

## Insulation

One of the biggest issues with the Dansby home is air leakage and having no insulation throughout the home.

In the basement there are many open leakage points coming through an open electrical panel, and worn through cement where you see daylighting coming in. In order to make the home more energy efficient these air leaks first need to be repaired.

After the air leakage is repaired the next step is insulation. Although we found some areas in the home had insulation the majority of the home did not.

Caulking and weather stripping on doors and windows would be needed.

Determining the ventilation for indoor air quality is essential for good quality air to breathe. According to ASHRAE the living area should be ventilated at a rate of 0.35 air changes per hour or 15 cubic feet per person per minute, whichever is greater.

There are three ventilation strategies, natural, whole-house or spot ventilation.

Natural ventilation is through windows, vents and doors but is not recommended for tightly sealed homes.

Whole-house is done using one or more fans and duct systems.

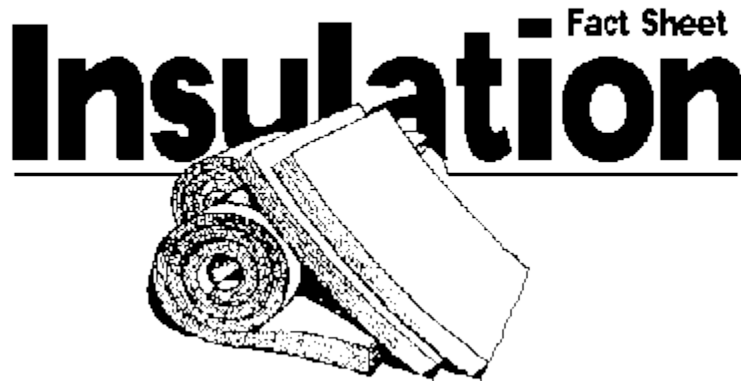
Spot ventilation uses exhaust fans to remove pollutants and moisture at the source. Used with a mixture of the other strategies.

We would recommend for the Dansbys a use of all three types while insulating the home as well.

Insulation is necessary to provide resistance to heat flow. Insulation resistance to heat flow is rated in terms of its thermal resistance R-value. Here is a website that I found [www.energysavers.gov](http://www.energysavers.gov) that will give you the recommended R-value for your zip code. Below are the recommendations for the Dansby zip code.

Using this site we determine the following:

**Department of Energy**  
Assistant Secretary  
Energy Efficiency and  
Renewable Energy



**ZIP-Code Results**

Here is what we know about your house. You live in **Portland, OR** and your zip code starts with **972**. Your existing house has ductwork in an unheated part of the house. Your alternative investment rate of return is **3.4%**. The following table shows what we know about your heating and cooling systems:

	<b>Heating</b>	<b>Cooling</b>
System	Natural Gas	Heat Pump
Efficiency	High (80.0%)	Medium (SEER = 11.0)
Cost	13.07 \$/1000 cubic ft	7.03 cents/kWh

If you want more information about how to buy or install insulation, please read the [Insulation Fact Sheet](#). To view the cost values used in this calculation, please see the [Insulation Cost Table](#). Here are our insulation level recommendations for your home.

<b>Wood-Framed Building</b>			
<b>Insulation Location</b>	<b>R-Add*</b>	<b>R-Value*</b>	<b>Notes</b>
Attic	38.0	38.0	-
Wall cavity	13.0	13.0	Blow insulation into any uninsulated exterior wall cavity.
Insulative sheathing on empty	5.0	5.0	Recommendation assumes that the exterior siding was removed for other purpose, i.e., does not include any consideration of the cost of removing and

wall			replacing the exterior siding.
Floor	25.0	25.0	Over unheated, uninsulated space.

<b>Basements and Foundations</b>			
<b>Insulation Location</b>	<b>R-Add*</b>	<b>R-Value*</b>	<b>Notes</b>
Crawl space wall	25.0	25.0	Crawl space walls are only insulated if the crawl space is unvented and the floor above the crawl space is uninsulated.
Basement wall interior	11.0	11.0	-

\* R-Values have units of F-ft<sup>2</sup>-h/Btu. R-Add is the R-Value of the insulation to be added. R-Value is the sum of the R-Value of the existing insulation and the R-Value of the insulation to be added.

Dave Roberts had me come by and look at the natural ventilation and insulation of the historical home he and his wife a renovating. They used cotton denim throughout the house and I thought this would be a good fit for the Dansby house as well.

UltraTouch Natural Cotton Batt Insulation is made from natural fibers. Is contains no chemical irritants and requires no warning labels. It has no VOC and it is safe for the person performing the install and good for the environment. It is a Class-A building product and meets the ASTM standards for fire and smoke ratings, fungi resistant. It contains 85% post-industrial recycled natural fibers.

This insulation would be used in the walls.

Ultratouch Nature blend Cellulose is a loose-fill insulation that would be used in the attic. It is post-consumer recycled paper and treated with borate solution.

Cotton radiant barrier can be used on the water heater, ducts, pipes, access panels and valves using foil tape to keep it in place. This insulation could also be used in the attic to the underside of the rafters this would help in the summer to help block heat transfer that builds up.

This insulation can be purchased through ecohaus here in Portland. The pricing is as follows:

R13-16 inch 105 sq ft 68.99 Trade price

R21-16 inch 53 sq ft 55.19 Trade price

R30-16 inch 52 sq ft 82.79 Trade price

Green Fiber blow in cellulose 11.00 a bag 30 lb variable sq ft

There are other types of insulation that are made from a variety of materials such as rolls, batts or blankets made from mineral fibers, fiberglass and rock wool.

**Loose fill insulation** made of fiberglass, rock, wool or cellulose that comes in shreds, granules or nodules and are usually blown into spaces using pneumatic equipment.

**Rigid foam insulation** which is usually more expensive than fiber but good where R-value needs to be higher and space is limited. Foam R-values range from R-4 to R-6.5 per inch of thickness (2.54 cm) and is 2 times greater than most insulating materials.

**Foam-in-place** insulation reduces air leakage in walls.

According to the DOE Oregon is rated in zone 3 and should have the following R-value weather you are on gas, electric furnace, fuel oil or heat pump.

Ceiling attic R-49, Cathedral R-38, Wall R-18, Floor R-25, Crawl Space R-19, Slab Edge R-8, Interior R-11 and Exterior R-10.