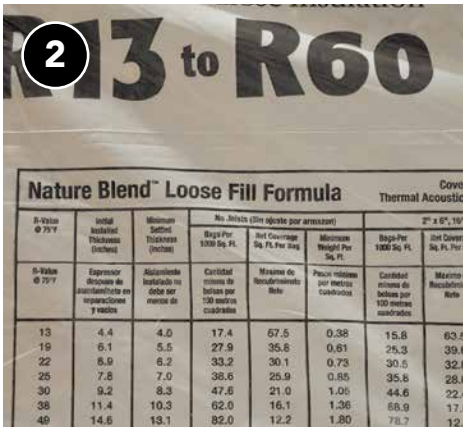
Aligns With Standard Work Specifications 4.0103.2, 4.0103.4, 4.0103.6

BEFORE

Ensure that attic prep work has been completed before starting installation (See 4-1 Prepare Attic Floor for Insulation).



Verify against work order that correct insulation material is being installed.



Verify insulation depth/density against manufacturer's coverage chart.

While installing, regularly check depth of insulation for even coverage and to meet required depth.

Ensure that insulation does not get into dammed-off areas, such as around chimneys and flues and inside soffit baffles.

AFTER

When complete, post insulation certificate by attic entrance.

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Checklist

Insulate attic floor and pass inspection the first time

DESIRED OUTCOME

Consistent thermal boundary between conditioned and unconditioned space controls heat flow.[1]

Preinstallation check:

- ☐ Safety protocols (e.g., venting, lighting, protective barriers) implemented prior to beginning work.
- ☐ Worker can determine whether attic is ready for insulation (e.g., check for air sealing, confirm dams around high-temp items).

Post-installation check:

- ☐ Insulation blown to proper depth.
- ☐ Level and even coverage reaches to all edges.
- ☐ Insulation is not blown onto equipment or between dams and the items dams are protecting.
- ☐ No more than 5 bags over-blown according to manufacturer's coverage chart.
- ☐ When insulating attic platforms or attics with partial platforms, insulation is in contact with air barrier (under platform) not blown over platform.
- ☐ Insulation has no gaps, voids, compression, or misalignment.
- ☐ Applicable sections of house-wide insulation certificate are filled out with[2] insulation type, coverage area, installed thickness, settled thickness, R-value, and number of bags installed.

1. Relevant Standards: 4.0103.2, 40101.4, 4.0103.6

2. Underlined details are required on all insulation certificates. Other items are required only when using blown-in insulation.

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Insulate Under a Floored Attic

Job Aid for Insulate Attic Floor and Pass Inspection First Time Badge

Aligns With Standard Work Specifications 4.0103.6

BEFORE

Attics with flooring often hide uninsulated cavities.

Ensure that floor cavities and chases are blocked securely at both ends with all edges of the blocking sealed.

If boards can be loosened, pry up as few boards as possible to access all cavities. If flooring is in solid sheets, access holes may need to be drilled.

Fill entire cavity with insulation to prescribed density. Reinstall any boards removed and close any access holes when complete.

Occasionally, a homeowner may not want the attic floor to be disturbed. The cavities can also be accessed from below through the ceiling, particularly in garages.

Blocking still needs to be put into place if open cavities extend into conditioned space (e.g., cavity below a knee wall in an outer ceiling joist attic space).

Blow insulation to completely fill cavities to prescribed density.

Fill and reseal access holes to prevent air movement.

AFTER

An insulated attic floor provides a continuous, contiguous, safe, and compliant thermal boundary that reduces air movement.

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Checklist

Insulate attic floor and pass inspection the first time

DESIRED OUTCOME

Consistent thermal boundary between conditioned and unconditioned space controls heat flow.[1]

Preinstallation check:

- ☐ Safety protocols (e.g., venting, lighting, protective barriers) implemented prior to beginning work.
- ☐ Worker can determine whether attic is ready for insulation (e.g., check for air sealing, confirm dams around high-temp items).

Post-installation check:

- ☐ Insulation blown to proper depth.
- ☐ Level and even coverage reaches to all edges.
- ☐ Insulation is not blown onto equipment or between dams and the items dams are protecting.
- ☐ No more than 5 bags over-blown according to manufacturer's coverage chart.
- ☐ When insulating attic platforms or attics with partial platforms, insulation is in contact with air barrier (under platform) not blown over platform.
- ☐ Insulation has no gaps, voids, compression, or misalignment.
- ☐ Applicable sections of house-wide insulation certificate are filled out with[2] insulation type, coverage area, installed thickness, settled thickness, R-value, number of bags installed.

1. Relevant Standards: 4.0103.6

2. Underlined details are required on all insulation certificates. Other items are required only when using blown-in insulation.

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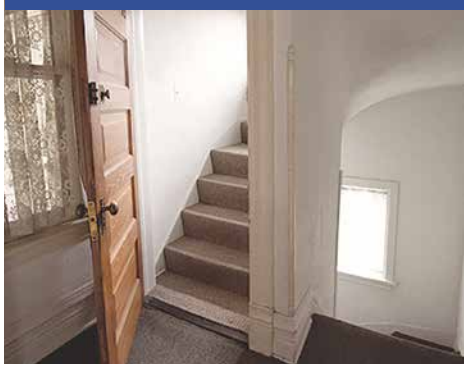
Insulate an Attic Stairway

Job Aid for Insulate Attic Floor and Pass Inspection First Time Badge

Aligns With Standard Work Specifications 4.0104.1, 4.0104.2, 4.0104.3, 4.0104.4, 4.0104.5, 4.0104.6, 4.0201.2, 4.0201.3, 4.0202.1

BEFORE



Attic stairways can offer a unique set of insulation challenges. Clearly define where the thermal and pressure boundary are going to be located before starting insulation.

If walls defining the thermal boundary are accessible from the attic side, choose between batt or blown-in insulation.

Seal off open cavities along the line of the thermal/pressure boundary.

Air seal around blocking material.

Cut batts to size for each individual cavity, ensuring no gaps remain, locating insulation vapor retarder toward conditioned space.

For batt insulation, cover installed batts with backing. For blown-in, attach netting to framing members, cut holes in netting, and blow insulation to an installed density of 3.5 pounds per cubic foot.

If walls are enclosed from attic side, drill holes in stairway walls defining the thermal boundary.

Dense pack stairway walls.

If the stairs have no backing material (e.g., drywall, plaster, etc.) towards the house or conditioned space; insulate with material specified by the work order.

Cover insulation with an approved thermal barrier material for fire safety and to seal off insulation from conditioned space in home.

If backside of stairs already have backing material, blow insulation into cavity behind stairs.

Plug access holes for blown insulation.

Weatherstrip and insulate door using fire safe materials that meet the requirements of the authority having jurisdiction.

AFTER

Insulation provides a continuous, contiguous, safe, and compliant thermal boundary that prevents air movement between the attic and the remainder of the home.

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Checklist

Insulate attic floor and pass inspection the first time

DESIRED OUTCOME

Consistent thermal boundary between conditioned and unconditioned space controls heat flow.[1]

Pre installation check:

- ☐ Safety protocols (e.g., venting, lighting, protective barriers) implemented prior to beginning work.
- ☐ Worker can determine whether attic is ready for insulation (e.g., check for air sealing, confirm dams around high-temp items).

Post-installation check:

- ☐ Insulation blown to proper depth.
- ☐ Level and even coverage reaches to all edges.
- ☐ Insulation is not blown onto equipment or between dams and the items dams are protecting.
- ☐ No more than 5 bags over-blown according to manufacturers' coverage chart.
- ☐ When insulating attic platforms or attics with partial platforms, insulation is in contact with air barrier (under platform), not blown over platform.
- ☐ Insulation has no gaps, voids, compression, or misalignment.
- ☐ Applicable sections of house-wide insulation certificate are filled out with[2] insulation type, coverage area, installed thickness, settled thickness, R-value, and number of bags installed.

1. Relevant Standards: 4.0104.1, 4.0104.2, 4.0104.3, 4.0104.4, 4.0104.5, 4.0104.6, 4.0201.2, 4.0201.3, 4.0202.1

2. Underlined details are required on all insulation certificates. Other items are required only when using blown-in insulation.

The Weatherization Installer Job Aids were developed by Simonson Management Services under contract (GS-10F-0065U/89243422FEE400259) and published by the National Renewable Energy Laboratory under contract (DE-AC36-08GO28308) with the U.S. Department of Energy. These job aids were funded by the Weatherization Assistance Program with contributions from the weatherization training network.

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Air Seal Above the Knee Wall

Job Aid for Seal and Insulate Knee Walls Badge

Aligns With Standard Work Specifications 3.0101.1, 3.0102.11

BEFORE

Knee walls often define the thermal and pressure boundary. Above the knee wall is often an open roof rafter cavity, which may need blocking or the knee wall could be missing a top plate.

After clearing away debris, measure gap above knee wall in line with pressure boundary.

Cut blocking material (extruded polystyrene, wood, gypsum board) to fit gap.

Securely fit infill or blocking material in place and seal around the edges.

An alternative method to steps 1–3 is to bring rigid foam or house wrap material up to the roof decking to block the opening and create an air seal when the edges of the material are sealed to the framing.

If a top plate is required, secure wood in place with mechanical fasteners.

Seal blocking with mastic, caulk, or one-part foam to maintain the pressure boundary and prevent air movement within the cavity.

AFTER

Air sealing the top of a knee wall continues the pressure boundary while supporting additional insulation from the knee wall or roof rafter above.

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Checklist

Seal and insulate knee walls

DESIRED OUTCOME

Knee walls framed to prevent thermal bypass and sealed to prevent air leakage between conditioned and unconditioned space.[1]

Air sealing (check prior to insulation):

- ☐ Existing insulation was removed or adjusted to allow access to top and/or bottom of knee wall.
- ☐ Rigid blocking or other durable material installed:
  - ☐ Beneath the knee wall (floor running under knee wall) and
  - ☐ Above the knee wall (ceiling cavity/ventilation chute/top plate).
- ☐ Installed blocking will stop airflow and support insulation.
- ☐ All joints, cracks, and penetrations, including connection between interior surface and framing, are air sealed.

Insulation:

- ☐ Install fabric or rigid backing material to enclose knee wall cavity in a durable, permanent way.
- ☐ Install insulation to manufacturers' specifications/ proper density.
- ☐ Ensure that insulation has no gaps, voids, compression, or misalignment.
- ☐ Seal holes in backing material as needed.
- ☐ Fill out applicable sections of house-wide insulation certificate with coverage area, thickness, and R-value.
- ☐ Clean work area.

1. Relevant Standards: 3.0101.1, 3.0102.11

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Air Seal Beneath the Knee Wall

Job Aid for Seal and Insulate Knee Walls Badge

Aligns With Standard Work Specifications 3.0101.1

BEFORE

Knee walls often define the thermal and pressure boundary and the open joist cavity below requires careful air sealing.

After clearing away debris, measure gap below knee wall in line with pressure boundary.

Cut blocking material (extruded polystyrene, wood, gypsum board) to fit gap.

Securely fit infill or blocking material in place.

Ensure blocking material is located in line with preferred pressure boundary.

Seal around the edges of the blocking material to align the pressure boundary.

AFTER

Air sealing each and every open joist cavity below the knee wall prevents air movement between the unconditioned attic and the conditioned floor.

SCEP
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Checklist

Seal and insulate knee walls

DESIRED OUTCOME

Knee walls framed to prevent thermal bypass and sealed to prevent air leakage between conditioned and unconditioned space.[1]

Air Sealing (check prior to insulation):

- ☐ Existing insulation was removed or adjusted to allow access to top and/or bottom of knee wall.
- ☐ Rigid blocking or other durable material installed:
  - ☐ Beneath the knee wall (floor running under knee wall) and
  - ☐ Above the knee wall (ceiling cavity/ventilation chute/top plate).
- ☐ Installed blocking will stop air flow and support insulation.
- ☐ All joints, cracks, and penetrations including connection between interior surface and framing are air sealed.

Insulation:

- ☐ Install fabric or rigid backing material to enclose knee wall cavity in a durable, permanent way.
- ☐ Install insulation to manufacturer's specifications/proper density.
- ☐ Insulation has no gaps, voids, compression, or misalignment.
- ☐ Seal holes in backing material as needed.
- ☐ Applicable sections of house-wide insulation certificate are filled out with coverage area, thickness, and R-value.
- ☐ Clean work area.

1. Relevant Standards: 3.0101.1

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Insulate an Attic or Knee Wall With Two-Part Spray Foam

Job Aid for Seal and Insulate Knee Walls Badge

Aligns With Standard Work Specifications 4.0104.5, 4.0104.6

BEFORE

Install durable backing material into any large gaps before applying spray foam to prevent foam from leaking into conditioned space. All surfaces in contact with foam should be free of dust and debris. Ventilate the work space according to manufacturer specifications to ensure workers and occupants are protected from spray foam vapors during and after installation.

Ensure installers are wearing appropriate personal protective equipment (respiratory, skin/body, and eye). Follow the manufacturer's specified temperature guidance for ambient air, surface, and chemical to avoid product failure.

Separate all foam products from living space with a thermal barrier material such as 1/2 inch drywall. Additionally, if the attic is only used for the service of utilities, foam will be separated from the attic space using a suitable ignition barrier. If the attic space is used for storage or occupancy, spray foam will be separated from the attic using a suitable thermal barrier.

AFTER

Spray walls as evenly as possible to the prescribed thickness to achieve the desired R-value. Consult with the manufacturer to determine the correct R-value per inch as it can vary by manufacturer.

SCEP
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Checklist

Seal and insulate knee walls

DESIRED OUTCOME

Knee walls framed to prevent thermal bypass and sealed to prevent air leakage between conditioned and unconditioned space.[1]

Air sealing (check prior to insulation):

- ☐ Existing insulation was removed or adjusted to allow access to top and/or bottom of knee wall.
- ☐ Rigid blocking or other durable material installed:
  - ☐ Beneath the knee wall (floor running under knee wall) and
  - ☐ Above the knee wall (ceiling cavity/ventilation chute/top plate).
- ☐ Installed blocking will stop airflow and support insulation.
- ☐ All joints, cracks, and penetrations, including connection between interior surface and framing, are air sealed.

Insulation:

- ☐ Install insulation to manufacturer's specifications/ proper density.
- ☐ Ensure that insulation has no gaps, voids, compression, or misalignment.
- ☐ Seal holes in backing material as needed.
- ☐ Fill out applicable sections of house-wide insulation certificate with coverage area, thickness, and R-value.
- ☐ Clean work area.

1. Relevant Standards: 4.0104.5, 4.0104.6

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Insulate an Attic or Knee Wall With Blown Insulation

Job Aid for Seal and Insulate Knee Walls Badge

Aligns With Standard Work Specifications 4.0104.1

BEFORE

Air seal gaps and wiring penetrations prior to covering the wall.

Securely install backing material over entire attic wall to create an enclosed cavity. Use wood strips along the studs and edges of the framing to hold the material in place, withstand air pressure, and prevent insulation from spilling out.

Cut holes in rigid backing material or cut small slits in house wrap material to allow access to each cavity.

Blow insulation into cavities to meet dense-pack standards.

Fill all cavities.

Patch all access holes in backing material. Use access hole plugs when a rigid material is used or seal slits in house wrap material with a high quality tape.

Seal all access holes.

AFTER

Once insulated, this attic wall provides a continuous, contiguous, safe, and compliant thermal boundary that prevents air movement. When using rigid foam insulation as the backer material, ensure the material meets fire safety requirements of the authority having jurisdiction.

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Checklist

Seal and insulate knee walls

DESIRED OUTCOME

Knee walls framed to prevent thermal bypass and sealed to prevent air leakage between conditioned and unconditioned space.[1]

Air Sealing (check prior to insulation):

- ☐ Existing insulation was removed or adjusted to allow access to top and/or bottom of knee wall.
- ☐ Rigid blocking or other durable material installed:
  - ☐ Beneath the knee wall (floor running under knee wall) and
  - ☐ Above the knee wall (ceiling cavity/ventilation chute/top plate).
- ☐ Installed blocking will stop airflow and support insulation.
- ☐ All joints, cracks, and penetrations, including connection between interior surface and framing, are air sealed.

Insulation:

- ☐ Install fabric or rigid backing material to enclose knee wall cavity in a durable, permanent way.
- ☐ Install insulation to manufacturer's specifications/ proper density.
- ☐ Ensure that insulation has no gaps, voids, compression, or misalignment.
- ☐ Seal holes in backing material as needed.
- ☐ Fill out applicable sections of house-wide insulation certificate with coverage area, thickness, and R-value.
- ☐ Clean work area.

1. Relevant Standards: 4.0104.1

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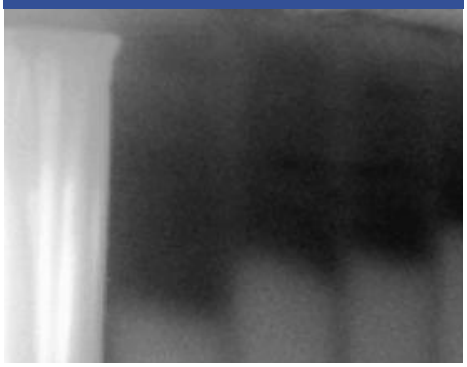
Dense-Pack a Sidewall via Exterior Blow

Job Aid for Install Dense-Pack Sidewall Insulation Badge

Aligns With Standard Work Specifications 4.0202.1

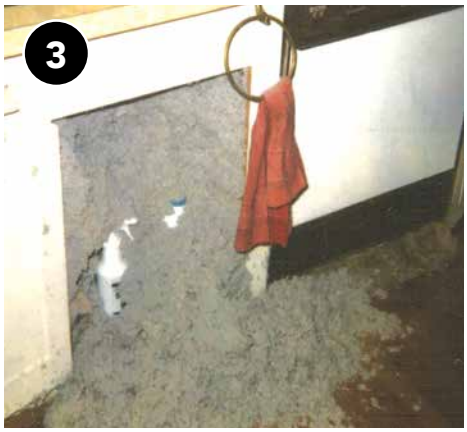
BEFORE



Walls that are missing insulation or underinsulated present opportunities for energy savings. (The darker shaded wall cavities of this thermal image are uninsulated.)

Protect work area from debris and dirt before removing siding.

Ensure balloon-framed walls are blocked at top and bottom to prevent insulation from unintentionally blowing into the attic or basement.



Confirm the wall integrity can withstand the air pressure of blown insulation and make sure all holes are repaired to prevent insulation blowouts.

Remove siding as needed based on the type of exterior cladding material. Many siding types (e.g., vinyl, aluminum, steel) can be loosened with a siding tool.

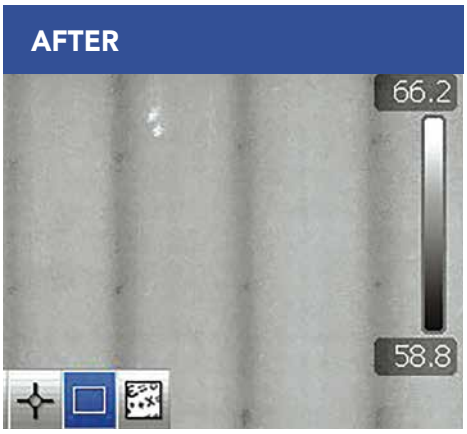
Drill insulation access holes as needed to ensure complete coverage of all uninsulated wall cavities.

Using an injection fill tube, insulate all cavities to the proper density.

Ensure all cavities are filled before completing the job.

Plug and seal insulation access holes. When present, repair the drainage plane to prevent water intrusion.

Carefully reinstall any removed siding.



When properly insulated, the thermal performance of the wall improves and air leakage is reduced. (The lighter shaded wall cavities in this thermal image are insulated.)

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Checklist

Install dense-pack sidewall insulation[1]

DESIRED OUTCOME

Minimize dust and achieve a consistent, uniform thermal boundary between conditioned and unconditioned space to prescribed R-value without voids in a manner that will prevent future settling and minimize framing cavity airflows.[2]

General

- ☐ Drill patterns reflect knowledge of framing.
- ☐ Probe cavities to ensure all were accessed.
- ☐ Fill all cavities to proper density. (Verify before holes are plugged or with blower door and infrared scan if temperature permits.)
- ☐ Patch drill holes as required by standards.
- ☐ Fill out applicable sections of house-wide insulation certificate with coverage area, thickness, and R-value.
- ☐ Clean the jobsite.

Exterior

- ☐ Install or use proper jobsite protection measures (e.g., covering shrubs).
- ☐ Remove siding as needed to prevent damage.
- ☐ Reinstall siding in a workmanlike manner.

Interior

- ☐ Install or use proper dust control measures (e.g., drill shrouds, vertical containment).

1. To earn badge, at least one of total number of jobs must be blown from exterior and one from interior.

2. Relevant Standards: 4.0202.1

The Weatherization Installer Job Aids were developed by Simonson Management Services under contract (GS-10F-0065U/89243422FEE400259) and published by the National Renewable Energy Laboratory under contract (DE-AC36-08GO28308) with the U.S. Department of Energy. These job aids were funded by the Weatherization Assistance Program with contributions from the weatherization training network.

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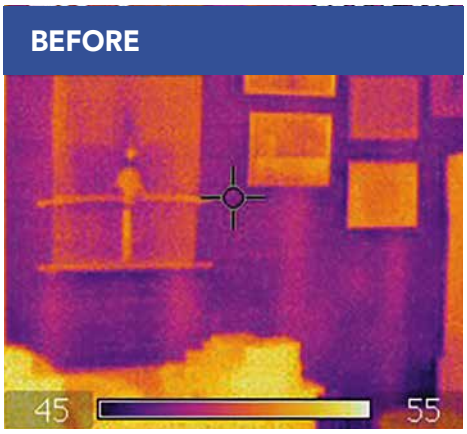
9-2

Dense-Pack a Sidewall via Interior Blow

Job Aid for Install Dense-Pack Sidewall Insulation Badge

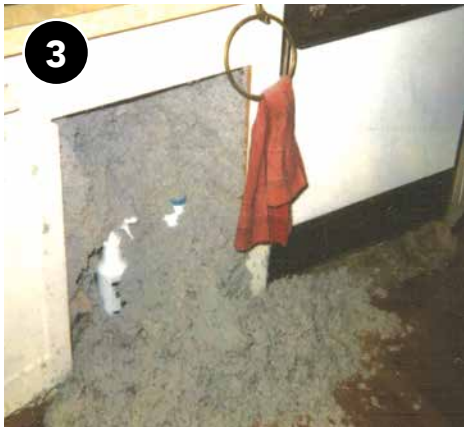
Aligns With Standard Work Specifications 4.0202.1



Older houses often lack exterior wall insulation. (The darker wall cavities of this thermal image are uninsulated.)

Protect the floor below the work area and use containment enclosures to prevent the spread of dust and debris.

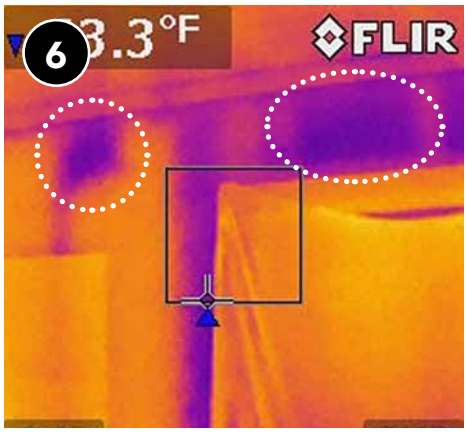
Ensure balloon-framed walls are blocked at top and bottom to prevent insulation from unintentionally blowing into the attic or basement.



Confirm the wall integrity can withstand the air pressure of blown insulation and make sure all holes are repaired to prevent insulation blowouts.

Drill insulation access holes as needed to ensure complete coverage of all uninsulated wall cavities.

Fill cavities completely and to the proper density.



Ensure all cavities are filled before completing the job (note that dark areas were missed).

Patch insulation access holes or use a chair rail molding to cover the holes.

AFTER

When properly insulated, the thermal performance of the wall improves and air leakage is reduced.

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Checklist

Install dense-pack sidewall insulation[1]

DESIRED OUTCOME

Minimize dust and achieve consistent, uniform thermal boundary between conditioned and unconditioned space to prescribed R-value without voids in a manner that will prevent future settling and minimize framing cavity air flows.[2]

General

- ☐ Drill patterns reflect knowledge of framing.
- ☐ Probe cavities to ensure all were accessed.
- ☐ Fill all cavities to proper density. (Verify before holes are plugged or with blower door and infrared scan if temperature permits.)
- ☐ Patch drill holes as required by standards.
- ☐ Fill out applicable sections of house-wide insulation certificate with coverage area, thickness, and R-value.
- ☐ Clean the jobsite.

Exterior

- ☐ Install or use proper jobsite protection measures (e.g., covering shrubs).
- ☐ Remove siding as needed to prevent damage.
- ☐ Reinstall siding in a workmanlike manner.

Interior

- ☐ Install or use proper dust control measures (e.g., drill shrouds, vertical containment).

1. To earn badge, at least one of total number of jobs must be blown from exterior and one from interior.

2. Relevant Standards: 4.0202.1

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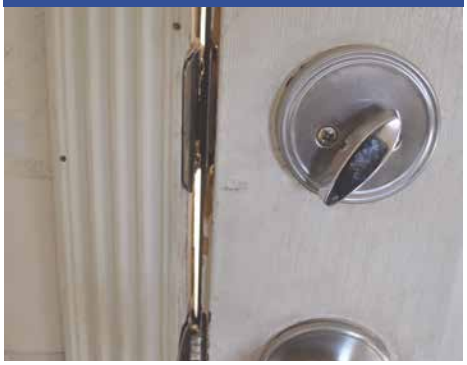
Install Weatherstripping on an Exterior Door

Job Aid for Install Weatherstripping and Sweep Set on Exterior Door Badge

Aligns With Standard Work Specifications 3.0202.1

BEFORE



Visible daylight or loose fitting exterior doors are common indicators of air leakage. Make adjustments (e.g., loose hinges, knobs, strike plates, etc.) to the door as needed prior to weatherstripping.

Measure each side of the doorway to determine the size of the weatherstripping.

Measure door top or bottom as well for weatherstripping and potential door bottom or sweep.

Notch the ends of each side piece of weatherstripping to allow for a tight fit with the top piece if a notch is not provided from the manufacturer.

Fit weatherstripping snuggly into place after applying a thin bead of caulk that aligns with the screw holes on the backside of the weatherstripping.

Fasten weatherstripping securely using short screws provided by the manufacturer. Check the door for smooth operation and make any necessary adjustments.

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Checklist

Install weatherstripping and sweep set on exterior door

DESIRED OUTCOME

Reduce air infiltration while maintaining or improving proper operation of the door.[1]

Site prepared for insulation:

- ☐ Install weatherstripping and door sweep in a durable manner.
- ☐ Ensure weatherstripping and door sweep to prevent air infiltration when the door is closed. (Verify with blower door and smoke.)
- ☐ Ensure weatherstripping and door sweep do not impede door operation.
- ☐ Adjust door as required to properly fit the jamb and allow for ease of operation.

1. Relevant Standards: 3.0202.1

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Air Seal Sill Plate and Rim Joist

Job Aid for Air Seal and Insulate Walls of a Conditioned Subspace (Basement or Crawl Space) Badge

Aligns With Standard Work Specifications 3.0104.1

BEFORE

Air movement around sill plates and near rim joists needs to be addressed before insulating.

For exterior holes larger than 1/4 inch, use steel wool or other pest blocking material before sealing.

Install backing material to fill space.

Install sealant to hold backing material in place and air seal.

Seal penetrations (electrical, plumbing, empty holes, etc.) at the subfloor that are located within the rim joist pocket.

Push sealant into seams where framing members meet while installing a continuous bead around all four sides of the pocket including any gaps in the sill plate.

AFTER

A continuous seal is achieved and the pocket is ready for insulation. Note: if using two-part foam to air seal and insulate, step 5 can be accomplished by spraying the outer edges of the pocket using a picture frame technique, then working towards the inside of the cavity to insulate.

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Checklist

Air seal and insulate walls of a conditioned subspace (basement or crawl space)

DESIRED OUTCOME

Subspace is air sealed and insulated to achieve best thermal performance possible while preventing moisture condensation on the inside of band joists or other wall cavities.[1]

Air sealing:

- ☐ Rim joist, sill plate, and adjacent surfaces and any walls to be treated were sufficiently cleaned and free of debris to allow for the proper adhesion of any caulks, adhesives, or spray foam used during installation.
- ☐ All penetrations greater than ¼" filled with backing, steel wool, or other pest-proof material before air sealing.
- ☐ Air sealing forms a continuous air barrier on the warm side of the thermal boundary, including floor-to-wall and wall-to-ceiling connections.

Insulation:

- ☐ On walls (basements[2] or crawl spaces), attach insulation with a durable connector equal to or better than manufacturer specifications.
- ☐ On rim joists, install foam-based or vinyl-faced fiberglass batt insulation tightly to the cavity and seal at all edges.
- ☐ Use fire-rated material if the insulation is to be left exposed.
- ☐ Ensure that the insulation has no gaps, voids, compression, or misalignment.
- ☐ Fill out applicable sections of the house-wide insulation certificate with coverage area, thickness, and R-value.

1. Relevant Standards: 3.0104.1

2. Where termite pressure exists, a 3-inch inspection gap will be maintained from the top of the insulation to the bottom of any wood to allow for termite detection. This varies by region and should be incorporated into the badge inspection criteria where applicable.

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Insulate Rim Joist

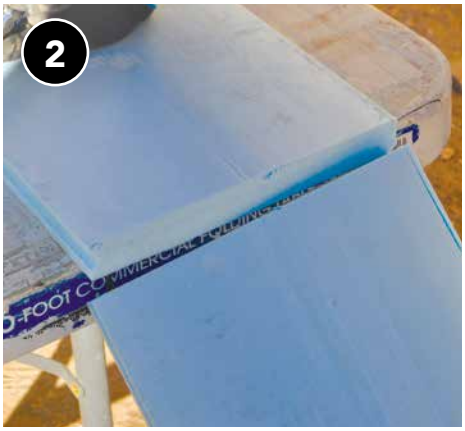
Job Aid for Air Seal and Insulate Walls of a Conditioned Subspace (Basement or Crawl Space) Badge

Aligns With Standard Work Specifications 4.0401.1, 4.0401.2, 4.0401.3

BEFORE

Basement and crawl space rim joists should be insulated when they define the thermal boundary.

Measure each individual cavity to be insulated and take note of obstacles where insulation needs to be trimmed for a proper fit.



Cut insulation, either rigid foam board or wrapped/faced batts, for each individual cavity.

Ensure space is filled with no gaps or misalignment, and place insulation tight to rim joist.

Ensure insulation is secured in place and will not move over time, then seal all of the edges with one- part foam, caulk, or mastic.

If foam insulation is more than 3.25 inches thick or space is permanently habitable, insulation needs to be covered by a thermal barrier, such as gypsum board. If requirements vary from this practice in your area, consult local code officials for clarification.

When using wrapped or faced batts, ensure facing is to the conditioned side and ensure the cavity is air sealed before installing the insulation.

Two-part spray foam can also be used as rim joist insulation.

AFTER

Foam products require a thermal barrier or coating, such as 1/2-inch gypsum board, to separate them from permanently habitable spaces. If requirements vary from this practice in your area, consult local code officials for clarification.

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Checklist

Air seal and insulate walls of a conditioned subspace (basement or crawl space)

DESIRED OUTCOME

Subspace is air sealed and insulated to achieve best thermal performance possible while preventing moisture condensation on the inside of band joists or other wall cavities.[1]

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Air sealing:

- ☐ Rim joist, sill plate, and adjacent surfaces and any walls to be treated were sufficiently cleaned and free of debris to allow for the proper adhesion of any caulks, adhesives, or spray foam used during installation.
- ☐ All penetrations greater than ¼" filled with backing, steel wool, or other pest-proof material before air sealing.
- ☐ Air sealing forms a continuous air barrier on the warm side of the thermal boundary, including floor-to-wall and wall-to-ceiling connections.

Insulation:

- ☐ On walls (basements[2] or crawl spaces), attach insulation with a durable connector equal to or better than manufacturer specifications.
- ☐ On rim joists, install foam-based or vinyl-faced fiberglass batt insulation tightly to the cavity and seal at all edges.
- ☐ Use fire-rated material if the insulation is to be left exposed.
- ☐ Ensure that the insulation has no gaps, voids, compression, or misalignment.
- ☐ Fill out applicable sections of the house-wide insulation certificate with coverage area, thickness, and R-value.

1. Relevant Standards: 40401.1, 40401.2, 40401.3

2. Where termite pressure exists, a 3-inch inspection gap will be maintained from the top of the insulation to the bottom of any wood to allow for termite detection. This varies by region and should be incorporated into the badge inspection criteria where applicable.

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12-3

Insulate Basement Walls in Conditioned Space

Job Aid for Air Seal and Insulate Walls of a Conditioned Subspace (Basement or Crawl Space) Badge

Aligns With Standard Work Specifications 4.0402.4, 4.0402.5

BEFORE

An uninsulated wall in a "conditioned" space allows little resistance to heat transfer.

Check the foundation wall for penetrations and air seal as needed prior to installing insulation.

Check wall for water intrusion that needs to be mitigated first. All bulk sources of moisture should be directed away from the foundation walls.

If insulation has vapor retarder on only one side, install the facing towards the conditioned space.

Install insulation using mechanical fasteners to prescribed R-value in full contact with the entire perimeter of the foundation wall from ceiling to floor.

Install a sealed air barrier on the conditioned side of the insulation. When using foam, gypsum board must be at least 1/2 inch to meet building code requirements as a thermal barrier.

AFTER

A sealed continuous air barrier finishes off an insulated basement wall, providing air sealing benefits and improved thermal comfort while reducing heat transfer of the wall assembly.

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Checklist

Air seal and insulate walls of a conditioned subspace (basement or crawl space)

DESIRED OUTCOME

Subspace is air sealed and insulated to achieve best thermal performance possible while preventing moisture condensation on the inside of band joists or other wall cavities.[1]

Air sealing:

- ☐ Rim joist, sill plate, and adjacent surfaces and any walls to be treated were sufficiently cleaned and free of debris to allow for the proper adhesion of any caulks, adhesives, or spray foam used during installation.
- ☐ All penetrations greater than ¼" filled with backing, steel wool, or other pest-proof material before air sealing.
- ☐ Air sealing forms a continuous air barrier on the warm side of the thermal boundary, including floor-to-wall and wall-to-ceiling connections.

Insulation:

- ☐ On walls (basements[2] or crawl spaces), attach insulation with a durable connector equal to or better than manufacturer specifications.
- ☐ On rim joists, install foam-based or vinyl-faced fiberglass batt insulation tightly to the cavity and seal at all edges.
- ☐ Use fire-rated material if the insulation is to be left exposed.
- ☐ Ensure that the insulation has no gaps, voids, compression, or misalignment.
- ☐ Fill out applicable sections of the house-wide insulation certificate with coverage area, thickness, and R-value.

1. Relevant Standards: 4.0402.4, 4.0402.5

2. Where termite pressure exists, a 3-inch inspection gap will be maintained from the top of the insulation to the bottom of any wood to allow for termite detection. This varies by region and should be incorporated into the badge inspection criteria where applicable.

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12-4

Insulate Conditioned Crawl Space Wall

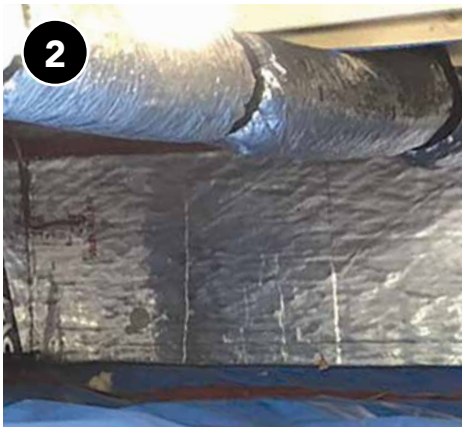
Job Aid for Air Seal and Insulate Walls of a Conditioned Subspace (Basement or Crawl Space) Badge

Aligns With Standard Work Specifications 4.0402.2, 4.0402.4, 4.0402.5

BEFORE

Unvented crawl spaces are sometimes considered to be part of the conditioned space, so the walls need insulation.

When using foam products, ensure the material meets fire safety requirements of the authority having jurisdiction.



Attach insulation in a durable manner and seal seams and edges with compatible materials.

Leave a 3-inch termite inspection gap between the bottom of the sill plate at the top of the insulation, if required.

AFTER

Insulation is or has class II vapor retarder facing conditioned space. Insulation laps underneath ground vapor retarder at foundation wall.

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Checklist

Air seal and insulate walls of a conditioned subspace (basement or crawl space)

DESIRED OUTCOME

Subspace is air sealed and insulated to achieve best thermal performance possible while preventing moisture condensation on the inside of band joists or other wall cavities.[1]

Air sealing:

- ☐ Rim joist, sill plate, and adjacent surfaces and any walls to be treated were sufficiently cleaned and free of debris to allow for the proper adhesion of any caulks, adhesives, or spray foam used during installation.
- ☐ All penetrations greater than ¼" filled with backing, steel wool, or other pest-proof material before air sealing.
- ☐ Air sealing forms a continuous air barrier on the warm side of the thermal boundary, including floor-to-wall and wall-to-ceiling connections.

Insulation:

- ☐ On walls (basements[2] or crawl spaces), attach insulation with a durable connector equal to or better than manufacturer specifications.
- ☐ On rim joists, install foam-based or vinyl-faced fiberglass batt insulation tightly to the cavity and seal at all edges.
- ☐ Use fire-rated material if the insulation is to be left exposed.
- ☐ Ensure that the insulation has no gaps, voids, compression, or misalignment.
- ☐ Fill out applicable sections of the house-wide insulation certificate with coverage area, thickness, and R-value.

1. Relevant Standards: 4.0402.2 4.0402.4, 4.0402.5

2. Where termite pressure exists, a 3-inch inspection gap will be maintained from the top of the insulation to the bottom of any wood to allow for termite detection. This varies by region and should be incorporated into the badge inspection criteria where applicable.

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Air Seal Small Penetrations in a Subfloor

Job Aid for Air Seal Floor Above Unconditioned Subspace (Basement or Crawl Space) Badge

Aligns With Standard Work Specifications 3.0101.1, 3.0104.1

Many types of caulks and sealants will easily span and seal a 1/4-inch gap.

One-part spray foams can also span up to 3 inches to create an air seal.

For small penetrations, caulk or sealant is often enough to seal the gap.

Use a backer rod or other infill material when sealing a gap larger than 1/4 inch with caulk.

Seal over the backer rod to establish the air seal.

Spray foam can also be used in areas with slightly larger penetrations if fire safety requirements (e.g., thermal or ignition barrier) of the authority having jurisdiction are followed.

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Checklist

Air seal floor above an unconditioned subspace (basement or crawl space)

DESIRED OUTCOME

Consistent pressure boundary between conditioned and unconditioned space.[1]

- ☐ Remove existing insulation as needed to access air sealing locations.
- ☐ Ensure all wall cavities are enclosed on all six sides (e.g., have top and bottom plates). Install additional blocking where necessary.
- ☐ Seal the following cracks, penetrations, and chases to prevent air movement with the appropriate materials based on hole sizes according to the AIR SEALING MATERIALS GUIDELINES table below:
  - ☐ Chases
  - ☐ Plumbing penetrations
  - ☐ Electrical penetrations
  - ☐ Chimney/flue[2]
  - ☐ Ductwork penetrations into subspace
  - ☐ Any other holes/penetrations in the floor plane/boundary.
- ☐ Clean work area.

AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4"–2" (medium)	One-component foam or mastic
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

1. Relevant Standards: 3.0101.1, 3.0104.1

2. Materials must be appropriate for high-temp situations.

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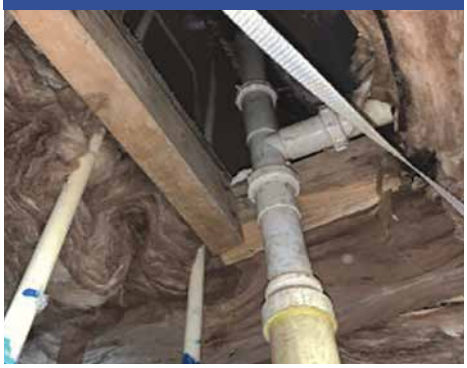
13-2

Air Seal Large Penetrations in a Subfloor

Job Aid for Air Seal Floor Above Unconditioned Subspace (Basement or Crawl Space) Badge

Aligns With Standard Work Specifications 3.0101.1, 3.0104.1

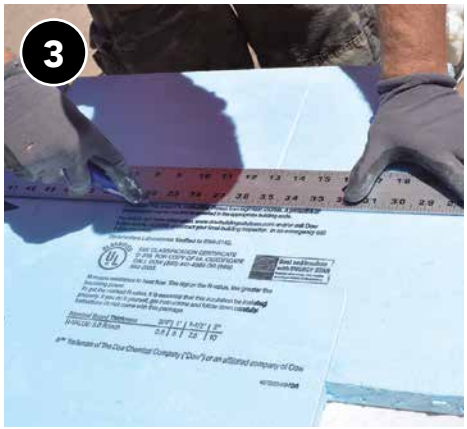
BEFORE



Larger penetrations in the subfloor, especially plumbing chases, need to be air sealed when they define the pressure boundary.

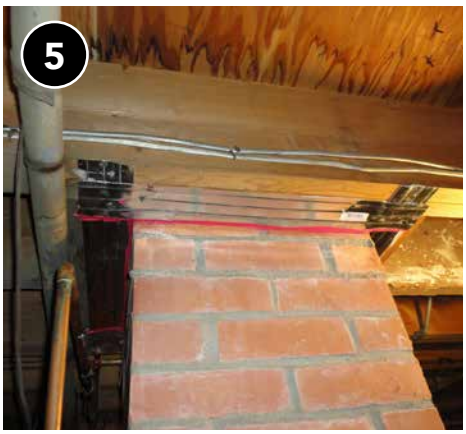
Spray foam expands to fill large holes, but may need fire protection (e.g., thermal/ignition barrier).

For larger holes, rigid infill material is needed.



Cut rigid infill with attention to locations of pipes and electrical.

Secure rigid infill in place and seal smaller gaps around infill with appropriate materials.



Use appropriate materials for high-temperature locations, such as around flues and chimneys.

AFTER

Depending on the size of the gap, one-part spray foam or a combination of infill material and foam or caulk can be used.

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Checklist

Air seal floor above an unconditioned subspace (basement or crawl space)

DESIRED OUTCOME

Consistent pressure boundary between conditioned and unconditioned space.[1]

- ☐ Remove existing insulation as needed to access air sealing locations.
- ☐ Ensure all wall cavities are enclosed on all six sides (e.g., have top and bottom plates). Install additional blocking where necessary.
- ☐ Seal the following cracks, penetrations, and chases to prevent air movement with the appropriate materials based on hole sizes according to the AIR SEALING MATERIALS GUIDELINES table below:
  - ☐ Chases
  - ☐ Plumbing penetrations
  - ☐ Electrical penetrations
  - ☐ Chimney/flue[2]
  - ☐ Ductwork penetrations into subspace
  - ☐ Any other holes/penetrations in the floor plane/boundary.
- ☐ Clean work area.

AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4"–2" (medium)	One-component foam or mastic
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

1. Relevant Standards: 3.0101.1, 3.0104.1

2. Materials must be appropriate for high-temp situations.

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13-3

Air Seal Balloon Framing at Subfloor

Job Aid for Air Seal Floor Above Unconditioned Subspace (Basement or Crawl Space) Badge

Aligns With Standard Work Specifications 3.0101.1, 3.0104.1

BEFORE

Balloon-framed walls have an open cavity that runs from the basement to the attic, allowing for large amounts of air flow via the stack effect.

Measure opening.

Cut blocking material to fit.

Seal all edges with caulk, foam, or mastic.

AFTER

Securely sealing off these cavities prevents air movement, as well as providing a barrier to hold in insulation and providing fire blocking.

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Checklist

Air seal floor above an unconditioned subspace (basement or crawl space)

DESIRED OUTCOME

Consistent pressure boundary between conditioned and unconditioned space.[1]

- ☐ Remove existing insulation as needed to access air sealing locations.
- ☐ Ensure all wall cavities are enclosed on all six sides (e.g., have top and bottom plates). Install additional blocking where necessary.
- ☐ Seal the following cracks, penetrations, and chases to prevent air movement with the appropriate materials based on hole sizes according to the AIR SEALING MATERIALS GUIDELINES table below:
  - ☐ Chases
  - ☐ Plumbing penetrations
  - ☐ Electrical penetrations
  - ☐ Chimney/flue[2]
  - ☐ Ductwork penetrations into subspace
  - ☐ Any other holes/penetrations in the floor plane/boundary.
- ☐ Clean work area.

AIR SEALING MATERIALS GUIDELINES	
HOLE/GAP SIZE	MATERIALS/NOTES
1/4" or less (small)	Caulk
1/4"–2" (medium)	One-component foam or mastic
2"–3" (large)	Two-component foam
3" or larger (extra-large)	Infill material installed that will not bend, sag, or move Support material (e.g., 2X4) installed for spans wider than 24"

1. Relevant Standards: 3.0101.1, 3.0104.1

2. Materials must be appropriate for high-temp situations.

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Insulate a Subfloor With Batts Above Unconditioned Space

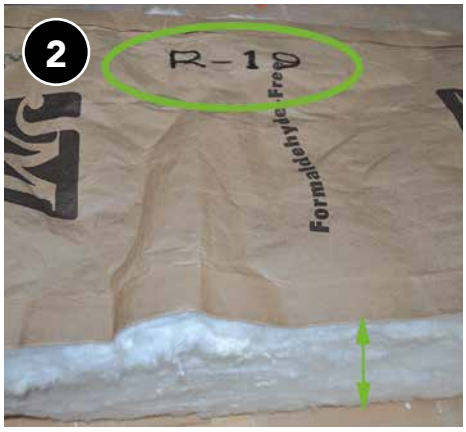
Job Aid for Insulate the Floor Above an Unconditioned Subspace (Site-Built Single Family) Badge

Aligns With Standard Work Specifications 4.0301.1, 4.0301.6, 4.0302.1

BEFORE

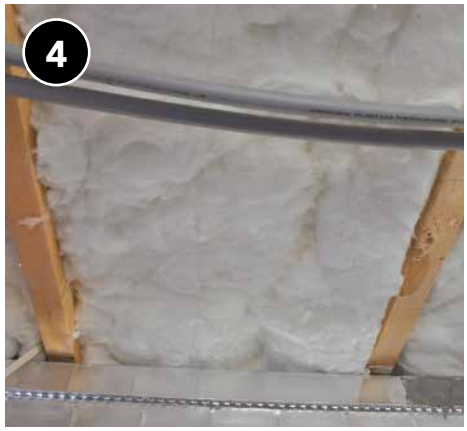
Uninsulated floor cavities are an opportunity to increase the thermal performance of floors above unconditioned spaces.

Ensure air sealing is complete prior to adding insulation.

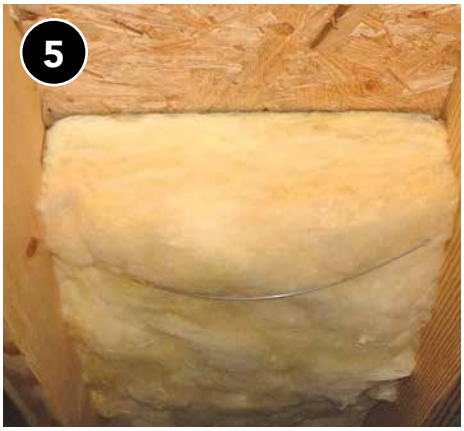


Ensure the insulation R-value matches the work order.

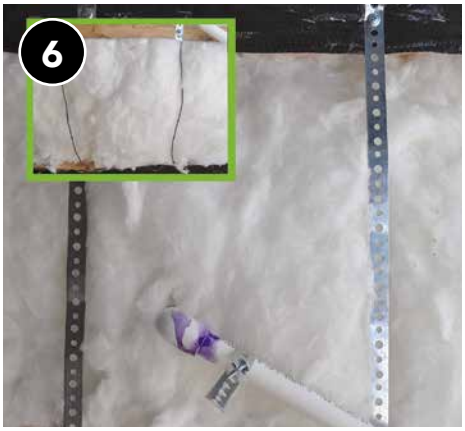
Install batts with vapor retarders so that the vapor retarder faces the conditioned space.



Install batts with no gaps.



Ensure batts are in contact with subfloor.



In areas exposed to the outside or to pests, install a rigid barrier over the insulation as an extra layer of protection.

AFTER

Insulation with complete coverage in contact with the subfloor will improve the thermal performance of the floor assembly.

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Checklist

Insulate the floor above an unconditioned subspace (site-built single family)

DESIRED OUTCOME

Consistent thermal boundary between conditioned and unconditioned space to the prescribed R-value.[1]

General:

- ☐ Ensure that worker verified air sealing of the floor system was completed before installing insulation.
- ☐ Install insulation to the prescribed R-value.
- ☐ Install insulation correctly for climate (e.g., vapor retarder layer toward the "warm" side).
- ☐ Ensure insulation is secure such that it will remain in contact with the subfloor.
- ☐ Ensure insulation has no gaps, voids or compressions, misalignments, or potential for wind intrusion.
- ☐ Fill out applicable sections of house-wide insulation certificate out with[2] insulation type, coverage area, installed thickness, settled thickness, R-value, and number of bags installed.

Batts:

- ☐ Secure batts with physical fasteners.
- ☐ Providing 100% coverage of the floor assembly.

Blown-in:

- ☐ When installing netting or rigid backing to accommodate blown-in insulation, ensure that backing is:
  - ☐ Mechanically fastened to underside of floor assembly according to manufacturer specifications or better.
  - ☐ Providing 100% coverage of the floor assembly.
- ☐ Install insulation to the correct density.

1. Relevant Standards: 14.0301.1, 4.0301.6, 40302.1

2. Underlined details are required on all insulation certificates. Other items are required only when using blown-in insulation.

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14-2

Insulate a Subfloor With Blown Insulation Above Unconditioned Space

Job Aid for Insulate the Floor Above an Unconditioned Subspace (Site-Built Single Family) Badge

Aligns With Standard Work Specifications 4.0301.2, 4.0301.3, 4.0301.4

BEFORE YOU BEGIN

Uninsulated floor cavities present opportunities to increase the thermal performance of floors above unconditioned spaces. Insulation can be blown if a rigid barrier or netting is attached to the bottom of the floor joists.

Verify all air sealing and prep work is complete before installing support material.

Attach rigid barrier to cover all floor cavities.

Seal seams between sheets of rigid material to prevent air movement and insulation leakage.

Cut an access hole into each cavity of the floor, large enough for fill tube.

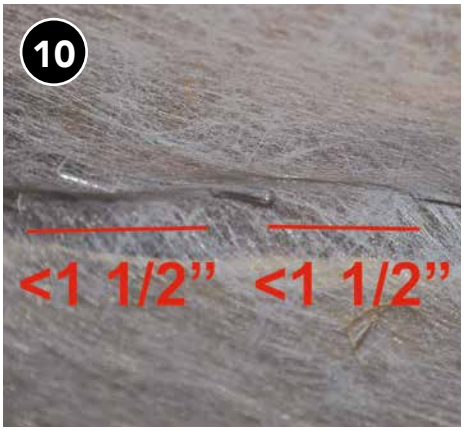
Use appropriate fill tube to insulate each cavity and ensure complete coverage.

Fill cavity completely to density required by work order.

Plug access hole either with original material cut out or appropriate replacement.

Seal around plug to keep it secure and air tight.

For work orders that require netting, secure a smooth layer of netting across the bottom of floor joists.



Keep staples close together.

Cover the entire cavity to ensure continuous insulation coverage and prevent insulation from blowing out the ends.

Cut access hole for fill tube.

Loose fill netting to required density.

Insulation with complete coverage that does not settle will improve the thermal performance of the floor assembly.

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Checklist

Insulate the floor above an unconditioned subspace (site-built single family)

DESIRED OUTCOME

Consistent thermal boundary between conditioned and unconditioned space to the prescribed R-value.[1]

General:

- ☐ Ensure that air sealing of the floor system was completed and worker verified before installing insulation.
- ☐ Install insulation to the prescribed R-value.
- ☐ Install insulation correctly for climate (e.g., vapor retarder layer toward the "warm" side).
- ☐ Secure insulation so that it will remain in contact with the subfloor.
- ☐ Ensure that insulation has no gaps, voids or compressions, misalignments, or potential for wind intrusion.
- ☐ Fill out applicable sections of house-wide insulation certificate with[2] insulation type, coverage area, installed thickness, settled thickness, R-value, and number of bags installed.

Batts:

- ☐ Secure batts with physical fasteners.

Blown-in:

- ☐ Where netting or rigid backing was installed to accommodate blown-in insulation, ensure that backing is:
  - ☐ Mechanically fastened to underside of floor assembly according to manufacturer specifications or better.
  - ☐ Providing 100% coverage of the floor assembly.
- ☐ Install insulation to the correct density.

1. Relevant Standards: 4.0301.2, 4.0301.3, 4.0301.4

2. Underlined details are required on all insulation certificates. Other items are required only when using blown-in insulation.

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Install or Repair a Crawl Space Vapor Retarder

Job Aid for Install or Repair Vapor Retarder in a Subspace Badge

Aligns With Standard Work Specifications 2.0202.1, 2.0202.2, 2.0202.3, (3.0104.1)

BEFORE

Exposed dirt floors in crawl spaces or basements allow ground vapor and soil gases to enter the space when vapor retarders are missing or not effective.

Clear out stored items and debris as needed to allow complete coverage while installing or repairing an existing vapor retarder (plastic ground cover).

Select a 6-mil minimum ground vapor retarder with a perm rating of 0.1 or less.

Spread out plastic as smoothly as possible.

Ensure plastic extends a minimum of 6 inches up walls, piers, and columns and is securely attached.

Overlap seams by at least 12 inches using a reverse shingle or upslope lapping technique.

Tape seams and secure plastic as needed using mechanical fasteners. Seal fasteners with appropriate material.

Seal the edge of the plastic to the foundation and around any supports with mastic or acoustical sealant.

A well-installed vapor retarder helps to minimize ground moisture vapor and soil gases, such as radon.

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Checklist

Install or repair vapor retarder in a subspace

DESIRED OUTCOME

Durable, effective ground vapor retarder provides long-lasting access and minimizes ground moisture and other gas vapors beneath home.[1]

- ☐ Use appropriate material (minimum 6-mil thickness).
- ☐ Ensure coverage is 100% (or as close as is reasonably possible).
- ☐ Extend vapor retarder at least 6 inches up walls, columns, and footings.
- ☐ Use physical attachments where practical and necessary for long-term adhesion of vapor barrier to vertical surfaces.
- ☐ Overlap all seams at least 12 inches using a reverse or upslope lapping technique.
- ☐ For wall-to-floor connection, install the wall vapor retarder under the ground moisture barrier.
- ☐ Fasten material to ground as needed to prevent movement where ground is sloping, area is accessible, or area is subject to wind/air movement that may disturb the material.
- ☐ Seal seams and penetrations with a durable sealant compatible with the vapor retarder (UNVENTED CRAWL SPACES only).
- ☐ Ensure vapor retarder does not interfere with established drainage patterns.

1. Relevant Standards: 2.0202.1, 2.0202.2, 2.0202.3, 3.0104.1

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Vent a Clothes Dryer

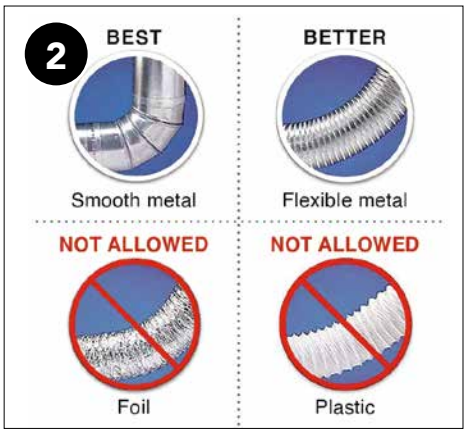
Job Aid for Clothes Dryer to the Exterior Badge

Aligns With Standard Work Specifications 6.0202.1, (6.0101.1, 6.0101.2)

BEFORE

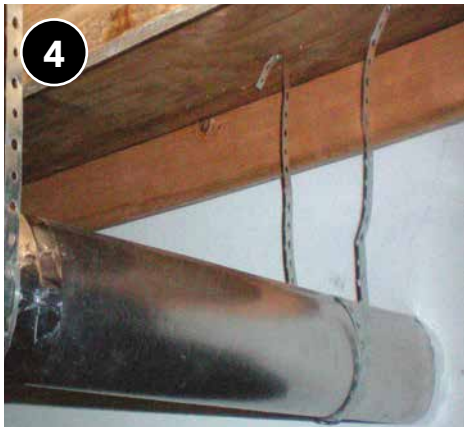
Dryer vents with long runs or excessive bends create a fire hazard and increase dry time.

Keep duct run as short and straight as possible to prevent backup of lint.



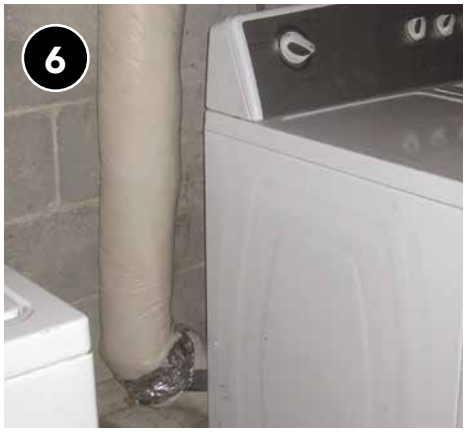
Duct material is rigid or semi rigid metal.

Use correct fasteners (no screws penetrating into duct).



Duct terminates to outside, at a downward slope when possible.

Termination has backdraft damper and no cage.



Duct in unconditioned space is insulated.

If duct run must exceed 35 feet, install booster fan.

AFTER

When properly vented, dryers run more efficiently, are safer, and last longer.

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Checklist

Vent clothes dryer to the exterior

DESIRED OUTCOME

Dryer air exhausted efficiently and safely without condensing in vent.[1]

- ☐ Duct material is rigid or semi rigid sheet metal venting material.
- ☐ Duct run is as short and straight as practical.
- ☐ Duct run is supported as needed to prevent bending or sagging and support materials do not cause the interior dimensions of the ductwork to be smaller than specified.
- ☐ Dryer is ducted to exterior (this does NOT include unconditioned attics, crawl spaces, and other areas that are ventilated to the outdoors).
- ☐ Duct connections are sealed as follows:
  - ☐ UL listed foil type duct or semi rigid to rigid sheet metal is fastened with clamp.
  - ☐ Other specialized duct fittings are fastened in accordance with manufacturer specifications.
  - ☐ In addition to mechanical fasteners, duct connections are sealed with UL 181B or 181B-M listed material.
- ☐ Duct connectors or other fasteners will not obstruct exhaust flow.
- ☐ Where they run through unconditioned space, ducts are insulated (as required by the authority having jurisdiction).
- ☐ Termination fitting is appropriate for dryer and includes a backdraft damper.
- ☐ Termination fitting DOES NOT include grille/cage/screen (International Residential Code 1502.3).

1. Relevant Standards: 6.0202.1, 6.0101.1, 6.0101.2

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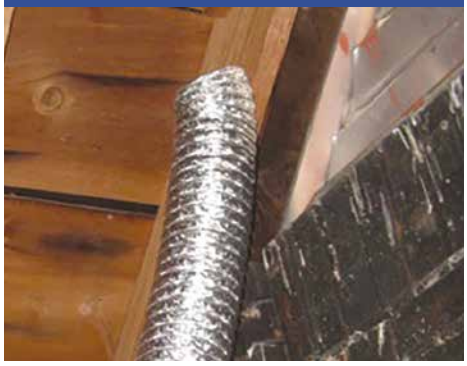
18-1

Install Exhaust Fan Flex Duct (Bath Fan Only)

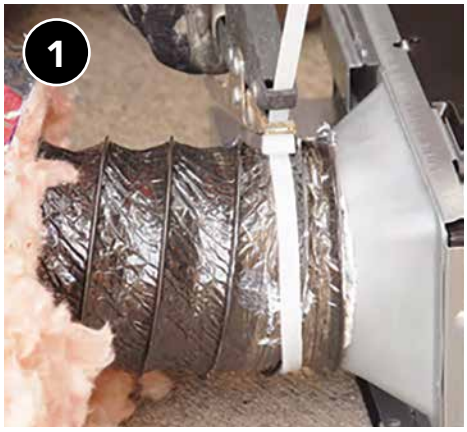
Job Aid for Install Ducting for Bath or Kitchen Range Fan Badge

Aligns With Standard Work Specifications 6.0101.1, 6.0101.2, 6.0201.1

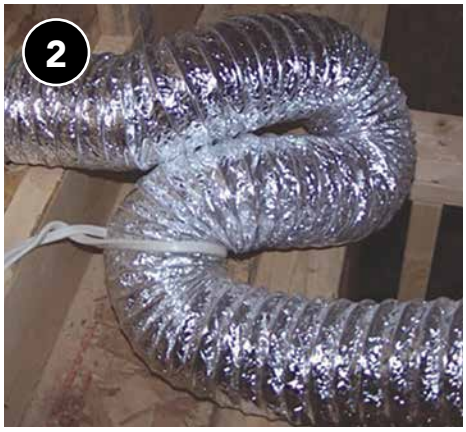
BEFORE



Exhausting moisture from bath fans into the attic or crawl space can cause mold and rot in building materials.



Ensure proper connection of duct to bath fan. The size of the ducting should be equal to or larger than the outlet (no downsizing or reducers).



Ensure flex ducting is pulled tight with no kinks or u-turns.

Create the shortest run possible to an exterior termination and provide adequate support as needed without compressing the duct. Ducting that runs through unconditioned spaces must be insulated.

AFTER

Bath fans must exhaust to the exterior of the home. Follow the manufacturer's installation instructions when installing the vent hood to ensure a water tight land durable install.

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Checklist

Install ducting for a bath or kitchen range fan

DESIRED OUTCOME

Installed ducts effectively move the required volume of air and prevent condensation.[1]

- ☐ Duct run is as short, straight, and smooth as possible.
- ☐ Ducts are at least as large as the connections they're attached to.
- ☐ Ducts are supported as needed to prevent bending and sagging:
  - ☐ Flexible and duct board ducts and plenums are supported every 4 feet using a minimum of 1½-inch wide material.
  - ☐ Metal ducts are supported by 1/2 inch or wider 18-gauge strapping or 12-gauge or thicker galvanized wire no more than 10 feet apart.
  - ☐ Support materials do not cause the interior dimensions of the ductwork to be smaller than specified.
- ☐ All connections are sealed and fastened according to the EXHAUST FAN DUCT CONNECTIONS table at right; in addition to mechanical fasteners, duct connections are sealed with UL 181B or 181B-M listed material.
- ☐ Fan is ducted to exterior. (This does NOT include unconditioned attics, crawl spaces and other areas that are ventilated to the outdoors.)
- ☐ Duct connectors or other fasteners will not obstruct exhaust flow.
- ☐ Where they run through unconditioned space, ducts are insulated to at least R-8 (as required by the authority having jurisdiction [BATH FANS only]).
- ☐ Work area is clean.

EXHAUST FAN DUCT CONNECTIONS

CONNECTING DUCTS	APPROVED MATERIALS/ TECHNIQUES
Metal-to-metal (round) Metal-to-PVC (round)	Minimum of three equally spaced screws
Other metal-to-metal connections	Fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, or tapes
PVC-to-PVC connections	Approved PVC cement
Flexible duct-to-metal or flexible duct-to-PVC	Tie bands, using a tie band tensioning tool
Other specialized duct fittings	In accordance with manufacturer specifications

1. Relevant Standards: 6.0101.1, 6.0101.2, 6.0201.1

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Install a Hard-Ducted Exhaust Vent

Job Aid for Install Ducting for Bath or Kitchen Range Fan Badge

Aligns With Standard Work Specifications 6.0101.1, 6.0101.2, 6.0201.1, 6.0201.2

BEFORE

Kitchens and bathrooms must be ventilated to control moisture, vapor, and combustion gases.

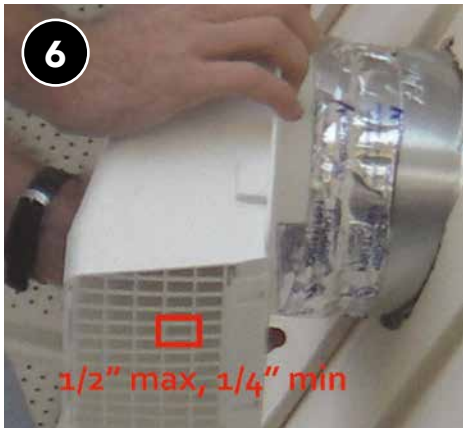
Fasten rigid duct using three equally spaced screws. Ducting should be 28-gauge or thicker.

Keep duct run as short as possible with few turns, and run to exterior, either via roof or sidewall.

Wrap seams with mesh.

Cover mesh with a layer of mastic to seal all joints. Alternatively, the seams can be sealed with UL-listed foil tape.

Locate exterior vent based on duct run and size hole less than 1/2 inch larger than duct.



Chose appropriate exterior termination to match size of duct while minimizing water and pest intrusion. Seal around exterior termination as needed.

Insulate ducting that runs through unconditioned space to R-8.

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Checklist

Install ducting for a bath or kitchen range fan

DESIRED OUTCOME

Installed ducts effectively move the required volume of air and prevent condensation.[1]

- ☐ Duct run is as short, straight, and smooth as possible.
- ☐ Ducts are at least as large as the connections they're attached to.
- ☐ Ducts are supported as needed to prevent bending and sagging:
  - ☐ Flexible and duct board ducts and plenums are supported every 4 feet using a minimum of 1½ inch wide material.
  - ☐ Metal ducts are supported by 1/2 inch or wider 18-gauge strapping or 12-gauge or thicker galvanized wire no more than 10 feet apart
  - ☐ Support materials do not cause the interior dimensions of the ductwork to be smaller than specified.
- ☐ All connections are sealed and fastened according to the EXHAUST FAN DUCT CONNECTIONS table at right; in addition to mechanical fasteners, duct connections are sealed with UL 181B or 181B-M listed material.
- ☐ Fan is ducted to exterior. (This does NOT include unconditioned attics, crawl spaces, and other areas that are ventilated to the outdoors.)
- ☐ Duct connectors or other fasteners will not obstruct exhaust flow.
- ☐ Where they run through unconditioned space, ducts are insulated to at least R-8 (as required by the authority having jurisdiction [BATH FANS only]).
- ☐ Work area is clean.

EXHAUST FAN DUCT CONNECTIONS

CONNECTING DUCTS	APPROVED MATERIALS/ TECHNIQUES
Metal-to-metal (round) Metal-to-PVC (round)	Minimum of three equally spaced screws
Other metal-to-metal connections	Fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, or tapes
PVC-to-PVC connections	Approved PVC cement
Flexible duct-to-metal or flexible duct-to-PVC	Tie bands, using a tie band tensioning tool
Other specialized duct fittings	In accordance with manufacturer specifications

1. Relevant Standards: 6.0101.1, 6.0101.2, 6.0201.1, 6.0201.2

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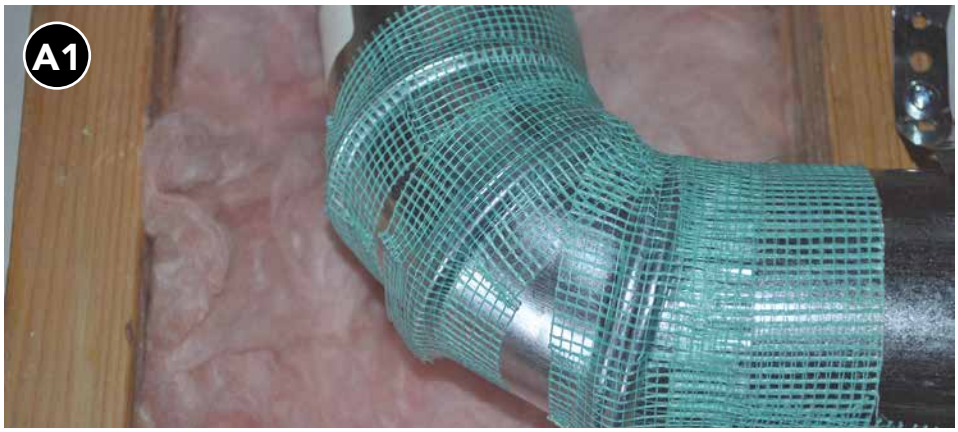
Seal Ducts With Mastic

Job Aid for Air Seal Ducted Distribution System Badge

Aligns With Standard Work Specifications 5.0106.1, 6.0101.2, 6.0101.3, (5.0105.1, 5.0105.2, 5.0105.3)

METHOD A: For small gaps (less than 1/4 inch) including all joints, seams, and cracks in duct system



Apply fiberglass mesh tape over all gaps, seams, joints, etc.

Apply mastic over all mesh tape and all gaps, seams, joints, etc.

METHOD B: For medium gaps (1/4–3/4 inch) such as minor holes and penetrations in duct system

Small holes and penetrations require one additional step.

Apply temporary UL-listed or mesh tape as a backer to hold mastic.

Apply mastic over the tape.

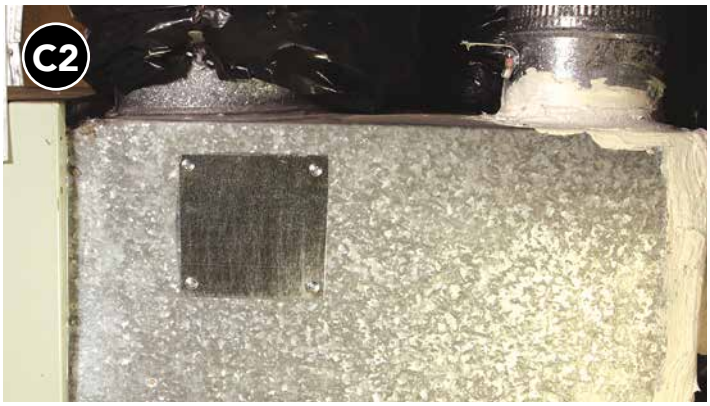
METHOD B: Continued

Push fiberglass mesh into the mastic.

Apply additional mastic over mesh and tape, extending at least 1 inch past edges of tape in all directions.

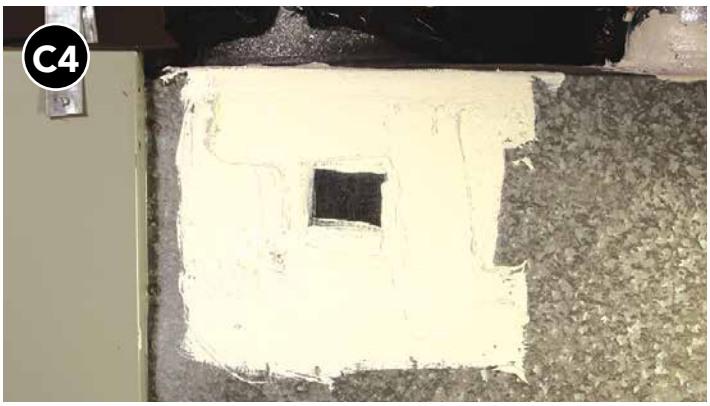
METHOD C: For larger gaps or holes (more than 3/4 inch)

Larger holes require a different process.



Cut patch that will extend over entire gap or hole and affix with mechanical fasteners.

Apply mastic over edges and fasteners of patch and push fiberglass mesh into it.



Apply additional mastic over mesh, extending at least 1 inch past tape and seam in all directions.

METHOD D: For connections between duct boot and surface

Often, holes for duct boots are cut too large and leave gaps around the boot that permit air leakage.

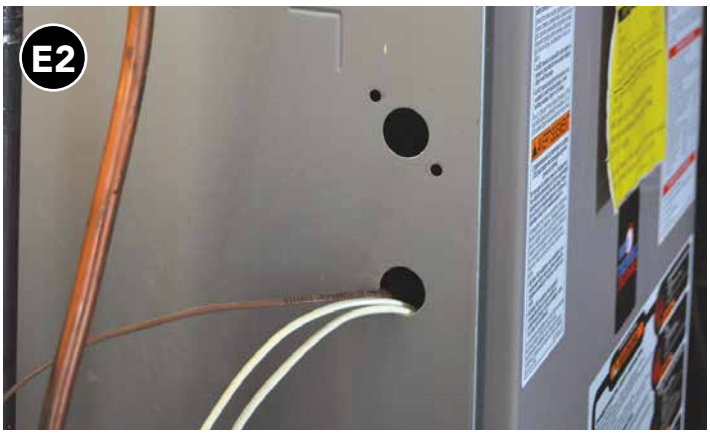
Clean the area around the duct boot to allow for better adhesion of fiberglass mesh tape.

Apply fiberglass mesh tape bridging from duct boot interior to surface, taking care not to extend past what will be covered by register.

Apply mastic over mesh tape and allow to dry completely before reinstalling register.

METHOD E: At the air handler

Ensure that filter slot covers are installed where missing. Covers should seal the opening and be easily removable so the occupant can change the filter.



Seal unnecessary holes in air handler cabinet with UL-listed butyl tape.

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Checklist

Air seal ducted distribution system

DESIRED OUTCOME

Duct leakage and connections between conditioned/unconditioned space is reduced, air is efficiently delivered from appliance to home and back.[1]

Preparing for the work

- ☐ Existing insulation cleared away as needed.
- ☐ Ducts are connected for durability according to DUCT CONNECTIONS table on the following page.
- ☐ Ducts are supported for durability according to relevant Standard Work Specifications:
  - ☐ Flex duct and duct boards are supported every 4 feet using 1½ inch wide material.
  - ☐ Metal ducts are supported every 10 feet or less using ½ inch wide 18-gauge metal straps or 12-gauge galvanized wire (or other approved means).
  - ☐ Support materials do not cause the interior dimensions of the ductwork to be smaller than specified.
- ☐ Holes are patched.
- ☐ If flex duct, any damaged sections removed and replaced with sealed spliced collar.
- ☐ Duct surfaces to receive applied sealant are clean.
- ☐ Supply boots are fastened to subfloor with mechanical fasteners.

Duct sealing[2]

- ☐ Seams of each supply boot sealed.
- ☐ Gaps between the subfloor or ceiling and the supply boot sealed.
- ☐ Seams of each return box sealed.
- ☐ All gaps between the subfloor, wall, or ceiling and the return box sealed.
- ☐ Panned returns sealed.
- ☐ Air handler panels taped or gasketed.
- ☐ Air handler penetrations sealed or gasketed.
- ☐ The following connections are mechanically fastened and sealed:
  - ☐ Connections between the air handler and the plenums.
  - ☐ Supply plenum seams and end caps.
  - ☐ Inner liner of all supply ducts to supply take-off collars/supply boots.
  - ☐ Connections between supply take-off collars and plenums.
  - ☐ Sectioned metal elbows to supply ducts and take-off collars.
- ☐ Connections between supply take-off collars and plenums sealed.

Checklist

Air seal ducted distribution system

HVAC DUCT CONNECTIONS	
DUCT TYPES	CONNECTION REQUIREMENTS
Metal to metal	Round ducts mechanically fastened to maintain alignment Other shaped ducts securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, or tapes
Flex to metal	Tie bands using a tie band tensioning tool
Duct board to duct board	Clinch stapler/staples
Flex duct to duct board	Metal take-off collar attached in accordance with International Residential Code

1. Relevant Standards: 5.0106.1, 6.0101.2, 6.0101.3, 5.0105.1, 5.0105.2, 5.0105.3

2. This checklist assumes ducts are in unconditioned space.

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Insulate Hard Pipe Ducts

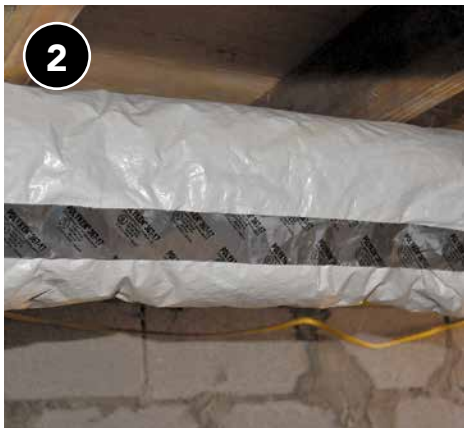
Job Aid for Insulate Ducted Distribution System Badge

Aligns With Standard Work Specifications 5.0107.1, 5.0105.2

BEFORE YOU BEGIN

Verify ducts are properly connected, supported, and sealed.

Layer insulation around duct, fitting between duct and construction members as necessary.



Tape joints to secure insulation in place.

Ensure insulation is not compressed.

Tape around circumference of duct at regular intervals.

Use twine or zip ties to provide additional support, being careful to not compress the insulation.

AFTER

Well-supported and uniformly-insulated ducts perform at higher efficiency.

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Checklist

Insulate ducted distribution system

DESIRED OUTCOME

Reduced conductive heat transfer of duct system and minimized condensation on the duct system.[1]

Preparing for the work:

- [ ] Ducts are prepared and sealed according to "air seal ducted distribution system" guidelines.

General:

- [ ] Duct insulation has an attached and continuous vapor retarder.
- [ ] Duct insulation is mechanically fastened and sealed with no exposed ducts.
- [ ] All insulation seams are sealed.
- [ ] Ducts are adequately supported and support materials do not cause the interior dimensions of the ductwork to be smaller than specified.

Metal ducts:

- [ ] Insulation is securely attached to the ducts with metal wire or rot-proof nylon twine.
- [ ] Pattern of wire or twine is sufficient to securely hold the duct insulation tight to the duct.
- [ ] Duct insulation vapor barrier seams are sealed with manufacturer approved tape.
- [ ] Duct insulation is minimum R-8.[2]

Flex ducts:

- [ ] All metal fittings including boots, elbows, and take-offs are insulated separately using a duct wrap of the minimum acceptable R-value with vapor retarder.
- [ ] Insulation on metal fittings, boots, elbows, and take-offs is mechanically fastened (e.g., stitch staples, tie bands) and sealed with no exposed metal.
- [ ] Any replacement flex duct is sized accordingly.
- [ ] Interior liner of flex-to-metal connections is fastened with tie bands using tie band tensioning tool.[3]
- [ ] Interior liner of flex-to-metal connections is sealed with UL 181 B-M listed mastic.
- [ ] The exterior liner of the flex duct is fastened with tie bands using a tie band tensioning tool.
- [ ] Exterior liner connections are sealed with UL 181 B-M listed mastic.

1. Relevant Standards: 5.0107.1, 5.0105.2

2. If variance request has been approved, replace this with approved figure.

3. Or other appropriate mechanical fasteners as necessary.

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Insulate and Install Flex Ducts

Job Aid for Insulate Ducted Distribution System Badge

Aligns With Standard Work Specifications 5.0107.1, 5.0105.2

BEFORE YOU BEGIN

Verify ducts are connected and air sealed at metal connections and any other holes within the liner. When new flex duct is needed, select insulation (duct wrap or flex duct) with a minimum R-8.

Secure flex duct liner to hard connections with zip tie and tensioner tool. If using duct wrap, follow the same procedure after adding insulation where missing, being careful not to compress the insulation.

Pull insulation over hard connections as needed.

Secure vapor retarder layer at boots.

Seal new joints where duct insulation meets plenum using UL-listed material.

AFTER

All exposed ducts located in unconditioned spaces are sealed, insulated, and supported with 1.5 inch or greater material.

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Checklist

Insulate ducted distribution system

DESIRED OUTCOME

Reduced conductive heat transfer of duct system and minimized condensation on the duct system.[1]

Preparing for the work:

- [ ] Ducts are prepared and sealed according to "air seal ducted distribution system" guidelines.

General:

- [ ] Duct insulation has an attached and continuous vapor barrier.
- [ ] Duct insulation is mechanically fastened and sealed with no exposed ducts.
- [ ] All insulation seams are sealed.
- [ ] Ducts are adequately supported and support materials do not cause the interior dimensions of the ductwork to be smaller than specified.

Metal ducts:

- [ ] Insulation is securely attached to the ducts with metal wire or rot-proof nylon twine.
- [ ] Pattern of wire or twine is sufficient to securely hold the duct insulation tight to the duct.
- [ ] Duct insulation vapor barrier seams are sealed with manufacturer approved tape.
- [ ] Duct insulation is minimum R-8.[2]

Flex ducts:

- [ ] All metal fittings including boots, elbows, and takeoffs are insulated separately using a duct wrap of the minimum acceptable R value with vapor retarder.
- [ ] Insulation on metal fittings, boots, elbows, and takeoffs is mechanically fastened (e.g., stitch staples, tie bands) and sealed with no exposed metal.
- [ ] Any replacement flex duct is sized accordingly.
- [ ] Interior liner of flex-to-metal connections is fastened with tie bands using tie band tensioning tool.[3]
- [ ] Interior liner of flex-to-metal connections is sealed with UL 181B-M listed mastic.
- [ ] The exterior liner of the flex duct is fastened with tie bands using a tie band tensioning tool.
- [ ] Exterior liner connections are sealed with UL 181B-M listed mastic.

1. Relevant Standards: 5.0107.1, 5.0105.2

2. If variance request has been approved, replace this with approved figure.

3. Or other appropriate mechanical fasteners as necessary.

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Insulate Supply Boots

Job Aid for Insulate Ducted Distribution System Badge

Aligns With Standard Work Specifications 5.0107.1, 5.0107.2

BEFORE YOU BEGIN

Exposed duct boots are a prime location for energy loss when ductwork is located in an unconditioned space.

Verify ducts are connected, supported, and air sealed properly.

Pull excess insulation tight to cover and insulate the exposed boot or measure and cut a new piece of duct wrap insulation to fit.

Secure the insulation in place, then seal around the boot to plenum connection with mastic to ensure a complete vapor retarder seal.

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Checklist

Insulate ducted distribution system

DESIRED OUTCOME

Reduced conductive heat transfer of duct system and minimized condensation on the duct system.[1]

Preparing for the work:

- [ ] Ducts are prepared and sealed according to "air seal ducted distribution system" guidelines.

General:

- [ ] Duct insulation has an attached and continuous vapor barrier.
- [ ] Duct insulation is mechanically fastened and sealed with no exposed ducts.
- [ ] All insulation seams are sealed.
- [ ] Ducts are adequately supported and support materials do not cause the interior dimensions of the ductwork to be smaller than specified.

Metal Ducts:

- [ ] Insulation is securely attached to the ducts with metal wire or rot-proof nylon twine.
- [ ] Pattern of wire or twine is sufficient to securely hold the duct insulation tight to the duct.
- [ ] Duct insulation vapor barrier seams are sealed with manufacturer approved tape.
- [ ] Duct insulation is minimum R-8.[2]

Flex Ducts:

- [ ] All metal fittings including boots, elbows, and take-offs are insulated separately using a duct wrap of the minimum acceptable R-value with vapor retarder.
- [ ] Insulation on metal fittings, boots, elbows, and take-offs is mechanically fastened (e.g., stitch staples, tie bands) and sealed with no exposed metal.
- [ ] Any replacement flex duct is sized accordingly.
- [ ] Interior liner of flex-to-metal connections is fastened with tie bands using tie band tensioning tool.[3]
- [ ] Interior liner of flex-to-metal connections is sealed with UL 181 B-M listed mastic.
- [ ] The exterior liner of the flex duct is fastened with tie bands using a tie band tensioning tool.
- [ ] Exterior liner connections are sealed with UL 181 B-M listed mastic.

1. Relevant Standards: 5.0107.1, 5.0107.2

2. If variance request has been approved, replace this with approved figure.

3. Or other appropriate mechanical fasteners as necessary.

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Insulate Plenum

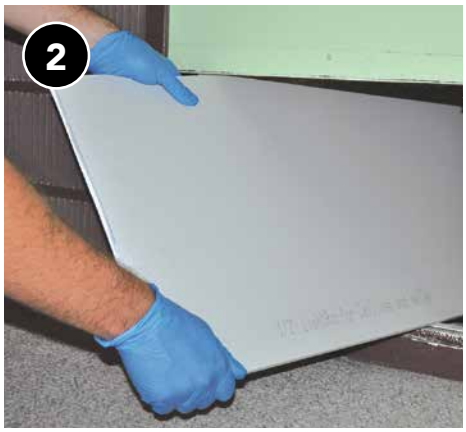
Job Aid for Insulate Ducted Distribution System Badge

Aligns With Standard Work Specifications 5.0107.1, 5.0107.2

BEFORE

Uninsulated supply and return plenums located in unconditioned spaces allow for energy loss and contribute to occupant comfort issues.

Cover any unnecessary holes in the air handler cabinet.



Check return cavities inside building envelope to ensure they are sealed off from unconditioned spaces.

Patch holes in ducts and plenum with appropriate materials (see 19-1 Seal Ducts With Mastic).

Prepare plenum by removing any residue from old insulation.

Measure insulation to take maximum advantage of large sheets of duct insulation.

Cut to size for area to be covered. Insulate all exposed metal of the plenum.

To ensure a complete vapor retarder, trim insulation from vapor barrier to create overlap flap for seams or tape seams with UL-181 tape.

Ensure clean surface for adhesion at overlap seam.

Spray adhesive over area where piece will be installed.

Ensure smooth and unrippled adhesion of insulation to metal of plenum.

Spray adhesive along vapor retarder at seam to seal closed.

Ensure overlapping flap is securely attached to the lower layer to maintain a complete vapor barrier, or tape seams with UL-181 tape.

Support insulation to prevent movement over time, securing in place without puncturing vapor retarder.

AFTER

Ducts are connected, supported, and air-sealed properly.

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Checklist

Insulate ducted distribution system

DESIRED OUTCOME

Reduced conductive heat transfer of duct system and minimized condensation on the duct system.[1]

Preparing for the work:

- [ ] Ducts are prepared and sealed according to "air seal ducted distribution system" guidelines.

General:

- [ ] Duct insulation has an attached and continuous vapor barrier.
- [ ] Duct insulation is mechanically fastened and sealed with no exposed ducts.
- [ ] All insulation seams are sealed.
- [ ] Ducts are adequately supported, and support materials do not cause the interior dimensions of the ductwork to be smaller than specified.

Metal Ducts:

- [ ] Insulation is securely attached to the ducts with metal wire or rot-proof nylon twine.
- [ ] Pattern of wire or twine is sufficient to securely hold the duct insulation tight to the duct.
- [ ] Duct insulation vapor barrier seams are sealed with manufacturer approved tape.
- [ ] Duct insulation is minimum R-8.[2]

Flex ducts:

- [ ] All metal fittings including boots, elbows, and take-offs are insulated separately using a duct wrap of the minimum acceptable R-value with vapor retarder.
- [ ] Insulation on metal fittings, boots, elbows, and take-offs is mechanically fastened (e.g., stitch staples, tie bands) and sealed with no exposed metal.
- [ ] Any replacement flex duct is sized accordingly.
- [ ] Interior liner of flex-to-metal connections is fastened with tie bands using tie band tensioning tool.[3]
- [ ] Interior liner of flex-to-metal connections is sealed with UL 181 B-M listed mastic.
- [ ] The exterior liner of the flex duct is fastened with tie bands using a tie band tensioning tool.
- [ ] Exterior liner connections are sealed with UL 181 B-M listed mastic.

1. Relevant Standards: 5.0107.1, 5.0107.2

2. If variance request has been approved, replace this with approved figure.

3. Or other appropriate mechanical fasteners as necessary.

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Window Installation

Job Aid for Install Window or Exterior Door Badge

Aligns With Standard Work Specifications 3.0201.9

BEFORE

Prepare the work area for installation by moving any customer belongings and protecting the floor. See job aids 1-1 and 1-2 for more details on working lead-safe on homes built prior to 1978.

Measure window rough opening to confirm the replacement window is the correct size and will fit.

Carefully remove window trim/stops prior to removing the existing window.

Clean up jamb and repair any damage. Insulate sash weight cavities with low expanding spray foam if present.

Replace flashing as needed.

Dry fit window.

Level the window using shims and secure with mechanical fasteners according to manufacturer's specifications.

Ensure window is operational.

Caulk all exterior edges.

Insulate and seal rough opening with backer rod and/or low expansion spray foam.

Reinstall existing trim or replace as needed.

Window opens and closes properly; all exterior edges are air-and watertight.

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Checklist

Install window or exterior door

DESIRED OUTCOME

Replacement window or door provides weathertight fit; improved energy efficiency performance of fenestration.[1]

- ☐ Window or door installed to meet all local building and safety codes.
- ☐ Window or door is fully operational.
- ☐ Installation prevents water and air infiltration (verify with blower door and smoke or infrared scan if temperatures permit).

1. Relevant Standards: 3.0201.9

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Door Installation

Job Aid for Install Window or Exterior Door Badge

Aligns With Standard Work Specifications 3.0202.2

BEFORE

Occasionally doors are damaged beyond repair and must be replaced.

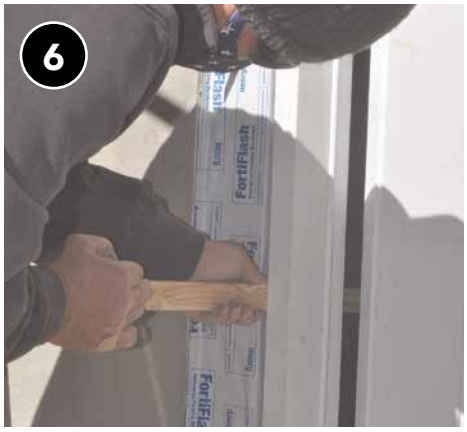
Remove old door and clear away debris.

Measure opening and ensure that the door on location is the proper size.

Prepare opening by ensuring that jambs are plumb and threshold is level.

Clean, frame-in (if needed), and adjust opening as necessary to accommodate new door.

Attach flashing, if necessary, to protect any new materials from water intrusion.



Using shims, locate door in frame, adjusting for level and plumb, and attach securely.

Ensure door is fully operational and lockset is aligned.

Insulate gaps between door jamb and frame.

Seal rough opening to prevent both air and water intrusion.

Reinstall existing trim or secure the trim supplied with the pre-hung door unit.

Seal along threshold, ensuring water will flow away from door.

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Checklist

Install window or exterior door

DESIRED OUTCOME

Replacement window or door provides weathertight fit; improved energy efficiency performance of fenestration.[1]

- ☐ Window or door installed to meet all local building and safety codes.
- ☐ Window or door is fully operational.
- ☐ Installation prevents water and air infiltration (verify with blower door and smoke or infrared scan if temperatures permit).

1. Relevant Standards: 3.0202.2

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Window Glass Replacement

Job Aid for Repair/Replace Cracked or Broken Glass Badge

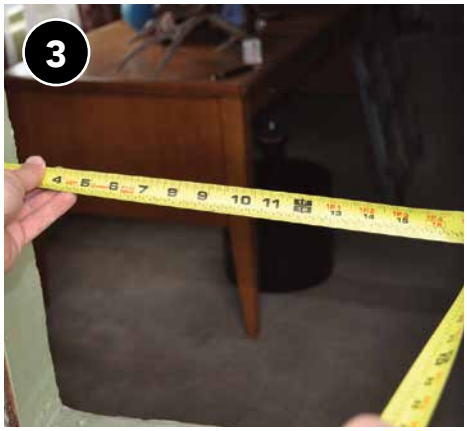
Aligns With Standard Work Specifications 3.0201.1, 3.0201.4

BEFORE

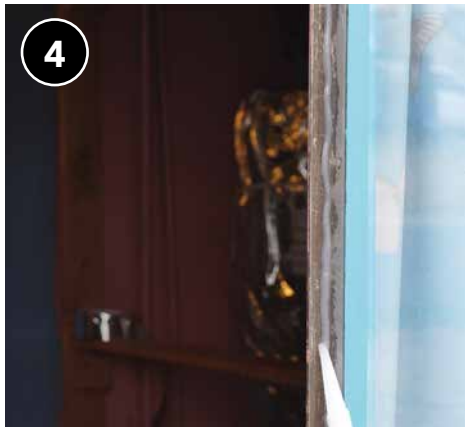
Broken, cracked, or missing glass breaks the pressure and thermal boundary.

Remove all broken glass.

Clean all debris, caulk, etc., from sash.



Measure rough opening for pane, size pane 1/8–3/16 inches smaller than the opening to ensure proper fit and minimize the potential of the glass cracking during installation.



(optional) Run interior small bead of caulk.

Install new glass, using tempered where code requires, that meets or exceeds the specifications of the previous glazing.

Temporarily hold new pane with tape and carefully install new push points.

Install glazing compound or sealant at all edges of the glass.

AFTER

Newly installed glass is sealed to prevent air and water leakage.

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Checklist

Repair/replace cracked or broken glass

DESIRED OUTCOME

Glass complete and intact; improved energy efficiency performance of fenestration.[1]

- ☐ In pre-1978 windows, presence of lead is assumed unless testing proved otherwise and work was completed accordingly.
- ☐ Replacement glass is sized correctly for the opening.
- ☐ Replacement glass matches original in color and look.
- ☐ Replacement glass meets local code requirements (e.g., tempered glass, safety glass).
- ☐ Glass is durably fastened to frame (stops or push points).
- ☐ Opening was cleaned adequately to allow adhesion of sealant.
- ☐ Glass is sealed according to design (e.g., glazing, glazing tape, or other) to prevent air movement.

1. Relevant Standards: 3.0201.1, 3.0201.4

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23-1

Insulate an Electric Domestic Water Heater

Job Aid for Insulate a Water Heater Tank and First Six Feet of Pipes Badge

Aligns With Standard Work Specifications 7.0301.2

BEFORE YOU BEGIN

Check data plate and warning label to find existing tank insulation level and confirm additional insulation is not prohibited by the manufacturer.

Insulate tank with minimum R-10 or better to achieve desired R-value, which will be a combination of the existing tank insulation and the newly added insulation.

Ensure a continuous vapor barrier with no gaps and mark for cutout locations of any access panels or safety features such as the temperature and pressure relief valve.

Do not obstruct temperature and pressure relief valve.

Carefully wrap the insulation around the water heater, and tape the seam and edges. Secure the insulation in place with plastic ties and avoid cinching them so tightly that the insulation is compressed.

AFTER

With access panel flaps cut and labeled, a properly insulated water heater reduces standby losses while allowing access to the water heater control panels.

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Checklist

Insulate a water heater tank and the first six feet of pipes

DESIRED OUTCOME

Improved thermal performance of the water heating and delivery system.[1]

- ☐ Water heater storage tank is insulated to achieve overall tank R-value of R-10.[2]
- ☐ Added insulation does not obstruct the unit's:
  - ☐ Pressure relief valve.
  - ☐ Thermostats or other controls.
  - ☐ Access plates.
- ☐ The first 6 feet of accessible inlet and outlet pipes are insulated so that coverage is complete and secure.
- ☐ Pipe insulation is correct size.
- ☐ Pipe insulation seams are sealed.

1. Relevant Standards: 7.0301.2

2. If variance request has been approved, replace this with approved figure.

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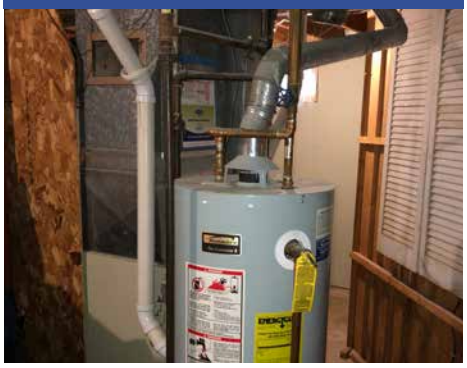
23-2

Insulate a Gas Domestic Water Heater

Job Aid for Insulate a Water Heater Tank and First Six Feet of Pipes Badge

Aligns With Standard Work Specifications 7.0301.2

BEFORE YOU BEGIN



Check data plate and warning labels on water heater to find existing insulation level and confirm additional insulation is not prohibited by the manufacturer.

Insulate tank with minimum R-10 or better insulation to achieve the desired R-value, which will be a combination of the existing tank insulation and the newly added insulation.

Carefully wrap the insulation around the water heater, using tape to hold the blanket together.

Tape insulation to the top of the water heater while maintaining a minimum clearance of 6 inches from draft diverter.

Do not obstruct burner access plate or combustion air intake.

Do not obstruct temperature and pressure relief valve.

Tape all seams and edges.

Cut flaps at access plates, tape them shut and then label from the exterior.

Secure seams with tie strap, wire, or twine and minimal compression.

AFTER

A properly insulated water heater safely reduces standby losses.

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Checklist

Insulate a water heater tank and the first six feet of pipes

DESIRED OUTCOME

Improved thermal performance of the water heating and delivery system.[1]

- ☐ Water heater storage tank is insulated to achieve overall tank R-value of R-10.[2]
- ☐ Added insulation does not obstruct the unit's:
  - ☐ Draft diverter.
  - ☐ Pressure relief valve.
  - ☐ Thermostats or other controls.
  - ☐ Access plates.
- ☐ The first 6 feet of accessible inlet and outlet pipes are insulated so that coverage is complete and secure.
- ☐ Pipe insulation is correct size.
- ☐ Pipe insulation seams are sealed.

1. Relevant Standards: 7.0301.2

2. If variance request has been approved, replace this with approved figure.

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23-3

Insulate Domestic Hot Water Pipes

Job Aid for Insulate a Water Heater Tank and First Six Feet of Pipes Badge

Aligns With Standard Work Specifications 7.0301.1

Insulate pipes to a minimum R-3 at least 6 feet from the water heater on both hot and cold lines. Use pipe wrap with an interior diameter sized correctly to fit the pipe.

Insulation should be continuous with no gaps. Cut pieces at a 45 degree angle to join two pieces of a 90 degree angle.

Keep insulation back at least 6 inches from draft diverter and single wall pipe.

Do not rely on manufactured adhesive seam seal to hold closed.

Secure seams with tape.

When path is partially obstructed or curved, shape insulation to the location to eliminate gaps.

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Checklist

Insulate a water heater tank and the first six feet of pipes

DESIRED OUTCOME

Improved thermal performance of the water heating and delivery system.[1]

- ☐ Water heater storage tank is insulated to achieve overall tank R-10.[2]
- ☐ Added insulation does not obstruct the unit's:
  - ☐ Draft diverter.
  - ☐ Pressure relief valve.
  - ☐ Thermostats or other controls.
  - ☐ Access plates.
- ☐ The first 6 feet of accessible inlet and outlet pipes are insulated so that coverage is complete and secure.
- ☐ A minimum R-3 pipe insulation is the correct size for pipes.
- ☐ Pipe insulation seams are sealed.
- ☐ A minimum clearance of 6 inches between pipe insulation and the water heater draft diverter or single wall vent flue is maintained.

1. Relevant Standards: 7.0301.1

2. If variance request has been approved, replace this with approved figure.

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Install a Low-Flow Showerhead

Job Aid for Install Low-Flow Faucet Aerators or Showerhead Badge

Aligns With Standard Work Specifications 7.0201.1

BEFORE

Higher flow showerheads waste water and use energy to to heat water that could be saved by installing a low-flow showerhead.

Carefully remove old showerhead with adjustable wrench, taking care not to loosen shower arm.

If old showerhead does not have flat sides at connection, wrap with buffer material, such as a piece of rubber.

Then use pipe wrench or channel locks to loosen connection at shower arm.

Clean threads of shower arm well to remove old residue.

Wrap new thread tape around threads.

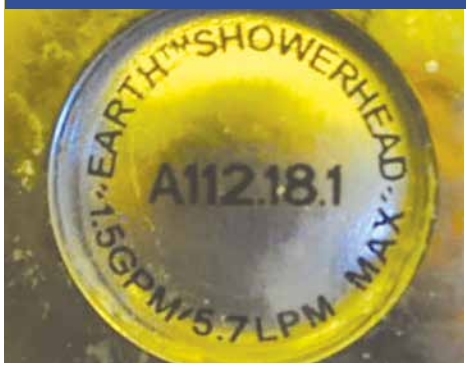
Install new showerhead according to occupant needs, such as handheld, shut-off, or swivel.

Ensure that connections will not leak while preventing damage by using buffer material.

Use thread tape at all connections.

Verify proper water flow and that there are no leaks.

AFTER



Low-flow showerheads must have flow rates of 2.5 gallons per minute or less, to reduce heating load and water use.

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Checklist

Install low-flow faucet aerators or showerhead

DESIRED OUTCOME

Energy and water use reduced while occupant needs for water flow maintained.[1]

- ☐ Equipment is installed in accordance with manufacturer instructions and applicable building codes.
- ☐ Rated flows of new fixtures will be no more than:
  - ☐ Showerheads—2.5 gallons per minute.
  - ☐ Faucet aerators—2.2 gallons per minute.
- ☐ Faucet aerator/showerhead is installed so that:
  - ☐ There is no water leakage upon completion.
  - ☐ Fixtures are undamaged.
  - ☐ Fixtures are fully functional (verify by testing).

1. Relevant Standards: 7.0201.1

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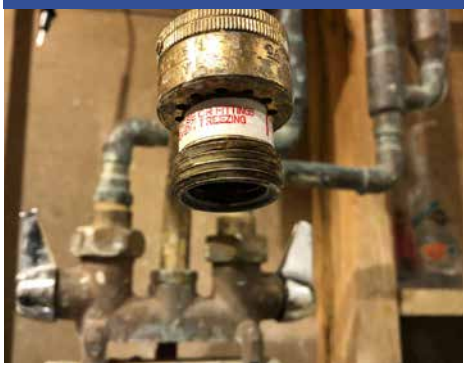
Install a Low-Flow Faucet Aerator

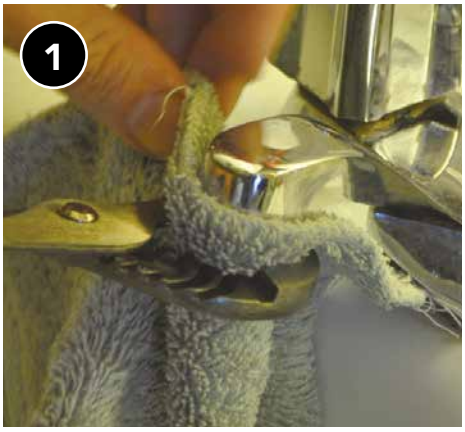
Job Aid for Install Low-Flow Faucet Aerators or Showerhead Badge

Aligns With Standard Work Specifications 7.0201.1

BEFORE



Faucets without aerators produce excess flow and old aerators can impinge flow or cause leakage.

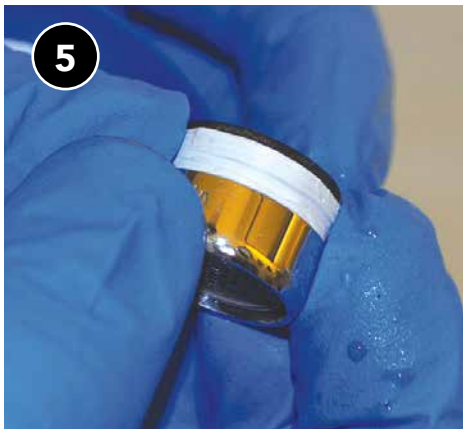


Using adjustable wrench or aerator wrench, gently remove old aerator, taking care not to damage faucet.

Once loose, continue removal by hand.

Clean threads of the faucet with a soft rag to remove any debris.

Verify which size and type of aerator will work with faucet.



Wrap thread tape around new aerator if male, or faucet threads if it takes a female aerator.

Carefully install new aerator without over tightening. Ensure rubber washers are in place and take care not to cross-thread.

Run water through new aerator to verify it is not cross-threaded and no water is leaking around sides.

Remove old aerator from property and dispose of it.

AFTER

Low-flow faucet aerators limit flow to 2.2 gallons per minute or less and reduce water heating load by reducing water usage.

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Checklist

Install low-flow faucet aerators or showerhead

DESIRED OUTCOME

Energy and water use reduced while occupant needs for water flow maintained.[1]

- ☐ Equipment is installed in accordance with manufacturer instructions and applicable building codes.
- ☐ Rated flows of new fixtures will be no more than:
  - ☐ Showerhead—2.5 gallons per minute.
  - ☐ Faucet aerators—2.2 gallons per minute.
- ☐ Faucet aerator/showerhead is installed so that:
  - ☐ There is no water leakage upon completion.
  - ☐ Fixtures are undamaged.
  - ☐ Fixtures are fully functional (verify by testing).

1. Relevant Standards: 7.0201.1

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25-1

Install Roof Vent

Job Aid for Install Exterior Roof Penetration (e.g., roof vents or bath fan termination) Badge

Aligns With Standard Work Specifications 6.0101.2, 6.0201.1, 6.0201.2, 4.0188.2

BEFORE

Kitchens, bathrooms, and dryers all exhaust air from the home and should be terminated to the exterior. Steps 1–5 can also be followed for installing passive attic roof vents.

Determine the appropriate vent dependent on its use—attic ventilation, kitchen hood, bath fan, dryer exhaust, etc.

Locate the ideal location for the vent and, from the attic side of the roof, drill a small pilot hole centered between the roof rafters. Exterior exhaust terminations should be located at least 3 feet from property lines, operable openings (windows and doors) to the home, and at least 10 feet from mechanical intakes or distances specified by the authority having jurisdiction.

Mark out size and location of hole on roof deck, verifying size of termination collar.

From roof side, cut hole slightly larger than termination collar. Note that when installing passive attic roof vents, a reciprocating saw is typically used.

If shingle roof, cut just below one layer of shingles in order to preserve overlap.

Run sealant around perimeter of vent and tuck under any surrounding uphill shingles. Seal uphill shingles over vent.

Collar should extend down through roof into attic.

Slide vent ducting to collar, sized to match the duct diameter, and attach with mechanical fasteners.

Seal duct joints with mesh and mastic to complete vent installation. Insulate as required.

A properly installed vent preserves the integrity of the roof while safety exhausting pollutants from the home.

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Checklist

Install exterior roof penetration (e.g., roof vents or bath fan termination)

DESIRED OUTCOME

Securely installed weatherproof termination fittings with unrestricted airflow.[1]

- ☐ Hole through building shell is no greater than ¼ inch larger than the termination fitting.
- ☐ Termination fitting is galvanized or stainless steel or copper (KITCHEN RANGE only).
- ☐ Termination fitting includes an integrated collar/flashing.
- ☐ Collar is same diameter as exhaust fan outlet OR if collar is larger than exhaust fan outlet, rigid metal transition of appropriate size is used.
- ☐ Fittings are appropriate for regional weather conditions.
- ☐ Duct to terminations connections align with TERMINATION FITTINGS table on this page.
- ☐ Duct connections are sealed with UL 181B or 181B-M listed materials, in addition to mechanical fasteners listed in table.
- ☐ Fasteners do not inhibit damper operation.
- ☐ Exterior terminations are flashed/weather sealed and direct water away from penetration.
- ☐ Exterior termination is covered with pest exclusion screen material with holes between ¼ and ½ inch.
- ☐ Exterior termination is located:
  - ☐ At least 3 feet away from property lines.
  - ☐ At least 3 feet away from operable openings in the home.
  - ☐ At least 10 feet away from mechanical intake.
  - ☐ Otherwise sited as required by authority having jurisdiction.

TERMINATION FITTING TO DUCT CONNECTIONS

DUCT-TO-TERMINATION CONNECTION TYPE		ACCEPTABLE MECHANICAL FASTENERS
Metal-to-metal or Metal-to-PVC	Round	3 equally spaced screws
	Other	Sealed welds, gaskets, mastic, mastic-plus-embedded-fabric, tapes
Flexible duct-to-metal or Flexible duct-to-PVC		Tie bands, using tie-band tensioning tool
PVC-to-PVC		Approved PVC cement
Other, specialized fittings		According to manufacturer specifications

1. Relevant Standards: 6.0101.2, 6.0201.1, 6.0201.2, 4.0188.2

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