U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Home Improvement Expert™ Factsheet

Attic Air Sealing and Insulation

WHY HOME IMPROVEMENT EXPERT?

An easy way to get a quality job.

Research findings reveal significantly reduced energy savings and potential performance risks where home improvements are not properly installed. To help homeowners address this challenge, the U.S. Department of Energy has compiled world-class expert guidance from industry leaders and national laboratories in factsheets and checklists under the name ***Home Improvement Expert***. Homeowners can leverage these expert recommendations to help ensure quality installation by attaching Home Improvement Expert checklists to vendor contracts and ensuring the vendor completes and signs the checklist before accepting the work.

READY TO DO MORE?

This factsheet and accompanying checklist cover one of more than 20 home improvements covered by the U.S. Department of Energy Home Improvement Expert. Use them to help optimize energy savings and improve performance related to comfort, health, safety, and durability.

To download other checklists: basc.pnnl.gov/home-improvement-expert

For more customized home improvement recommendations:

- Get your ***Home Energy Score*** from a qualified assessor (www.home-energy-score.gov)
- Schedule an expert assessment through **Home Performance with ENERGY STAR®** (www.energystar.gov/homeperformance).

BENEFITS

Done correctly, attic air sealing and insulation can reduce utility costs while improving comfort, indoor air quality, and durability.

In older homes, attics may have extensive holes, cracks, and missing air barriers and insufficient insulation that allow unwanted heat loss in cold weather, heat gain in hot weather, and infiltration of contaminants year-round. Air sealing uncontrolled leaks and adding insulation between the attic and the home is one of the most cost-effective measures to improve your home's performance. It can reduce your heating and cooling bills, improve comfort by stopping drafts, keep contaminants such as moisture, dust, and pests from entering your home, and reduce moisture-related durability problems.

RELATED HOME IMPROVEMENT CONSIDERATIONS

Before air sealing and insulating your home's attic, consider working with a qualified home energy assessor to help ensure combustion safety and sufficient fresh air once the home is made more air-tight. They will check for:

- required combustion air for any natural draft combustion equipment (e.g., if the home has a natural draft furnace, boiler, or water heater);
- adequate fresh air throughout the home;
- exhaust fans in bathrooms to remove moisture; and
- an exhaust fan in the kitchen to remove cooking emissions.

For more information on attic air sealing, please search the Building America Solution Center, basc.pnnl.gov.

TIPS FOR HIRING A CONTRACTOR

- Look for licensed, insured, and certified contractors.
- Check references and reviews on home improvement web sites.
- Get multiple bids in writing.
- Check with your utility and state, local, and federal weatherization programs for rebates and incentives.
- Include the Home Improvement Expert™ checklist in bids and contracts to ensure quality installation.
- Consider using a Residential Energy Services Network (RESNET) certified Home Energy Rating System (HERS) rater, Building Performance Institute (BPI) certified Building Analyst, or other qualified professional (e.g., licensed engineer or architect) to inspect the work.

ENCLOSURE UPGRADES

- Attic Air Sealing and Insulation
- Basement Wall Insulation
- Framed Wall Insulation
- Masonry Wall Insulation
- Home Air Sealing
- Vented to Unvented Attic
- Vented to Unvented Crawl Space
- Window Replacement

HEATING & COOLING

- Air Conditioner Replacement
- Gas Furnace Replacement
- Heat Pump Replacement
- Duct Sealing and Insulation
- Oil or Gas Boiler Replacement

HOT WATER HEATING

- Gas Tank Water Heater
- Gas Tankless Water Heater
- Heat Pump Water Heater

FRESH AIR SYSTEM

- Bathroom Exhaust Fan
- Kitchen Exhaust Fan
- Balanced HRV/ERV
- Balanced Supply plus Exhaust
- Supply Integrated with HVAC

PROPER SEQUENCING OF HOME IMPROVEMENTS

Through the U.S. Department of Energy's Building America research program, expert guidance has been developed for optimizing whole-house energy-efficiency upgrades. This includes a recommended sequence for home improvements (shown below) to help ensure homeowners get the most out of their upgrade investments while minimizing potential harm from safety, indoor air quality, and moisture issues.

STEP 1: ENSURE SAFE AND DURABLE

Have experts assess opportunities to improve energy efficiency and identify comfort, moisture management, health, and safety issues.

STEP 2: ENSURE FRESH AIR

Ensure effective ventilation before increasing air tightness.

STEP 3: ENSURE MOISTURE CONTROL

Ensure adequate water protection before reducing the ability of walls to dry by adding air sealing and insulation.

STEP 4: ENSURE DRAFT-FREE

Capture air sealing opportunities not accessible after insulation is installed.

STEP 5: ENSURE THERMAL COMFORT

Insulate at least to the latest national code recommendations for your location after addressing related safety, indoor air quality, and moisture management issues.

ANYTIME: EQUIPMENT UPGRADES

Replace heating and cooling equipment, water heaters, windows, appliances, lighting, fans, and electronics when they fail or become out of date with ENERGY STAR® qualified products or better, and improve systems to operate more efficiently.

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For more resources, visit
basc.pnnl.gov/home-improvement-expert

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Home Improvement Expert™ Checklist

Attic Air Sealing and Insulation

This U.S. Department of Energy checklist includes important specifications that can contribute to a complete and quality installation. All work shall comply with these specifications, all relevant codes and standards, and all manufacturer installation instructions. The contractor shall check each box on the checklist below and sign and date at the bottom to certify the work is completed.

PREPARATION

☐	The attic shall be inspected for water leaks and moisture, structural, or pest damage. A list of all needed repairs shall be provided to the homeowner before attic work begins so remediation can be fully addressed as necessary.
☐	The attic shall be inspected for sufficient attic ventilation (e.g., ridge vents, soffit vents). Ventilation issues shall be addressed before proceeding with attic air sealing or insulation.
☐	If there is active knob and tube wiring present in the attic, insulation shall not be installed until wiring is replaced or properly boxed. Work shall not proceed if existing insulation is vermiculite, which may contain asbestos.
☐	All exhaust fans shall be modified as required to vent to the outside, not into the attic.
☐	A combustion safety test shall be performed if any natural draft combustion equipment exists in the home to ensure there is no backdrafting or spillage of combustion emissions. Any combustion safety issues shall be addressed before proceeding with attic work.
☐	The contractor shall state whether existing insulation is to be removed or moved aside for air sealing.

INSTALLATION: ATTIC AIR SEALING AND AIR BARRIERS PRIOR TO INSULATION

☐	All gaps, cracks, seams, and penetrations between conditioned and unconditioned space (such as gaps around lighting fixtures, HVAC duct boots, electric wiring, plumbing pipes, and flues) shall be sealed with sealants alone (e.g., caulk, foam, aerosol sealant) if the gaps are narrow enough or with rigid blocking material sealed in place with sealants, per the sealant manufacturer's instructions. Fibrous insulation is not an air barrier and shall not be used for air sealing.
☐	The seams where drywall attaches to the top plate at all interior and exterior walls shall be sealed from the attic side with a caulk, spray foam, or sprayer-applied sealant.
☐	Larger gaps and openings (such as uncovered dropped soffits and openings under knee walls or at the tops of balloon-framed gable walls) shall be closed off using a solid material such as rigid foam or OSB that is sealed at the edges with caulk, sealant, or mastic.
☐	Gaps around masonry chimneys or gas appliance vents shall be sealed with high-temperature-rated caulk or foam and insulation dams shall be constructed around them as needed using heat-safe materials in accordance with building code requirements.
☐	Attic access panels, doors, and drop-down stairs shall be insulated with a minimum of R-10 rigid foam insulation and gasketed (not caulked) to provide a continuous air seal when closed.
☐	All non-ICAT recessed light fixtures shall be boxed with a solid material such as drywall or rigid foam that is sealed at all seams with a sealant such as caulk, mastic, or spray foam.
☐	Before installing fibrous attic floor insulation, baffles shall be installed at all attic eaves adjoining vented soffits to prevent air flow through the insulation and to provide a path for ventilation air from the soffit vents to the ridge vents. The baffles shall extend at least 6 inches above the height of the attic insulation.

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Home Improvement Expert™ Checklist

Attic Air Sealing and Insulation *Continued*

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INSTALLATION: ATTIC INSULATION

☐	Continuous R-19 insulation shall be installed at attic knee walls, skylight shaft walls, vertical portions of all dropped ceilings, and any other vertical wall adjoining conditioned space.
☐	All joints, cracks, and penetrations in the wall air barrier shall be fully sealed with caulk, foam, or equivalent.
☐	Attic insulation shall be installed at all flat and sloped surfaces adjoining the conditioned space with less than 2% gaps, voids, and compressions and at levels that meet or exceed prescriptive levels specified by the 2012 International Energy Conservation Code.
☐	All attic insulation shall be uniform and conform to manufacturer-specified density with attic rulers to verify full depth.

COMMISSIONING

☐	At the completion of the work, a radon test kit shall be provided to the homeowner with a recommendation to initiate a radon remediation strategy if post-retrofit radon measurements exceed EPA acceptable levels.

I hereby certify that, to the best of my knowledge and ability, all checked items on the above checklist have been accomplished as part of completion of this home upgrade.

Contractor Signature: _____ Date: _____

Contracting Organization: _____

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