

Using infrared cameras in building defect litigation

Testing Functions Case Study



Measuring tools: Fluke TIR2-FT Thermal Imager

Operator: Regan Brown, Principal, G.B. Group General Contractors

Tests conducted: Roofs, cladding, windows/doors, electrical, plumbing, insulation, wall/interior components

*By Regan Brown, Principal,
The G.B. Group, Inc, for Fluke*

When homeowner associations see a repetitive problem, they begin to suspect a “defect” in the construction. The most common complaint that initiates an investigation into a possible litigation claim is water intrusion.

Infrared cameras (thermal imagers) are increasingly being used to assist litigation inspections. They can provide a more definitive view or confirm suspect penetrations or water intrusion. They also expedite testing and guides experts more quickly to specific problem areas.

A team effort

A litigation investigation usually involves a team of experts from various building disciplines examining both interior and exterior building envelopes. They will check roofs, cladding, windows/doors, electrical, plumbing, structural and civil concerns to ensure that the construction performed was up to ICCO building codes and free from other construction defects.

Application Note

To provide effective infrared support, coordinate with each expert for each location.

Because this is a litigious situation, standard testing methods apply. Since infrared has not yet been officially incorporated into ASTM (American Standard Testing Methods) methods, thermal images can serve as additional supporting data but cannot stand alone. Therefore, be as detailed as possible and follow ASTM procedures.



Expert performing ASTM window test.



Expert performing testing on residential roofs.



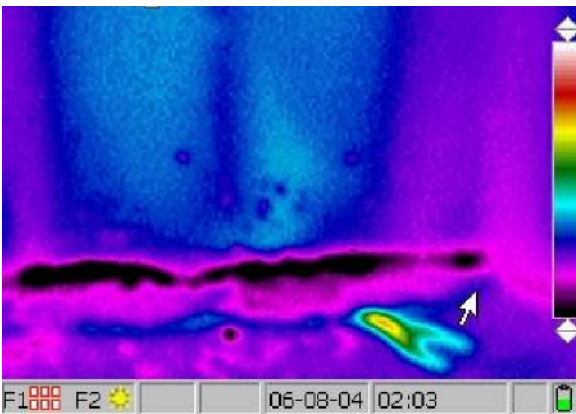
Conducting an inspection

First, perform a thorough visual inspection and take both digital photo and thermal images of any suspect areas. This is your control documentation. During this “pre-testing” phase, use both thermal and visual inspections to detect anomalies throughout the building envelope. Look for any anomaly with a hot or cold signature. This is a good time to raise questions about missing or moved insulation, electrical signatures, roof problems, water stains and plumbing issues.

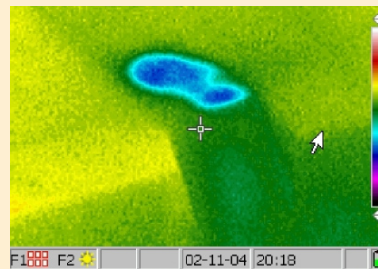
Note: Infrared cameras do not provide “X-ray” vision. They cannot detect structural aspects such as strapping, hold downs, or anchor bolts, because those components take on the ambient temperature of the interior wall.

Next, validate anomalies either by

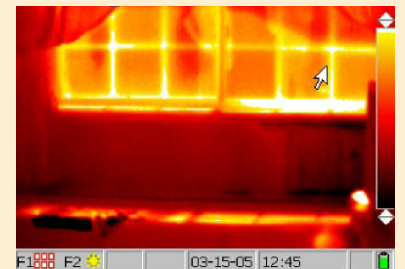
- cutting the wall open to confirm the pinpointed location
- use a moisture meter to confirm the presence of water
- using a borescope (penetrate with a small camera) and photo document the interior of the wall.



Using a moisture meter to confirm water at the bottom of a wall after taking a thermal image.



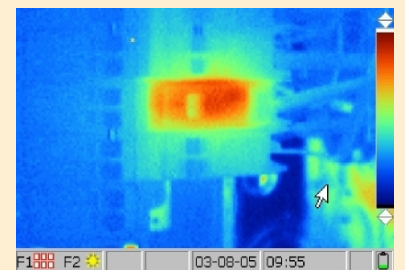
Plumbing leak anomaly found during visual inspections.



Water intrusion at a window test.



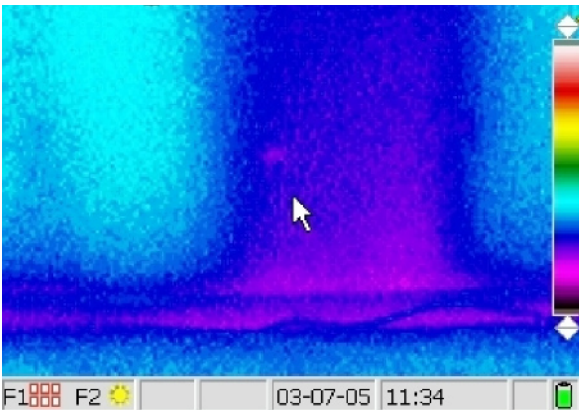
Missing insulation.



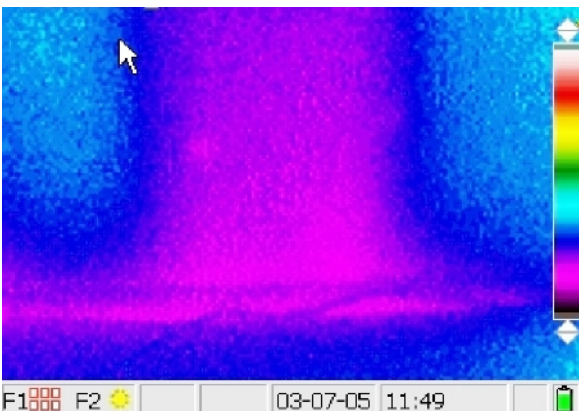
Electrical panel circuit anomaly. It may not be a problem but should be inspected by an expert. Working with live electricity requires an electrician to open and remove panel covers.



Calibrated spray rack used to simulate a rainshower.



Thermal signature after 15 minutes of ASTM water test.



Thermal signature after approximately 30 minutes of ASTM water test.

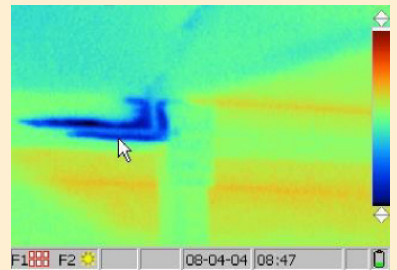
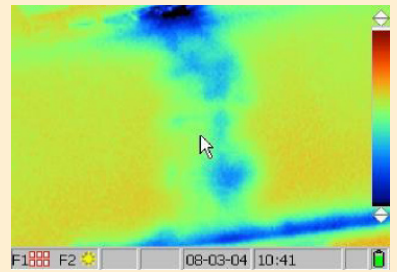
Water tests

Testing is not necessarily done conveniently after rain showers or turbulent weather, so the tests are designed to simulate specific rain patterns, wind storms, and so on. Specific equipment is necessary to scientifically test the possible failures. Calibrated spray racks can simulate a rainstorm or a blower door test can simulate negative/positive air pressure on the doors and windows.

Water can take longer to detect than the ASTM time-frame used to determine leaks, because the wall has several layers to penetrate before the moisture is thermally apparent. So as long as you stop the application of water within the ASTM time allotment, you can still go back 30 minutes or more later to see if the thermal signature appears. You don't necessarily need the maximum Delta T to see the anomaly. The photos below show a water thermal signature increasing as moisture travels through the inner layers of the wall cavity.

Conclusion

All of your investigation and documentation are captured moments in time. We attempt through testing to duplicate the outcome of the building component function under specified conditions. Your thermal litigation support report provides powerful supporting data for the court to evaluate.



Samples of deck soffits that show water penetration and migration. Because there are usually fewer building components from top to bottom of the soffit, water migrates quickly and leaves a very identifiable trail.

Fluke. Keeping your world up and running.®

Fluke Corporation
PO Box 9090, Everett, WA 98206 U.S.A.

Fluke Europe B.V.
PO Box 1186, 5602 BD Eindhoven, The Netherlands

For more information call:
In the U.S.A. (800) 443-5853 or Fax (425) 446-5116
In Europe/M-East/Africa +31 (0) 40 2675 200 or Fax +31 (0) 40 2675 222
In Canada (800)-36-FLUKE or Fax (905) 890-6866
From other countries +1 (425) 446-5500 or Fax +1 (425) 446-5116
Web access: <http://www.fluke.com>

©2008 Fluke Corporation. Specifications subject to change without notice. Printed in U.S.A. 1/2008 3248837 A-EN-N Rev A