



WEATHERIZATION

FOR HEAT PUMP CONTRACTORS



Who: Heat pump installers | **Why:** Increase profit and customer satisfaction while reducing callbacks

Installing a new HVAC system in a home with a poor envelope often results in a dissatisfied customer left with the same issues they previously had. Providing recommendations to a homeowner on how they can lower their monthly energy costs and increase comfort will **gain trust** and **increase chances of winning a bid**. Add simple weatherization improvements or partner with a weatherization contractor to **increase profit and customer satisfaction**.

When installing a heat pump, all efforts should be made to reduce the heating and cooling load of the building prior to installation.

- Decreasing the load and tightening the envelope results in increased comfort and lower utility bills.
- A weatherized home allows heated or conditioned air to better travel throughout the home. This results in more uniform temperatures and can simplify distribution needs.
- The building's thermal and pressure boundary should be prioritized by recommending basic air-sealing and insulation measures.



Reducing the heating and cooling loads of a home by weatherizing will make your heat pump bid more competitive, increase comfort, and reduce callbacks.

Weatherization upgrade costs and benefits vary with each home. The high priority items are relatively easy improvements that quickly result in benefits and energy savings in most homes. The lower priority items are more expensive or labor intensive and can be done when a homeowner is looking to do a complete renovation or an obvious need is presented.

High Priority ↑↑↑

- Air seal known cracks or gaps with caulking, gaskets, or weather stripping
- Air seal attic, basement, and wall partitions
- Increase or improve attic insulation
- Insulate and air seal the basement rim joist
- Add storm windows or SHGC film to windows
- Replace damaged windows and doors

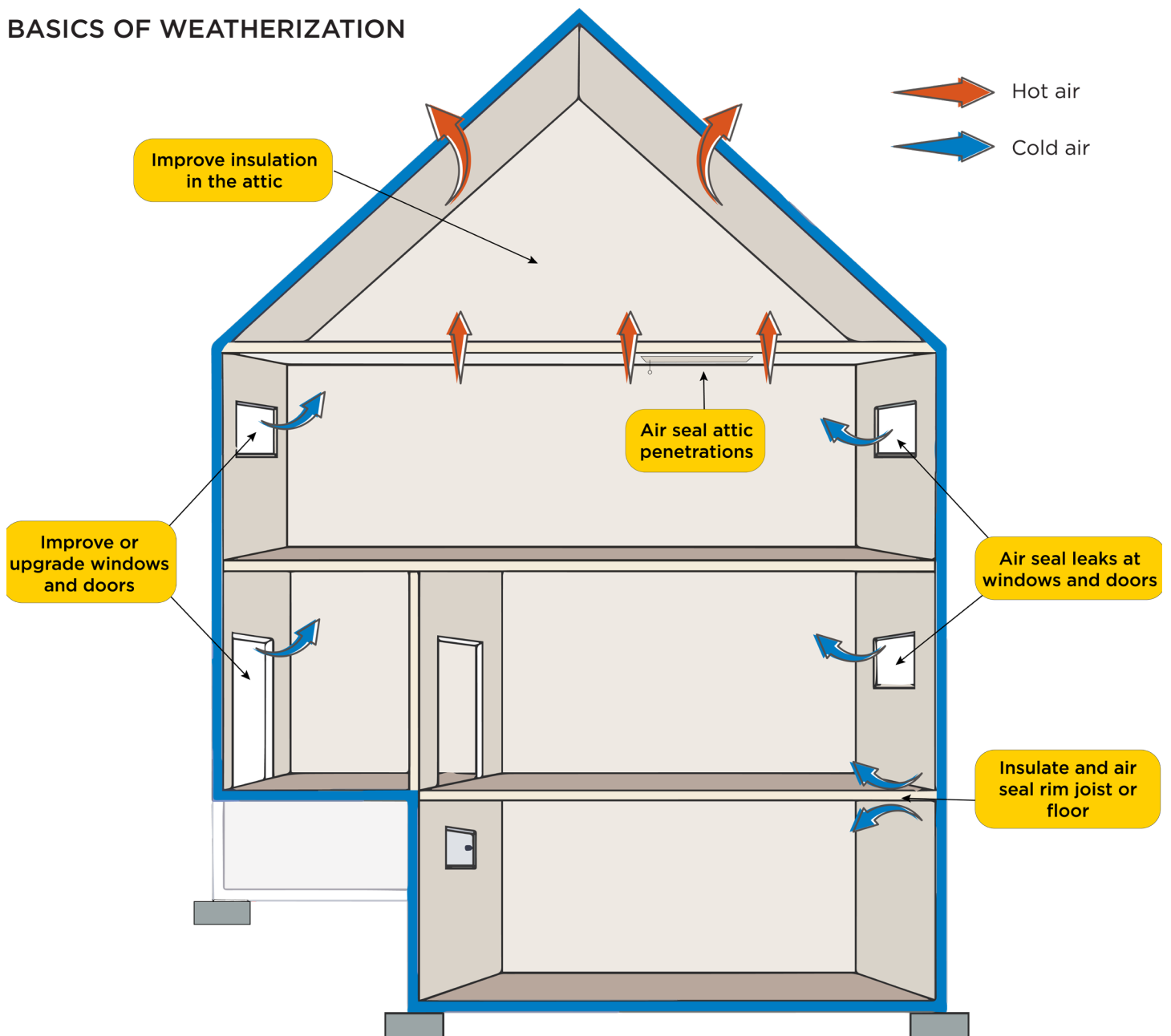
Low Priority ↑

- Install new windows and doors
- Increase or improve wall insulation

HEAT PUMPS AND WEATHERIZING

Upgrading a home's envelope and HVAC system go hand in hand. Ideally, the home will be weatherized and ready for a new heat pump when a customer calls for installation. However, the timelines do not always align. **When weatherization upgrades are planned, it is important to size the heat pump to the reduced loads after weatherization upgrades are complete.** If the upgrades will not be installed before heating season, install supplemental heating or retain the existing heating system until upgrades can be installed. The customer should be informed of how the system will operate until upgrades can be completed and controls should be installed to ensure the heat pump and supplemental heating work in unison.

BASICS OF WEATHERIZATION



Adding basic weatherization skills can diversify your business and increase your reputation with customers. By offering weatherization, you can increase your revenue and profit from each job. Customers will be satisfied that they are purchasing a smaller heat pump and will be paying less on utility bills each month. The money they save on utility bills can be collected by you for air sealing, installing insulation, or upgrading doors and windows!



AIR SEALING

Sealing air leaks lowers building load, decreases humidity in the summer, and can increase air quality. Proper air sealing can save homeowners up to 11% of total energy costs when combined with insulation upgrades to meet current US DOE guidance.

It should be noted that deep air sealing can cause need for mechanical ventilation to ensure proper air quality. If the house is tightly sealed, evaluate the envelope and consider adding mechanical ventilation.

Air sealing costs range from \$600 to \$2500. The national average to seal the interior and exterior walls for a 1500 square foot home is around \$1500.

Assess the Home

<ul style="list-style-type: none"> • Does the home have hot or cold spaces? • Is the home constantly humid in the summer? • Are there cracks or gaps around a window, attic hatch, lighting fixture, floorboard, or other? • Are gaskets or weatherstripping around doors and windows old and in need of replacement? 	<p>★★★ BEST: Conduct a blower door test to accurately quantify the air leakage.</p>
	<p>★★ BETTER: Close all windows and exterior doors and pressurize the home by turning on the HVAC system and use a smoke pencil to identify drafts from potential air leaks.</p>
	<p>★ GOOD: Assess the pressure boundary of the home for visible leaks and gaps using a smoke pencil. Inspect the quality of window and door weatherstripping. Look for air leaks at envelop penetrations and framing junctions. Ensure the attic and basement access hatches or doors have working gaskets.</p>



INSULATION

Upgrading or installing insulation or radiant barriers can save homeowners up to 11% of total energy costs when combined with air sealing to meet current US DOE guidance. Better insulation reduces the building load and the energy needed to condition a space. In warm, sunny climates, installing a radiant barrier in the attic can reduce cooling costs 5% to 10%. Insulating a basement or crawl space can reduce humidity and eliminate moisture or air quality issues.

Insulation costs will range from \$1.50 to \$5.00 per square foot installed.

Assess the Home

<ul style="list-style-type: none"> • Are any areas of the home colder than others in the winter? • Are there any visibly exposed areas of the attic floor, roof, basement walls, floorboards, or other that should have insulation? • Is the rim joist missing insulation? 	<p>★★★ BEST: Use a thermal camera to assess hot and cold areas and identify gaps in insulation.</p>
	<p>★★ BETTER: Use an infrared thermometer to assess temperatures across the thermal envelope for potential gaps in insulation.</p>
	<p>★ GOOD: Visibly assess the thermal envelope of the building. Confirm attic insulation is evenly spread throughout the space with no gaps or compressions.</p>



WINDOWS AND DOORS

Upgrading windows and doors to new Energy Star windows from single pane windows and old doors could save a homeowner up to 33% of total energy costs. Replacing doors and windows is a relatively expensive upgrade. In most situations, adding a SHGC film to reduce solar heat gain is a cost effective alternative to full window replacement.

Storm windows are a viable alternative for a homeowner that wants to keep costs low or preserve the original windows. Energy Star certified storm windows cost around \$200 each and provide similar benefits as new Energy Star windows. Because windows come in many types and sizes, their costs range greatly. A basic Energy Star certified window ranges from \$150 to \$1500 each.

Assess the Home

<ul style="list-style-type: none"> • Are window U-values at the required value for your area's building codes? • Are there gaps under or around exterior doors? • Are there cracks in glass? • Is the caulking aged or cracked? 	<p>★★★ BEST: Identify the window U-values and conduct a blower door test to assess leakage around frame.</p>
	<p>★★ BETTER: Identify the window U-values and conduct a visual inspection of windowpanes and perimeter of windows and doors.</p>
	<p>★ GOOD: Determine the age of installed windows and conduct a visual inspection of windowpanes and perimeter of windows and doors.</p>

Properly insulating and air sealing a home reduces the amount of heat transferred between the interior of the home and its surroundings. Less energy lost to a home's surroundings means that the heating and cooling system will use less energy to heat and cool the home and will result in lower energy bills. Table 1 shows potential savings of weatherizing a home.

Table 1: Cost and potential savings of weatherization upgrades

Weatherization Tactic	Cost to Homeowner	Possible Annual Savings ⁶	Total Annual Savings
Energy Audit	\$100 - \$1500	-	37% ^{4,5}
Air Sealing	\$600 - \$6000 ¹	11% ²	
Adding Insulation	\$1.50 - \$5.00 per square foot		
Window and Door Upgrades	\$60 - \$200 each	12% - 33% ³	
Window Replacement	\$150 - \$1500 each	12%	
Exterior Door Replacement	\$250 - \$4000 each	10%	

¹ Air Sealing costs range greatly depending on home square footage, age, existing insulation, and existing windows and doors

² Air sealing and insulating combined reduces total energy costs by 11% per www.energystar.gov.

³ Range based on type and age of windows. Upgrading single pane windows will have higher annual savings than updating newer double and triple pane windows.

⁴ Average annual cost savings based on U.S. Department of Energy national evaluation of their Weatherization Assistance Program.

⁵ Total annual savings based on U.S. Department of Energy's typical home of 1700 square foot with an annual energy bill of \$1000

⁶ Data from www.energy.gov/energysaver

Homeowners can help offset costs of weatherization upgrades through incentives, rebates, and federal and state tax credits. The homeowner or contractor should check their local utility and state incentive, rebate, and tax credit programs to see what additional cost savings are available. Table 2 shows annual federal tax credits that a homeowner can receive for completing energy efficiency upgrades. The IRA 25C tax credit reimburses 30% of the cost for each energy efficiency upgrade up to the annual tax credit limit for that upgrade. There is an aggregate yearly maximum of \$1200 for all building envelope components, home energy audits, and energy property.

Table 2: Federal annual tax credits for energy efficiency upgrades available to homeowners through the IRA 25C

Energy Efficiency Upgrade	Annual Tax Credit Limit
Home energy audit	\$150
Insulation and air sealing	\$1200
Exterior doors	\$250 for one door; \$500 for all doors
Exterior windows and skylights	\$600
Central air conditioners	\$600
Electrical panels and related equipment	\$600
Natural gas, propane, oil water heaters and furnaces	\$600
Heat pump water heaters	\$2000
Heat pumps	\$2000
Biomass stoves and boilers	\$2000

Use the Energy Star website: https://www.energystar.gov/about/federal_tax_credits, to learn what is available to your customers.

