

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: bas.c.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

Installed correctly, framed wall insulation can cut your utility bills, make your home more comfortable, and increase its value.

Older homes without effective wall insulation allow excessive heat loss in winter and heat gain in summer. Insulating walls is a highly effective way to improve your home's performance. It can reduce your heating and cooling bills, improve comfort with less drafts, and help your home meet increasing performance expectations. If you are undertaking a remodel or renovation project where drywall or exterior siding is removed, conventional insulating techniques can be used. Otherwise, there are two strategies for installing wall insulation. One is to remove the existing wall cladding and install continuous rigid foam insulation under the new cladding. The other option is use "drill and fill" in which holes are drilled in either the exterior siding or the interior drywall, insulation is installed through the holes, then the holes are patched and finished.

RELATED HOME IMPROVEMENT CONSIDERATIONS

Before insulating your framed walls, consider working with a qualified home energy assessor to evaluate other related home performance needs and opportunities. This includes:

- testing for adequate combustion air with atmospherically vented combustion equipment (e.g., a furnace, boiler, or water heater);
- integration of a fresh air system into the heating and cooling system;
- installation of exhaust fans in bathrooms to remove moisture; and
- installation of an exhaust fan in the kitchen to remove cooking emissions.

For more information on wall insulation, please search the Building America Solution Center, bas.c.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.



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 walls shall be inspected for any evidence of bulk water penetration, knob and tube wiring, or moisture or pest damage, and a list of any potential problems shall be provided to the homeowner before proceeding with the work so remediation can be fully addressed as necessary, including upgrades to the exterior cladding and flashing details as required before starting the work.

INSTALLATION: OPTION 1 - CONTINUOUS EXTERIOR INSULATION

- Existing wall cladding and trim shall be removed.
- The wall sheathing shall be free of any protruding nail heads, screws, or irregularities to ensure a smooth surface for installing the air/water control membrane.
- Windows and doors shall be removed as required to allow installation of flashing and air control layer transitions into openings including pan flashing at sills and flashing at the jamb and head.
- All exposed cracks and penetrations at sheathing, rim areas, and top and bottom plates shall be air sealed with sealant compatible with the surface.
- A weather-resistive barrier (WRB) (e.g., house wrap) shall be installed over the entire exterior wall with seams taped and edges sealed at the top and bottom. Liquid-applied WRBs will not have seams and will not require additional taping or sealing.
- Flashing for windows and doors shall be integrated with the WRB to protect the wall assembly from bulk moisture.
- Per the contract scope of work, existing windows and doors shall be re-installed or new windows and doors shall be installed in properly flashed openings per window manufacturer's specifications.
- Insulation shall be installed in accordance with the R-value specified for the wall assembly under the contract agreement for this work.
- Furring strips or other spacing shall be installed in a vertical orientation over insulation and attached to the structural sheathing and/or framing. Wall cladding and trim shall be attached to the furring strips. Where vinyl siding is being used, the furring strips shall not be required.



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.

INSTALLATION: OPTION 2 - DRILL AND FILL WITH BLOWN-IN INSULATION

<input type="checkbox"/>	If the wall cavity has some existing batt insulation, a 1-foot strip shall be cut out along the wall near the floor on either the interior or exterior side of the wall, and the old batt insulation shall be removed to allow proper installation of blown insulation into the wall cavities. Alternatively, an infrared camera shall be used to verify that the blown insulation has adequately filled the wall cavities around the existing batt insulation.
<input type="checkbox"/>	If the walls are balloon framed, blocking shall be installed at the top and bottom of the walls at each floor.
<input type="checkbox"/>	Blown-in cavity insulation shall be installed so it completely fills the cavity, with adequate density per the manufacturer's specifications to ensure no settling.
<input type="checkbox"/>	If installed from the interior, any holes cut into the interior wall surface shall be patched after the insulation is installed and all cracks and penetrations in the wall surface shall be fully air sealed.
<input type="checkbox"/>	If installed from the exterior, all cracks, penetrations, and holes shall be patched and air sealed after insulation is installed.

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: _____

THE U.S. DEPARTMENT OF ENERGY DOES NOT WARRANT OR ENDORSE THE WORK, PRODUCTS, OR SERVICES OF ANY OF ITS PARTNERS.