

Roper Solar Greenhouse Energy Audit

Donation of [Energy Check](#), Blacksburg VA

Audit was performed by Joe Mugavero.

Test Results and Conclusions:

Building Envelope

The blower door test calculates the tightness of the building envelope, and pinpoints air leaks.

An infrared scan reads temperature differences across the surfaces of your building, to find and photograph sources of air and moisture, as well as inadequacies in insulation.

The blower door test was performed simultaneously with the infrared scan.

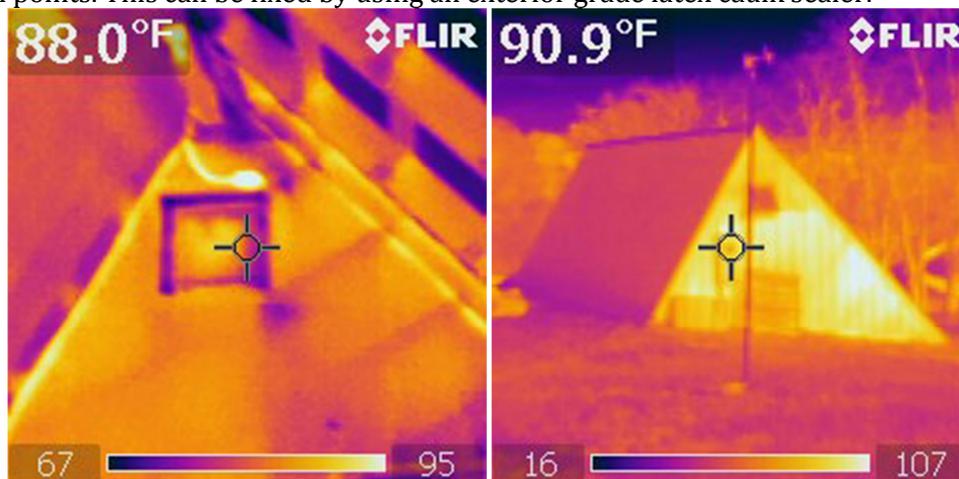
The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) recommends, for energy efficiency that the building have a tightness of .35 ACH (Air Changes per Hour) or less and that intentional, mechanical fresh air ventilation be added in order for the building to provide healthy air and prevent unhealthy air intake. Further, for a home at .25 ACH or less, mechanical fresh air is mandatory by ASHRAE standards.

The blower door test revealed .06 ACH, with a total air infiltration opening of 16 square inches (about the size of a 4" hole being open at all times). This is considered very energy efficient according to ASHRAE and BPI, Inc. standards.

Using the Infrared Camera, we were able to pinpoint specific areas that are causing the air leakage as well as radiant losses. They can be corrected by defining and completing the building envelope. Many of these incomplete areas are accessible, and can be retrofitted relatively easily to obtain better energy performance and comfort.

The building envelope is incomplete in the following areas:

1. The peak of the vaulted roof design has small amounts of air leakage at the beam connection points. This can be fixed by using an exterior grade latex caulk sealer.



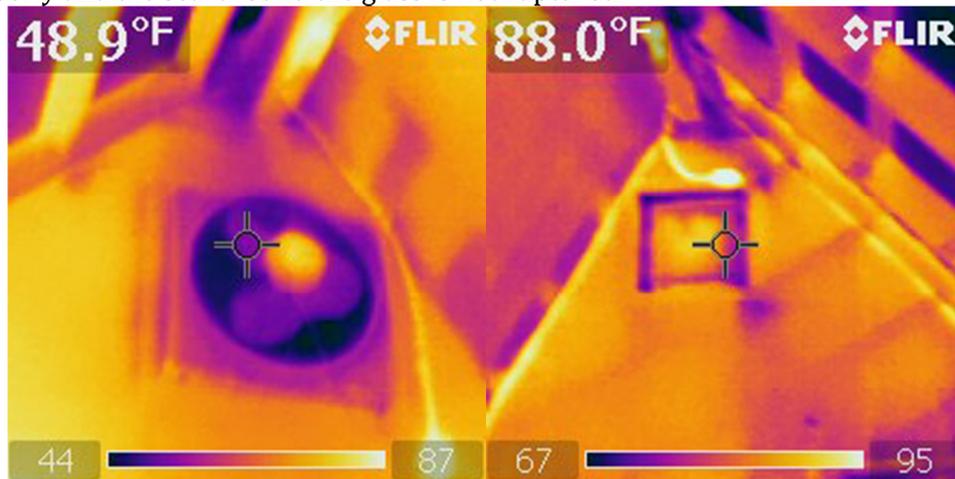
We need to bring a long ladder in and caulk the peak. Note the heat leakage at both the top and bottom of the roof.

2. Wall penetrations on the West wall pose the largest amount of air leakage. The electrical conduit pipes from outside should be sealed.



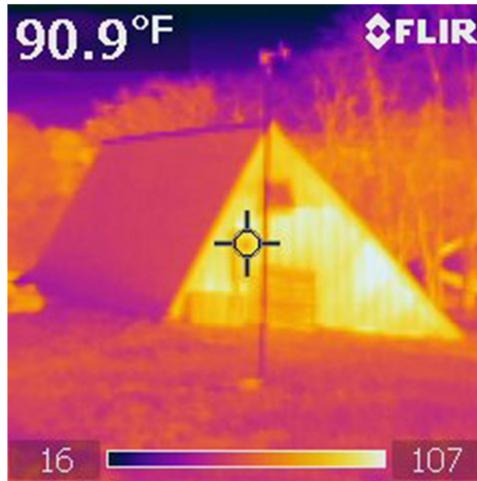
This was fixed by spraying foam into the electrical connection.

3. The West window performs poorly based on thermal imagery. Be sure this window closes properly and the seal around the glass is not ruptured.

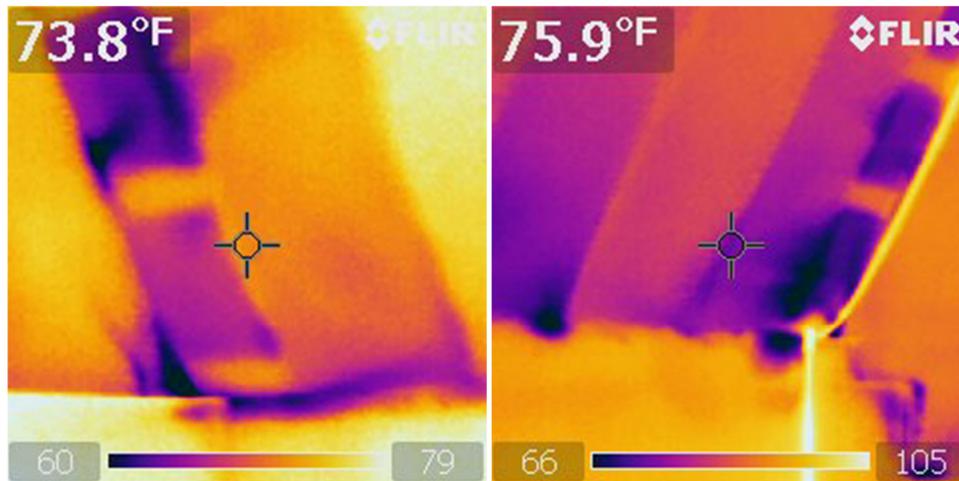


The first picture is the west window, the second picture is the east window. We later discovered that the west window was not fully closing because the window latch was not fully latched open.

4. There is some apparent air leakage inside the north wall and roof assembly. For peak energy performance, this should be minimized at the sill plate from outside.



Note the heat leakage at both the top and bottom of the roof.



The heat leakage at the west and east ends of the roof is due to construction since boards took up space that was then not available for insulation.

Blower-Door test

