
Thermal Imaging Scan Reveals the Truth Behind the Wall

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ABSTRACT

You suspect you have missing insulation in your home. You have cold and drafty areas, and you wonder just how much or what is missing. Did your builder miss something? Are you paying higher utility bills as a result?

INTRODUCTION

IR thermography is a well-accepted method of imaging and evaluating the thermal efficiency of building insulation, doors, windows and other penetrations, along with the performance and condition of heating and cooling systems. Temperature deviations which may indicate larger problems are rendered visible, allowing improvements to be carried out with certainty. No matter the age of the structure, an infrared scan always proves beneficial, providing fast detection for fast action.

SUBJECT PROPERTY "Author's Brand New Home"

During a framing walkthrough with home builder, it was noticed that the design of the building had shear paneling installed on the interior portion of the wall in the master bedroom (Figure 1), and the exterior weatherproofing paper had already been applied. The builder was questioned on how this exterior portion of a wall was insulated as the insulation was put in after the weatherproofing was applied. The Builder responded that it was taken care of. This created questionable integrity, as it would be difficult to prove. Further review was needed and homeowner "Hopkins," being a building inspector by trade, proceeded to look further into.



Figure 1. Exterior wall showing shear paneling on interior wall.



Figure 2. A small hole was cut in exterior paper confirming suspicion of missing insulation.

Shear paneling is typically installed on the outside of a house, however the engineer's design also included shear paneling on the interior of the home in the master bedroom. By using this construction method, the builder should have known to insulate the wall before applying the building wrap.

Knowing that leaving just one wall un-insulated can make quite a difference (see table and image, figure 7) in room temperature and wasted energy, the builder was informed of the problem, and requested that the wall be fully insulated. The lower portion of wall was exposed by an electrician running last minute wiring prior to stucco (figure 3). The builder's work team returned to supposedly finish the job. Hopkins the homeowner knew that fire blocking is installed about 4 feet up from the bottom limiting their ability to install insulation in the upper portion. He became suspicious and decided to check out the workmanship. The homeowner cut an opening in building paper (figure 2) to expose missing upper insulation. With marking paint in hand, the homeowner decided to make it more visible to the builder. The original hole was patched over later by builder (figure 4) and the homeowner was once again informed that it was complete.



Figure 3. Electrician had to run last minute wiring, builder insulated lower portion at this time.



Figure 4. After hole cut in top portion of wall to show missing insulation (figure 2), builder patched hole over.

After the homeowner moved in several months later and repeated requests to verify that the wall was properly insulated, the builder returned at the homeowners request to verify that the wall in the master bedroom had in fact been fully insulated. Nine holes were cut along the top of the wall to reveal that insulation was provided (Figure 5). Unfortunately, the opening of wall was done when homeowner was not present.

The first response from the builder was that wall was fully insulated. The homeowner, suspicious, decided that further review was necessary. Looking closely (Figure 6) at openings in the wall identified that fiberglass thread remains at shear panel were on every cut. It was suspected that the insulation was shoved into each opening prior to homeowners' arrival and presented as a fully insulated wall. The homeowner pulled samplings of these pieces of insulation out of wall to find that they were a maximum of 12 inches. The builder was informed of this finding, and came back next day and stated that it was now going to be fixed properly. Unfortunately the homeowner was once again unable to be present during their repair.



Figure 5. Nine holes cut in drywall/shear panel



Figure 6. Close up of hole cut showing insulation threads on shear panel.

The homeowner remained skeptical of the installation and suspected that the 5-6 foot height of insulation that needed to be installed would be difficult with fiberglass batts shoving through a small 4" opening. At this time, Hopkins purchased a FLIR thermal imaging camera not only for his home and building inspection company, but also for his own personal use. After the restless ordeal of building a new home, Hopkins naturally wanted to first inspect the wall in the master bedroom to uncover what he had questioned all along.

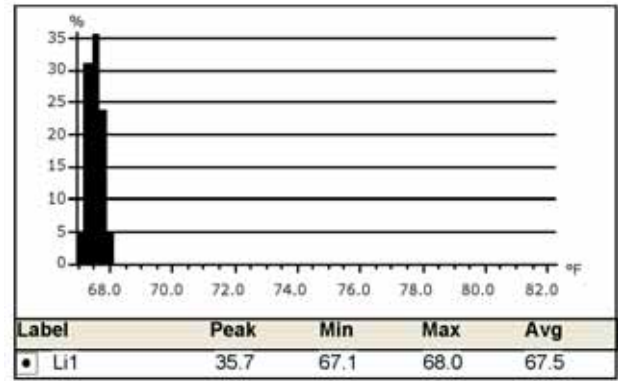
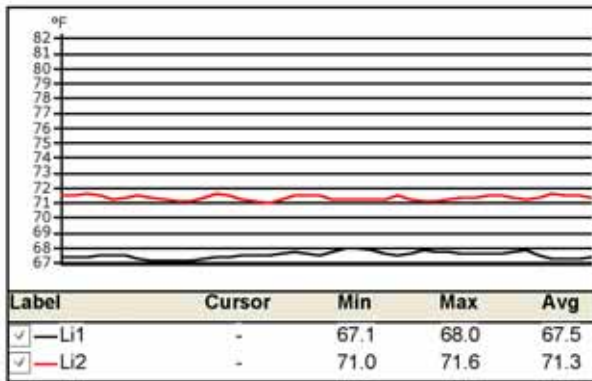
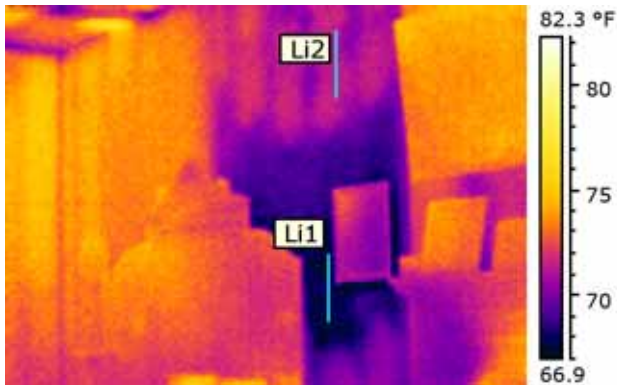


Figure 7. Thermal Pairing showing thermal and visible image of affected areas. Darker areas on thermal show missing insulation. Histogram showing average line temperatures comparing insulated/non-insulated area.

The thermal scan did indeed confirm that a four-foot space across the center of the wall remained uninsulated. The builder at second repair only shoved about 3 feet of insulation into wall. By capturing immediate documentation with the infrared camera, Hopkins was able to prove his case in point, leaving the builder no other choice but to remedy the situation.



Figure 8. Insulation remediation.



Figure 9. Thermal of contractor blowing in insulation, wall being insulated.

SUMMARY

According to the U.S. Department of Energy, the typical family spends close to \$1,300 a year on their home's utility bills (most likely higher in California), and unfortunately, a large portion of that energy is wasted due to insufficient insulation and a lack of weather stripping around doors and windows. Professional home inspectors and energy auditors have been using leading-edge infrared technology to perform energy auditing of homes and buildings to improve energy efficiency, thus leading to savings on energy costs.

Peter Hopkins, owner of SoCal Infrared, specializes in performing thermal infrared scans to detect moisture intrusion, inspect commercial built up roofing (BUR), and most commonly evaluate energy efficiency. Energy costs in California are among the highest in the nation; therefore assessing thermal efficiency is imperative to conserving natural resources and lowering energy costs. Hopkins relies on his FLIR Systems E65 infrared camera to monitor and diagnose the condition of homes and buildings in a powerful, noninvasive way. Infrared allows us to see what the human eye cannot by detecting temperature anomalies within building materials, revealing problems that would otherwise go unseen, and enabling repairs to be made with confidence.



"Thanks to my infrared camera, I was able to provide the concrete evidence needed to validate my claim that my house was not properly insulated. After conducting a full thermal scan of my new home, forty locations were located via infrared of places not thoroughly insulated. Now that I've been able to pinpoint the locations in need of repair, I can rest assure that my home will be energy efficient, while I save on energy costs."

REFERENCES

U.S. Department of Energy

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ABOUT THE AUTHOR

Peter Hopkins, the principal of SoCal Infrared and the parent company InspecDoc Inspection Services, Inc., has been in the building inspection and evaluation business for over 10 years. Currently servicing most of Southern California as multi-inspector firm with several of the inspectors certified in thermography. Peter completed a certificate major in Construction Inspection with academic honors from Palomar College in Southern California. Peter was the recipient of a Scholarship from (ICBO) The International Conference of Building Officials now known as ICC (International Code Council, www.iccsafe.org) and currently holds five certifications as a Residential Combination Inspector, Building Inspector, Electrical Inspector, Mechanical Inspector and Plumbing Inspector. Peter has performed over 5000 Real Estate evaluations and over 1000 energy audits in Southern California. Peter is a Certified CREIA Inspector and a New Construction Specialist with The California Real Estate Inspection Association (www.creia.org) and has served in various volunteer leadership positions within organization. Peter is affiliated with Energy Checkup (www.energycheckup.com) as an Energy Inspector. Peter resides in Southern California along with his wife and two children.