

## Non Destructive Testing (NDT) and Temperature Data Indicate No Insulation in the Ceiling

### Case Study:

E3 Power was called to diagnose the reason for a very cold room in a new home. The residence was built in 2015 and obtained a HERS Rating of about 60. The owners had always suspected that something was wrong in that part of the home because the bedroom was always 10 degrees colder than the rest of the house. The homeowners used a simple liquid thermometer to compare the temperature in that room compared to the thermostat setting. This method is accurate but not definitive proof since this device has no logging potential and likely has a large margin of error.

During the preceding six months the homeowner and the builder had many discussions, with the outcome being always the same. The builder always said that there was nothing wrong with the home, that the HVAC was designed correctly, and that it is normal for some rooms to be a little colder than others.

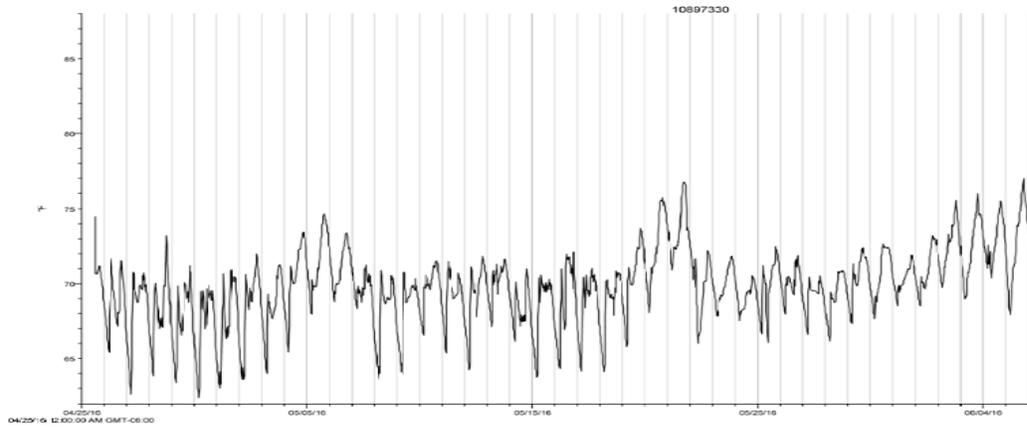
The thermal scan of the ceiling showed a strong thermal gradient with the demarcation line down the center of it. We suspected that the insulation was missing or severely compromised.

However, as with all NDT, further testing is always recommended. We attempted to get a visual of the area through the attic access in the garage. Unfortunately, this part of the attic was inaccessible due to a barrier wall built to separate the garage from the front room. The only access would be to cut a hole in the knee wall or the ceiling of the front room. During this diagnostic period the builder was finally convinced through the thermal pictures to conduct further investigation and eventually cut a hole in the barrier wall to get a good visual of the blocked area. Simultaneously, we came up with a plan to record the excessive temperature differences that were occurring in the home. Two temperature Hobo™ data loggers were installed in the home.

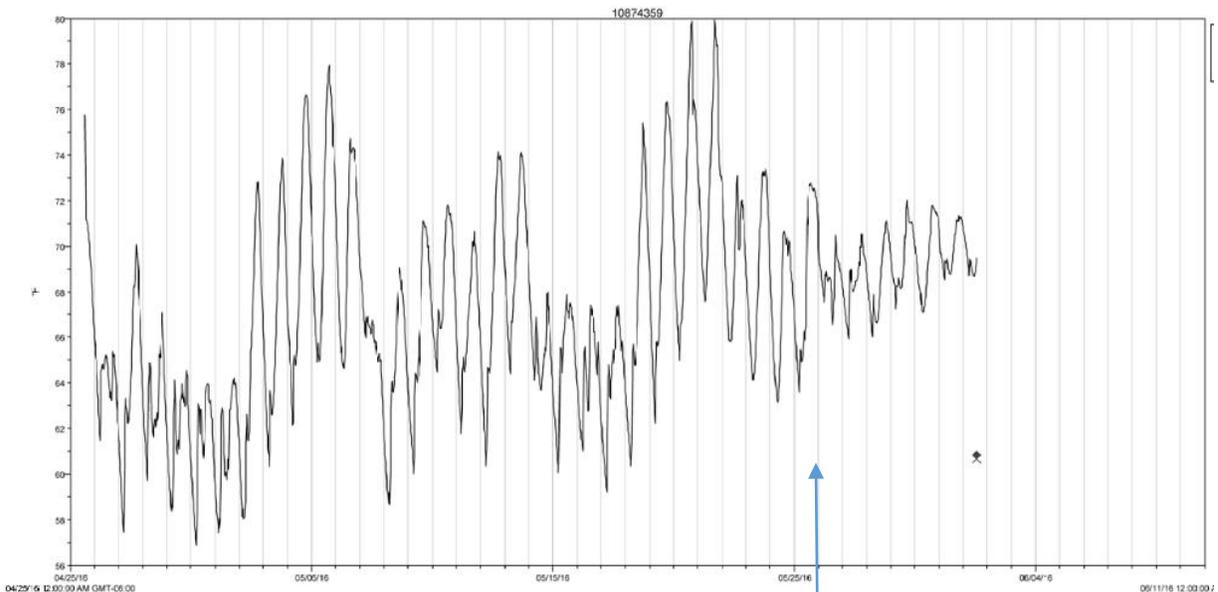
The MX1160 with Bluetooth was installed in the front cold room, while a standard MX090 was installed in the master bedroom. We left the loggers in place for 30 days before retrieving the readings. The loggers were set to take a temperature measurement every 15 minutes.

On May 25<sup>th</sup> when the hole was cut into the barrier wall, a visual showed that soffit baffles were installed, but the entire area was void of insulation. On June 1<sup>st</sup> the data from the Hobo™ loggers were downloaded to the software. The results were astounding. Prior to the insulation deficiency the temperature swings were between 12-16 degrees a day in the room without insulation. After the insulation was installed the swings lowered to 2-4 degrees a day.

The second logger was located in the main living area and also controlled by the setback thermostat near the location of the data logger. The results were not surprising as the temperature logger mimicked the thermostat setback settings.



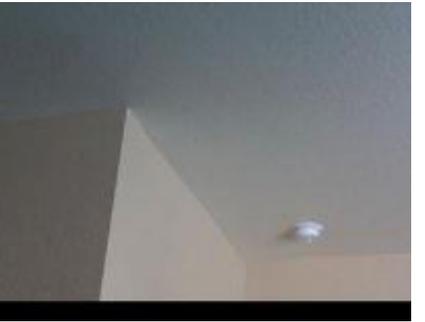
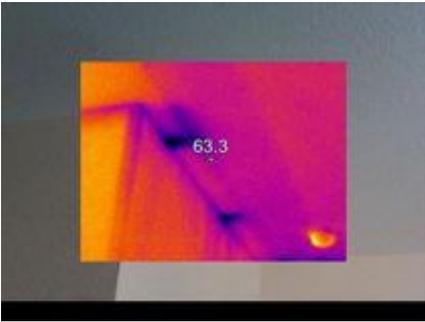
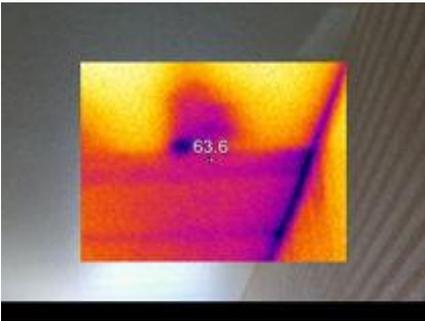
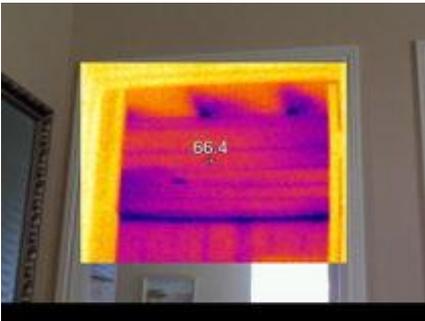
Temperatures in the back of the house with a set back thermostat.

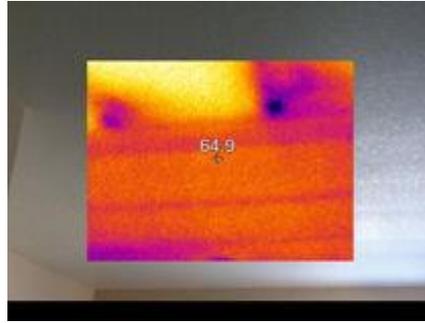
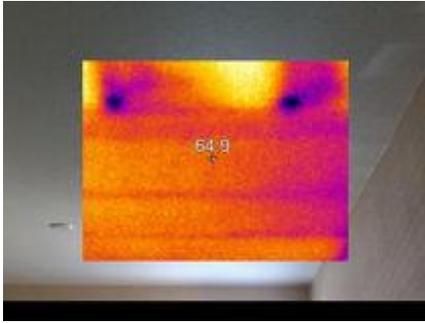


Temperature in the front room. The insulation was installed on May 26th

These pictures show the demarcation line between the insulated attic and the non-insulated attic.

(pictures by Jeremy Bryan, e3 Power)





Digital photos of the attic space when the area was accessed through the knee wall in the garage. The insulating company completely missed this area of the home.

