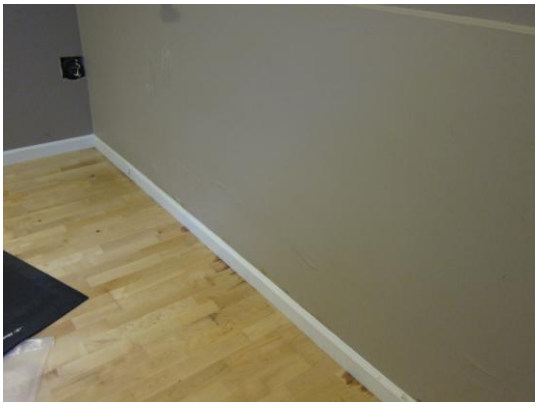


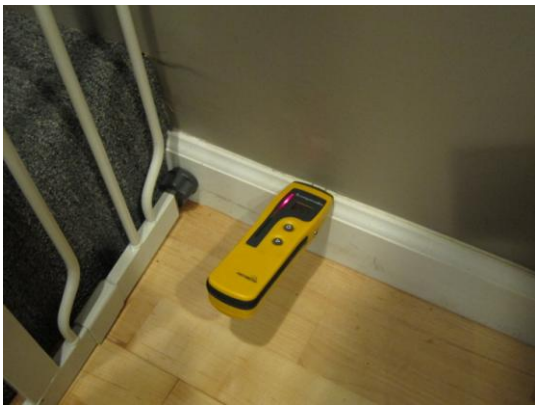

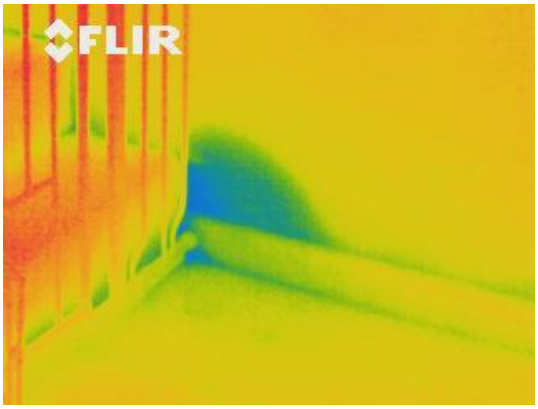


# Using Thermal Imaging Cameras to Diagnose Water Intrusion Issues

**Dateline: CSI San Francisco – "Where in the heck is that water coming in from?"**

Once you see water invading your structure, the question most people ask themselves is "Where in the heck is that water coming in from?" The next question is usually "How am I going to find it?"

There are two basic approaches to finding a leak source when the 'obvious' is not certain:

1. Get out the sawzall and open the areas up.

2. Use a thermal imaging camera to "zero in" on possible areas of hidden unseen moisture.

So, what would you like to do? Start ripping up your ceilings and walls to see for yourself what you can find or strategically use a CSI type of approach which can lead you in a direction that will minimize your initial tearout and lead you to a systemized approach in dealing with your water intrusion issues? Think of it like going into surgery – would you like your surgeon to go in and start poking and prodding or perhaps do an x-ray first to get a sense of the situation? X-ray, right? Good choice.

To understand how a thermal camera fundamentally works, let's cover some basics. First and foremost, thermal cameras measure thermal radiated energy, not temperature, not moisture. But you say "How will that help me?" Well, here's how it does. Follow this line of thinking. When water evaporates it becomes water vapor. Water vapor is at a higher energy state (warmer) than the water itself. As the energy (heat) leaves the water (to become vapor), the water gets colder.

In a nutshell: when objects get warmer (higher temperature) there is increased molecular activity which causes infrared radiation to increase, and vice versa, when things get colder (lower temperature) infrared radiation decreases. The cameras detect the energy radiation levels based on molecular activity which are reflected in temperature differentials displayed on the camera display screen.

Now, imagine for a moment that you put water on your forehead. It starts to feel cool, right? That's because the water is evaporating causing your skin to be cooled by the evaporation process, i.e. your skin gets colder because the water on your forehead, which is becoming colder through evaporation, starts to pull energy (heat) out of your skin.

The same goes for the building materials of your home when they get wet. When your home has water intrusion, the materials which have absorbed water become cooler through the evaporation process (just like your forehead). So if the area you are observing with the camera appears to be quite a bit colder than the surrounding areas, chances are that that cooler area just might have excessive moisture there. The more water, the more evaporation; the cooler the material gets, the darker the image on the camera display screen. (Note: I set my camera to display cooler temperatures as darker images).

How does a thermal camera work? My unit for example, a Flir EX320, shoots out approximately 18,000 laser points and measures the energy radiation level of each spot it hits on the surface of the area examined. It converts this information to a reflective temperature at each spot to within +/- 2 degrees centigrade. Imagine the laser points as 18,000 thermometers measuring these little micro spots so they develop a thermal photo image, if you will. This image can be seen in color or black and white.

What's the next step? Get out your moisture meter and take actual moisture readings to verify that there is actual moisture and not just a cool area. You might also want to open up areas to perform visual inspections as well. If the areas of moisture include sheet rock, you are going to more than likely want to open up the affected areas anyway because you do not want mold growth to begin and/or propagate on the back side of the sheet rock paper which can be within walls or ceiling cavities. Opening these areas will facilitate the drying out process when appropriate. (Note: Sometimes blower fans can facilitate the drying out process within wall cavities without sheet rock removal if these hidden surfaces can be dried quickly enough).

Interesting tid-bit: Older homes, let's say prior to 1940 or so, were built with lumber that generally has tighter grain than today's lumber. The older homes also have plaster and 1x material below the flooring and behind the siding. Newer homes are built with quick growth lumber, plywood, particle board, sheet rock etc. These new types of building material absorb much more water than the older homes ever did.

I have been told that if you were to dunk a typical old home in a lake it would absorb approximately 50 gallons of water or so. A new home, 500 gallons. No wonder new homes have so many water intrusion and mold issues compared to the older and wiser homes. Interesting.

So, in essence, the use of an infrared camera can help detect areas of water intrusion and facilitate in diagnosing the scope of the problem without tearing out more than you need to. The camera may also point out additional areas that you might not have considered which could alter your overall approach to the remediation as well.

In the end, it is just another tool but when conditions are such that the 'obvious' may not be apparent, it can be a real money saver for the homeowner.

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