AIR SEALING

DISCLAIMER: These tools are for illustrative purposes only and do not always align with the Energy Trust Existing Homes Specifications.

Air Sealing Contents

Air sealing is a challenging and important job. Done right it can bring increased comfort, safety and health to the home's occupant while saving them money on their heating and cooling bills. The purpose of this guide is to assist you, the air sealing professional, with getting the job done right the first time – every time. Below is a list of provided materials in this section:

Health + Safety Information Sheet

Health + Safety: Introduction

The introduction to this manual introduced EPA's Healthy Indoor Environment Protocols for Home Energy Upgrades. The document is a useful tool for finding solutions for common issues that arise when completing home energy upgrades. This page will highlight some important details in the document in relation to safety when duct sealing.

Health + Safety: Worker Safety

As mentioned in the introduction, it is required for all contractors to follow OSHA regulations. By law, employers and supervisors are required to ensure that all workers have the correct personal protective equipment. These items include, but aren't limited to:

- Gloves
- Protective clothing
- Knee pads
- Eye protection
- Respirators: Different types of respirators are required for different jobs. Use the Healthy Indoor Environment Protocols for Home Energy Upgrades to verify that your current respirator is compliant with the job.
- Non-contact voltage detectors

Tip: It is important to keep your PPE in good condition. Having a bag that stores all of your PPE and supplies for cleaning the items will save you time and keep you safe.

Health + Safety: Health Hazards

It is important to look for hazards and create a mitigation plan before beginning work. The list below highlights the most important items to identify and mitigate for all duct repair jobs:

- Sewer gases, fuel oil, chemicals and other pollutants in crawl spaces or attics
- Mold-like growth in attics and crawl spaces
- Presence of pest/rodents in crawl spaces or attics
- Lack of CO alarm in all houses with combustion appliances and attached garages
- Unvented combustion appliances
- Combustion air intakes
- Knob and tube wiring
- Vermiculite insulation
- Pipe insulations that are likely to contain asbestos
- Deteriorated interior finishes that may contain asbestos in a friable condition

If any of these conditions exist, follow action items listed in the Healthy Indoor Environment Protocols for Home Energy Upgrades before beginning work.

AIR SEALING SURVEY

HOUSE FLOOR PLAN

Create a diagram of the house below:

AIR SEALING SURVEY

✓	N/A	ASSESSMENT
❑	❑	1. Complete combustion safety testing before starting work and inform occupant if problems are found.
❑	❑	2. Create a rough sketch of the house floor plan, including all interior walls.
❑	❑	3. Mark areas on the floor plan that may be chases, dropped ceilings and soffits that are adjacent to the attic.
❑	❑	4. Draw conditioned and unconditioned spaces on the floor plan .
❑	❑	5. Mark location of fire hazards (combustion flues, can lights, etc.).
❑	❑	6. Mark remaining areas on the floor plan that need to be sealed.
❑	❑	7. Create a Scope of Work based on the interior assessment

AIR SEALING LOCATIONS

Look for seams, cracks joints, holes in these locations:

ATTIC		
Top plates of all walls	Can Lights	Dropped Ceilings
Tongue + Groove Ceilings	Plumbing Vent Pipes	Stairwells
Chases	Exhaust Fans	Chimney/Flue
Soffits	Missing wall cavity top plates	Ductwork
Attic Hatches		
WALL		
Electrical Wire	Missing knee wall cavity bottom plates	Attic Doors
Bottom plates of knee walls	Missing wall cavity top plates	CMU Hollow Cores
FLOOR		
Chases	Electrical	
Plumbing	Blocking of all floor cavities	

JOB INFORMATION	
Assessor Name	Initials
Address	Date

CHECKLIST:
AIR SEALING

✓	N/A	PREP
☐	☐	1. Complete a combustion safety test and record the results.
☐	☐	2. Verify that a ventilation plan is established.
☐	☐	3. Put on all personal protection equipment (PPE).
☐	☐	4. Identify all worker and occupant safety hazards.
☐	☐	5. Identify all potential durability issues.
☐	☐	6. Address all combustion safety, worker safety, occupant safety and durability issues prior to starting work and notify the occupant. **Do not complete work if a life safety hazard is identified.**
☐	☐	7. Create a diagram of the attic, walls and/or floor, identifying area needing sealing.

✓	N/A	AIR SEALING
☐	☐	8. Remove existing insulation at air sealing locations.
☐	☐	9. For homes with vented exterior soffits, install protective baffling.
☐	☐	10. Install insulation dams.
☐	☐	11. Verify that all wall cavities have six sides. Install additional blocking where necessary.
☐	☐	12. Install infill material in all extra large holes.
☐	☐	13. Seal all small, medium and large holes between the unconditioned and conditioned space.
☐	☐	14. Reinstall removed insulation and install new insulation to align with the air barrier and according to the manufacturer's specifications. Verify that all insulation has no gaps, voids, compression or misalignment.

✓	N/A	CLOSE OUT
☐	☐	15. Clean the work area.
☐	☐	16. Complete a combustion safety test and record the results.
☐	☐	17. Educate occupants on the work completed.

JOB INFORMATION	
Installer Name	Initials
Address	Date

AIR SEALING GUIDELINES

For seams, cracks, joints, holes and penetrations that are:

1/4-inch or less (small)	1/4 inch to 2 inches (medium)	2 to 3 inches (large)	3 inches or more (extra large)
Seal with caulk.*	Seal with one component foam or mastic.*	Seal with two component foam.	Install an infill material that will not bend, sag or move. Follow guidelines for applicable hole size.

BEFORE AFTER

BEFORE AFTER

BEFORE AFTER

* Sealants used for larger holes may also be used in these conditions.

AIR SEALING LOCATIONS

Look for seams, cracks joints, holes in these locations:

ATTIC		
Top plates of all walls	Can Lights	Dropped Ceilings
Tongue + Groove Ceilings	Plumbing Vent Pipes	Stairwells
Chases	Exhaust Fans	Chimney/Flue
Soffits	Missing wall cavity top plates	Ductwork
Attic Hatches		
WALL		
Electrical Wire	Missing knee wall cavity bottom plates	Attic Doors
Bottom plates of knee walls	Missing wall cavity top plates	CMU Hollow Cores
FLOOR		
Chases	Electrical	
Plumbing	Blocking of all floor cavities	

SEALING CATHEDRAL CEILING SKYLIGHTS

DESIRED OUTCOME: Seams of skylight sealed to prevent movement of air leakage or moisture movement between the attic and conditioned space.

MATERIALS	TOOLS

** Materials and tools listed are only recommendations and may not include everything needed to complete job.*

Skylight not air sealed.

BEFORE

Skylight fully air sealed.

AFTER

SAFETY + NOTES

Gloves, appropriate respirator, safety glasses

Any evidence of roof leak must be investigated prior to air sealing. (e.g. water staining, discoloration, peeling paint)

SEALING CATHEDRAL CEILING SKYLIGHTS

Prepare skylight shaft for air sealing. Remove trim as needed.

Install backer rod or infill, if needed.

Reinstall trim around perimeter of skylight.

1 PREPARE

2 SEAL SKYLIGHT

3 TRIM

Notes:

CRITICAL DETAIL:

SEALING PENETRATIONS

DESIRED OUTCOME: Penetrations sealed to prevent leakage and moisture movement between the attic and conditioned space.

MATERIALS	TOOLS

** Materials and tools listed are only recommendations and may not include everything needed to complete job.*

Leaking wiring penetration.

BEFORE

Penetration air sealed.

AFTER

SAFETY + NOTES

Gloves, appropriate respirator, safety glasses

Select a sealant that meets local code requirements regarding flammability.

SEALING PENETRATIONS

Leaking wiring penetration.

Seal penetration with caulk or foam.

Penetration air sealed.

1 FIND PENETRATION

2 SEAL PENETRATION

3 SEALED

Notes:

SEALING KNEE WALLS

DESIRED OUTCOME: Attic knee walls framed to prevent thermal bypass and sealed to prevent air leakage between attic and conditioned space.

MATERIALS

TOOLS

Knee wall with incomplete or missing top and bottom plate and no air sealing.

BEFORE

Knee wall with both a top and bottom plate and air sealed.

AFTER

SAFETY + NOTES

Gloves, appropriate respirator, safety glasses

** Materials and tools listed are only recommendations and may not include everything needed to complete job.*

SEALING KNEE WALLS

Remove or adjust insulation to allow access to top and/or bottom of knee wall.

Install top plate or blocking.

Air seal joints, cracks and penetrations including connection between interior surface and framing.

1 REMOVE BATT

2 INSTALL TOP PLATE

3 SEAL

Notes:

SEALING TONGUE + GROVE CEILINGS

DESIRED OUTCOME: Tongue and groove ceilings sealed to prevent air leakage and moisture movement between the attic and conditioned space

MATERIALS

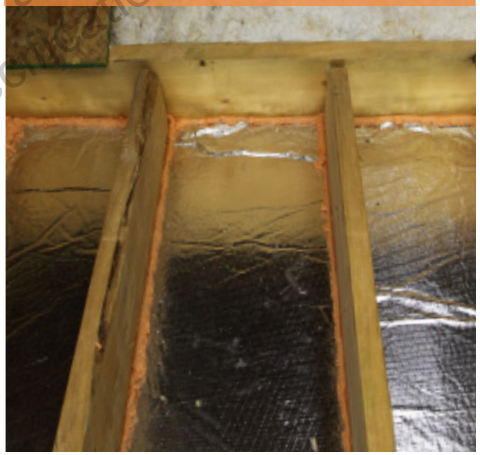
TOOLS

Unsealed tongue and groove ceiling.

BEFORE

Air sealed tongue and groove ceiling.

AFTER



SAFETY + NOTES

Gloves, appropriate respirator, safety glasses

NOTICE: No sealant should be visible in the living space.

** Materials and tools listed are only recommendations and may not include everything needed to complete job.*

SEALING TONGUE + GROVE CEILINGS

Option A: Air seal tongue and groove ceiling.

NOTICE: If air sealant is a foam plastic, it must be covered with an approved thermal barrier (e.g. rockwool, slag wool).

Option B: Install air barrier that is approved for attic exposure.

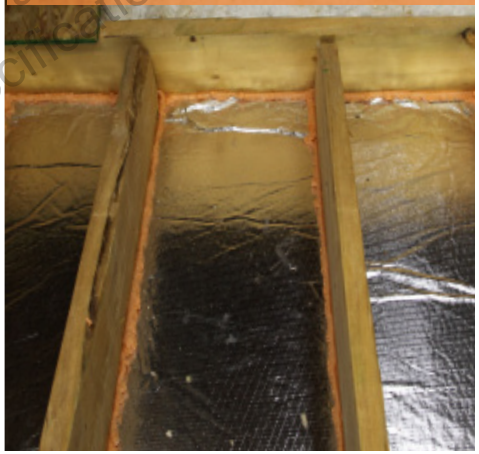
Air seal backing using a sealant that meets fire barrier specifications.

1 SEAL

2 INSULATE

3 INSTALL BACKING

4 SEAL



Notes:

CRITICAL DETAIL:

SEALING BALLOON FRAMING

DESIRED OUTCOME: Open wall cavities sealed to prevent air leakage and moisture movement between the attic and conditioned space

MATERIALS	TOOLS
Cardboard baffles	Hammer stapler

** Materials and tools listed are only recommendations and may not include everything needed to complete job.*

Wall cavities open to attic.

BEFORE

Wall cavities blocked and sealed.

AFTER

SAFETY + NOTES

Gloves, appropriate respirator, safety glasses

CRITICAL DETAIL:
SEALING BALLOON FRAMING

Prepare work area.

Cover or fill cavity at ceiling height with rigid material. Fasten as needed.

Seal all seams, gaps, and holes in blocking.

Seal all gaps, holes and seams in adjacent framing.

1 PREPARE

2 INSTALL BLOCKING

3 SEAL BLOCKING

4 SEAL FRAMING

Notes:

CRITICAL DETAIL:

CAPPING CHASES

DESIRED OUTCOME: Chase capped to prevent air leakage and moisture movement between the attic and conditioned space.

MATERIALS	TOOLS

** Materials and tools listed are only recommendations and may not include everything needed to complete job.*

Chase open to the attic.

BEFORE

Chase completely capped and air sealed.

AFTER

SAFETY + NOTES

Gloves, appropriate respirator, safety glasses

Any evidence of roof leak must be fixed prior to air sealing.

If interior surface covering in chase is not appropriately fire rated, the material used to cap the chase must be appropriately fire rated.

CAPPING CHASES

Chase open to the attic.

Install cap to cover entire chase. Install support material as needed. Fasten in place.

Seal all cracks, seams, and holes at chase and adjacent framing.

1 OPEN CHASE

2 CAPPED CHASE

3 AIR SEALED CHASE

Notes:

CRITICAL DETAIL:

CAPPING SOFFITS

DESIRED OUTCOME: Soffit is capped to prevent air leakage or moisture movement between the attic and conditioned space

MATERIALS

Interior cladding: see notes

TOOLS

Wall cavities within the SOFFIT/ DROPPED CEILING are open to the attic.

BEFORE

Wall cavities capped and air-sealed.

AFTER

SAFETY + NOTES

Gloves, appropriate respirator, safety glasses

If interior surface covering in soffit is not appropriately fire rated, the material used to cap the soffit must be appropriately fire rated.

** Materials and tools listed are only recommendations and may not include everything needed to complete job.*

CAPPING SOFFITS

Prepare work area.

1 PREPARE

Install support material (e.g., 2X) for spans wider than 24 inches.

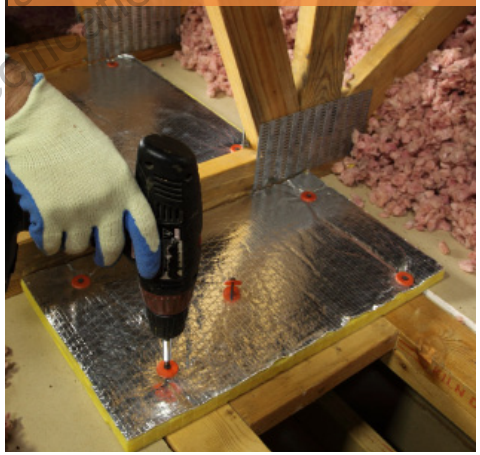
2 INSTALL SUPPORT

NOTICE: If air sealant is a foam plastic, it must be covered with an approved thermal barrier (e.g. rockwool, slag wool).

3 FIRE RATING

Install and fasten rigid sheathing over soffit/dropped ceiling.

4 RIGID SHEATHING



Air-seal all gaps, holes and seams of rigid sheathing.

5 SEAL SHEATHING

Seal all gaps, holes and seams in adjacent framing.

6 SEAL FRAMING

Notes: Be cautious when installing support material since excessive hammering may crack interior surfaces (e.g. drywall)

CRITICAL DETAIL:

CAPPING STAIRWELLS

DESIRED OUTCOME: Stairwells sealed to prevent air leakage and moisture movement between the attic and conditioned space

MATERIALS	TOOLS
Interior cladding: see notes	

** Materials and tools listed are only recommendations and may not include everything needed to complete job.*

Wall cavities within the stairwell open to the attic.

BEFORE

Whole stairwell capped and air sealed.

AFTER

SAFETY + NOTES

Gloves, appropriate respirator, safety glasses

If interior surface covering in stairwell is not appropriately fire rated, the material used to cap the stairwell must be appropriately fire rated.

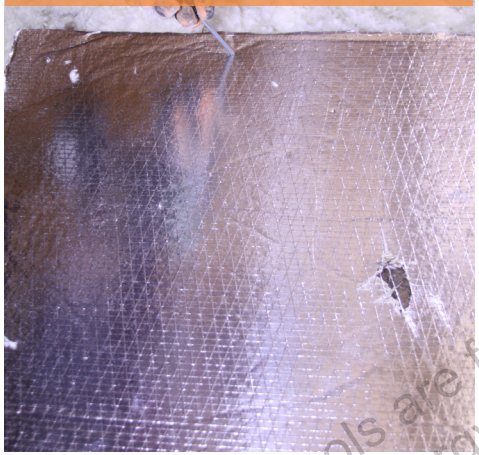
CAPPING STAIRWELLS

Install support material (e.g., 2X) for spans wider than 24 inches.

1 INSTALL SUPPORT

IMPORTANT: Rigid sheathing must have 15-minute fire rating if interior walls are not fire rated.

2 FIRE RATING



Install and fasten rigid sheathing over stairwell.

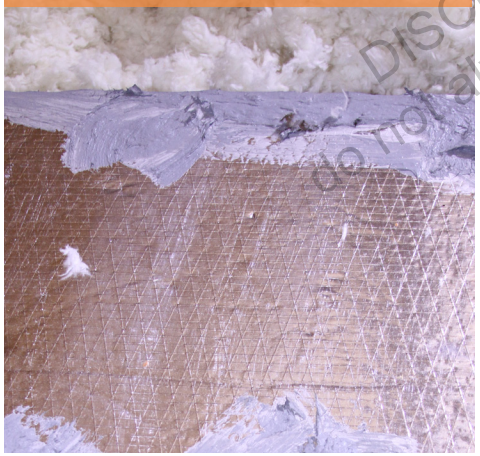
3 RIGID SHEATHING

Air seal all gaps, holes and seams of rigid sheathing.

4 SEAL SHEATHING

Seal all gaps, holes and seams in adjacent framing at top of stairwell.

5 SEAL FRAMING



Notes: Be cautious when installing support material since excessive hammering may crack interior surfaces (e.g. drywall)