NebGuide

University of Nebraska–Lincoln Extension, Institute of Agriculture and Natural Resources

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G2234

Home Efficiency: Homeowners and Energy Codes

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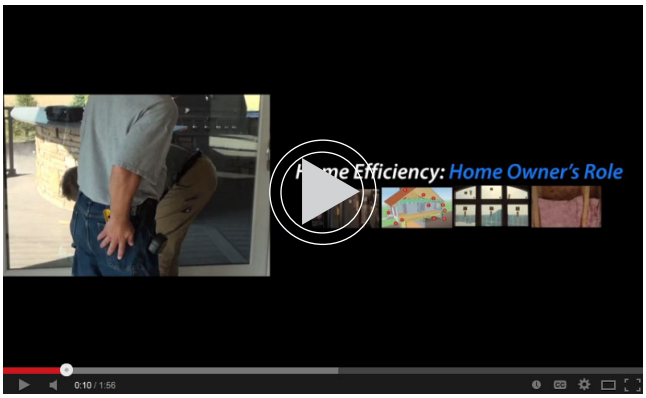
Understanding energy codes helps homeowners make wise decisions when choosing energy efficient products, such as insulation and windows, for their new or existing home.

Nebraska's new homeowners are entitled to homes that meet minimum state and national standards for energy efficiency. The adoption of the Nebraska Energy Code helps ensure the efficient design and construction of new and, in some cases, renovated residential and commercial buildings. The energy code forms part of the overall building code that is adopted by state and local government and establishes the *minimum* energy requirements. Homeowners, especially those building new homes, go *beyond* these minimum requirements during construction because installing additional insulation at that time is very cost effective, and those costs can be rolled into the mortgage. Keep in mind, local code jurisdictions can exceed the requirements of the Nebraska Energy Code so discuss any local requirements with your builder or local code authority.

Energy codes are important because they:

- **Save you money.**
  Buying a home is likely the most expensive investment that you will make in your lifetime. Before buying, think about how much it will cost to operate the home. Did you know that the average U.S. homeowner spends $2,175 on utility costs per year? That's over $180 per month. Buildings constructed to meet energy codes use less energy, which reduces utility bills and puts money back into your pocket.
- **Protect you and your family.**
  Homes built to the energy code protect you and your family from high utility bills and below-standard construction. Builders must comply with the Nebraska Energy Code as stringently as they comply with other building codes that protect life, health, and safety.



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- **Are a cost-effective investment.**
  It's more cost-effective to build a home that meets the energy code, than try to improve energy efficiency later through expensive retrofits. When the cost of the efficiency investments are spread out over the term of a standard mortgage, owners usually realize net savings within the first year. Would you rather spend a few dollars more on your monthly mortgage payments while saving $20 dollars or more on your utility bills or spend money on an energy retrofit a few years down the line?
- **Reduce pollution and increase reliability.**
  Constructing buildings that waste energy needlessly make power plants work harder and put additional stress on the electric grid. Buildings that meet the energy code requirements reduce pollution, improve grid reliability, and help to make your utility costs more predictable.

Would you buy a gallon of milk without checking the expiration date? Or a car without checking the miles-per-gallon? Then why would you buy a home without checking the monthly utility bill? Taking a little time to consider the

energy efficiency of a home (new or existing construction) that you are contemplating purchasing can save you a lot of money and discomfort in the future. **Before you buy, do your research.**

- In the case of an existing home, ask the current residents how much they pay each month for electricity and heating fuel.
- If it's a new home, ask the builder if the home has an ENERGYSTAR® rating or to have the energy efficiency features explained.

Using a Home Energy Code Guide and Checklist, such as the one provided at *http://www.greenerchoices.org/pdf/Home_Energy_Code_Checklist.pdf*, gives you the power to ensure that your home is well-built, will save you money and, in the case of new construction, meets the minimum requirements of the Nebraska Energy Code. This checklist does not cover every aspect of the energy code, but it explains the requirements that are easiest to understand and see in a home after construction is complete. This information will help you to determine whether a home likely meets the energy code or what upgrades may be needed when renovating an existing home.

Insulation

Insulation levels in a home have a large impact on heating and cooling costs. A properly insulated home allows it to be maintained at a comfortable temperature while using less energy. There are different types of insulation used in both new construction and energy retrofits:

- **Batt or blanket** insulation can be made of a variety of products including glass fiber or rock or mineral wool. The batts come in lengths and widths ready for installation. Blankets, however, come in rolls that are cut to specific needs. The R-value of batt or blanket insulation is printed on the face of the product to allow for easy verification.
- **Loose-fill** insulation comes in bags. It can be made from cellulose, glass fiber, or mineral wool. Loose-fill insulation needs to be installed to a proper density and depth to provide an appropriate R-value. In the case of new construction, the Nebraska Energy Code requires that the R-value and blown depth of loose-fill insulation be easily marked and available for verification and inspection.
- **Rigid board** insulation comes in a wide range of materials including expanded polystyrene, extruded polystyrene, polyurethane, and polyisocyanurate. Rigid boards have a high ability to resist moisture and are commonly used in the basement or crawl space walls around the foundation. The R-value of insulation is printed on the face of the product to allow for easy verification.
- **Foamed-in-place** insulation is sprayed into or onto the surface of the walls and is most commonly made of polyurethane material. It generally comes in different densities that provide different R-values. Foamed-in-place insulation has excellent air sealing and insulation qualities. Ask for documentation on the R-value and density of any foamed-in-place insulation to confirm that appropriate code-required R-values are met.

All insulations are measured by R-value per inch. The higher the R-value, the better the insulated value of the material will be. More information can be found at *http://energy.gov/energysaver/articles/types-insulation*.

Windows, Skylights, and Doors

The Nebraska Energy Code requires windows, doors, and skylights in new buildings to meet a minimum efficiency standard. That standard for windows and doors is currently a minimum U-value of 0.35. The U-value or U-factor is an indicator of how well a window or door resists heat transfer. The lower the U-value, the lower the heat transfer and the better the insulating value. The minimum U-Value for skylights is 0.60.

In new homes, confirm these requirements are met for windows and skylights by asking for documentation, such as copies of the window label, showing the U-factor and solar heat gain coefficient (SHGC). Some manufacturers label their windows with serial numbers or other data that can be used to obtain information on the efficiency rating. Look for trademarks and codes etched into the corner of the window glass and/or paper or metal labels that may be attached to the window sill, header, or tracks on the sides. If the builder cannot provide documentation, contact the customer service department of the window manufacturer to confirm the efficiency of the product installed.

In existing homes, examine the condition of the windows and estimate their U-value. U-factors generally range from 0.2 (very little heat loss) to 1.2 (high heat loss). Single-pane windows have a U-factor of about 1.0, double-paned windows about 0.5, and high-performance double-paned windows about 0.25.

The code does exempt up to 15 square feet of window from the efficiency requirement to allow specialty glazing and other options.

Basements and Crawl Spaces

Get under the house and look at the crawl space. Either the floor over the crawl space should be insulated or the crawl space walls should be insulated. Insulation should be attached securely without gaps.

Attic and Crawl Space Doors

Check the attic access and crawls space hatch/door. These can be a major source of air leakage in the home, creating high utility bills and uncomfortable drafts. The hatch or door should be weatherstripped and insulated. They should be well-made so they are airtight when closed. (Test by closing door or hatch on a piece of paper. Can the paper be pulled out when the hatch/door is closed?) The insulation should be attached so that it won't be damaged or become loose when the hatch or door is used.

Figure 1. Insulating joints and seams with the proper product can reduce energy loss and energy costs.

Air Leakage

Look for sources of air leakage into and out of the home. Air leakage is often responsible for 10-30 percent or more of total energy loss. All joints, seams, and penetrations between the inside and outside of the home should be sealed (*Figure 1*). Typically, caulk, gaskets, spray foam, or weatherstripping is used to seal these air leaks.

Check whether leaks have been sealed by looking at where phone lines, electrical lines, plumbing, and other services enter the house. Are the holes plugged with caulk or other sealants? What about the holes in the attic floor where pipes, wires, and ducts lead to the rooms below? Are they sealed with foam, caulk, or other materials to prevent airflow?

Open the cabinets under the kitchen sink, under the kitchen island, under bathroom sinks, etc., and see where pipes lead to the floor below or out through walls. Are the spaces around the pipes filled with caulk, foam, or other materials to prevent airflow?

In the basement, look at places where pipes and wires lead to unheated or uncooled areas. Are these holes sealed as well?

Check where pipes and ducts pass up through an unheated or uncooled basement ceiling to the floor above. Are there gaps and spaces that create drafts and waste energy, or are they sealed tightly?

Why Do Air Leaks Matter?

If a home is not properly sealed, dirt, dust, and moisture enter the home and can lead to a variety of respiratory problems including asthma and allergies. Did you know that up to 40 percent of the air you breathe on the first floor of our home comes from the basement or crawl space?

One way that home builders can demonstrate that they've sealed air leaks in a new home is to have a blower door test done. Ask whether a blower door test was conducted on the home and, if so, request a copy of the results.

NOTE: The Nebraska Energy Code requires blower door testing in new homes unless the air sealing in the home was inspected. Having a home professionally inspected and/or tested for air leakage is an important safeguard for consumers. Alternatively, tested air leakage must be less than "seven air changes per hour (ACH) when measured with a blower door at a pressure of 33.5 pounds per square foot (33.5 psf) or 50 pascals (50 Pa)." To standardize the test for different homes and different parts of the country, the equipment used for the test is set at a standardized pressure level (33.5 psf or 50 Pa). Very efficient homes may have leakage rates of only 0.6 to 2.5 ACH with a pressure of 50 Pa.

For more information on blower door testing visit *http://www.greenbuildingadvisor.com/blogs/dept/musings/blower-door-basics*.

Lighting

Lighting has an enormous impact (approximately 12 percent) on the energy use in homes. The energy code requires that the builder put high efficiency light bulbs in at least 50 percent of the lighting fixtures that are hardwired into the home. Some examples of hardwired fixtures include lighting in kitchens and bathrooms, recessed lighting, hallway lights, and exterior lights next to the front door and garage door. High efficiency bulbs can include compact fluorescents, high-efficiency halogens, and LEDs. If the bulbs look like standard incandescent bulbs, ask the builder whether the energy efficiency lighting requirement has been met.

Thermostat

Programmable thermostats can generate annual energy savings of 10 percent. A home with a forced-air furnace heating system must have a programmable thermostat installed. The thermostat must be capable of controlling the heating and cooling systems on a daily schedule to maintain different temperature setpoints at different times of the day. The average cost of a programmable thermostat ranges from $30-50.

Fireplaces

Generally speaking, fireplaces often *reduce* the energy efficiency of a home. The national model code requires that the doors of wood-burning fireplaces have gaskets to help make them airtight.

For more information visit *http://www.woodheat.org/maintenance.*

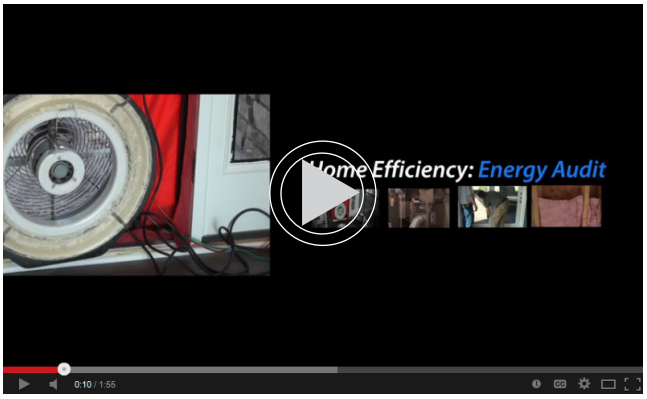
Ductwork

Leaky ducts can be responsible for 10-30 percent of energy loss in a home. To avoid this, leaks should be sealed and ducts should be insulated and tested when running through unheated or uncooled areas.

Unless the attic is heated and cooled, when ductwork runs through attic space, it must be insulated to a minimum of R-8. Look at the label on the ductwork insulation to find out what R-level it is.

All ducts and air handlers should also be sealed with mastic (a special type of caulk that is easily visible). Duct tape *isn't* sufficient.

In addition, the energy code requires that the entire duct system be tested for leaks if any part of the ductwork is located in unheated or uncooled spaces. Leaky ducts are a major source of energy loss, which means this requirement is extremely valuable in making homeownership affordable month after month. If there is ductwork in an unheated or uncooled space, ask for a copy of the report documenting the duct testing.



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During construction or renovation of your home, it is important to be active in the process. Good communication with your home builder is key to making sure that your home meets minimum energy code requirements. It also will help you know what features make your home efficient and how to appropriately operate them to achieve their maximum energy saving potential.

Definitions

R-value — A measure of the insulating quality of a material. A higher R-value indicates a greater ability to insulate a space, preventing heat transfer through the material.

U-factor (U-value) — A measure of the flow of heat through an insulating or building material. The lower the U-value, the better the insulating ability.

Solar Heat Gain Coefficient (SHGC) — A measure of a window or door's ability to block heat transfer into the home from sunlight. SHGC is expressed as a number between 0 and 1.0. A low SHGC (like 0.40) indicates a window or door that transmits low amounts of heat and will keep rooms cooler on a sunny day.

This publication has been peer reviewed.

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