

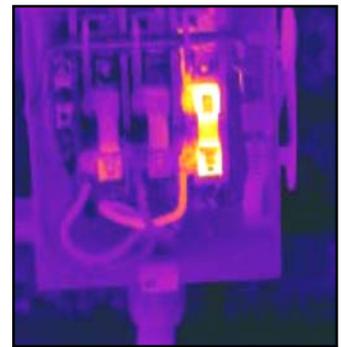
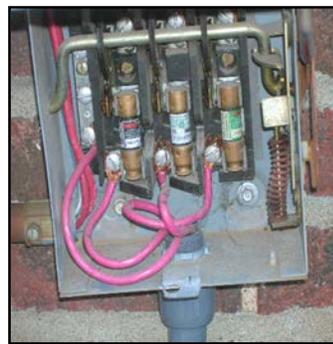


# ELECTRICAL: INFRARED THERMOGRAPHY

## WHAT IS INFRARED THERMOGRAPHY?

Infrared thermography is a noncontact and nondestructive way for detecting "hot spots," which are temperature differentials that may indicate problems in an electrical system.

An infrared survey can detect a problem before it manifests itself into a costly failure. It is very common to find a loose wire that can be repaired for less than \$100. But, if it were allowed to fail, the cost could skyrocket to thousands of dollars for equipment, repair or replacement. Or worse, an electrical failure can lead to fire. Loss of life and injury are the ultimate price. In addition, a fire can lead to damage that can render the building unfit for occupancy.



Images courtesy of Hartford Steam Boiler

All electrical and mechanical equipment emits heat in the form of electromagnetic radiation. Infrared cameras, which are sensitive to thermal radiation, can detect and measure the temperature differences between surfaces. Abnormal or unexpected thermal patterns can be indicative of a problem with the equipment – problems that could lead to a breakdown or failure, or cause a fire.

For example, thermal patterns in equipment can indicate conditions such as:

- loose connections,
- overloaded circuits or phases, or
- deteriorated or damaged insulation.

Infrared thermography utilizes a camera-like device which views a large area at a time, senses infrared emissions and converts the emissions into a visual display. Trouble spots can be pinpointed quickly, saving labor and cost, and targeting building maintenance resources where they are needed.

## HOW DOES THE CAMERA “SEE” HEAT?

All objects (even cold ones) radiate heat in the form of infrared energy. As an object heats up, it radiates more energy, and the wavelength gets shorter. Infrared radiation, visible light and ultraviolet light are all forms of energy in the electromagnetic spectrum. The only difference is their wavelength.

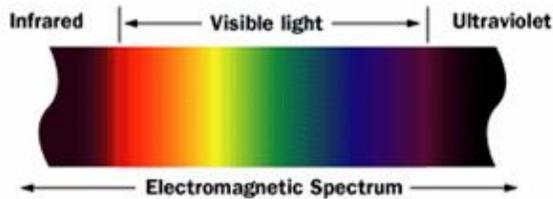


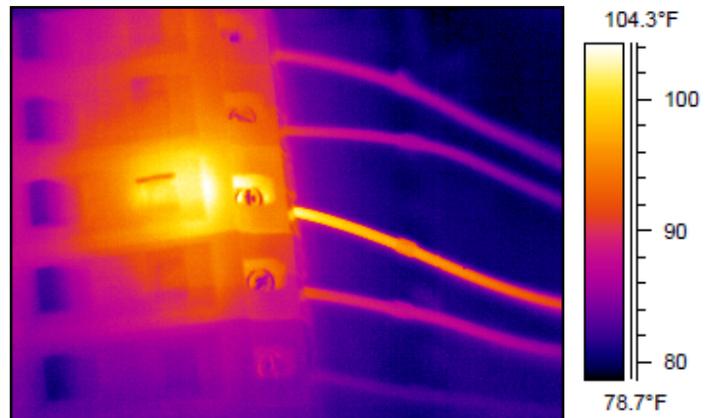
Image courtesy of Hartford Steam Boiler

The human eye can only see a small range of colors in the electromagnetic spectrum. These light waves range in length from 0.4 to 0.7 microns. If an object gets hot enough, the energy will reach the visible range and the object will be “glowing” red, like the burner on an electric stove. Fortunately, infrared imaging systems can detect infrared energy long before it reaches the visible stage.

The camera-like device then converts these invisible light waves into a graphic image that is displayed on a monitor. Modern infrared cameras also provide actual temperature readings, and store the data, so that the information can be later used to produce a report.

## ELECTRICAL APPLICATIONS

Electrical components, such as fuse blocks, control circuits, circuit breakers, transformer bushings and main disconnects, can all develop faulty connections. Infrared thermography can detect faulty connections in early stages so that repairs may prevent possible future breakdowns that would be very costly.



Infrared Scan of a circuit breaker panel showing a hot spot.

Image courtesy of Hartford Steam Boiler

## HARTFORD STEAM BOILER – INFRARED THERMOGRAPHY SERVICES

Hartford Steam Boiler has been conducting infrared thermography surveys since the mid-1980s in locations from office buildings to paper mills, both in the United States and around the world. They take their own advice, in that they have a formal written practices program, in addition to best practices. This means that there is a good chance that they have had experience with your type of business and can assist you in writing a formal program and in conducting infrared surveys.

### What to Expect during an Infrared Thermography Survey

Someone from your organization who is capable of opening and closing electrical panels will need to be present during the survey. In addition, the need for an electrical load to be placed on the system will be explained.

The terminal connections of equipment, such as transformer bushings, circuit breakers, fuse blocks, fused disconnects, exposed bus bars, motor control relays and various power boards, are the main areas viewed. To gain a clear line of sight between the infrared camera and the points of interest, the electrical cabinets must be accessed by having panels or doors opened. All opening and closing of equipment must be conducted by site personnel, who are properly trained and experienced in working around live electrical circuits.

All visits conclude with an exit interview. At this time, any conditions that have been uncovered are discussed and any questions are answered. A full report is produced and sent to you, which identifies the areas of concern, as well as what steps are necessary to correct these issues.

### Who to Contact

If you are interested in having an infrared thermography survey, or want additional information about this service, including a quote on price, please contact GuideOne Risk Resources for Health Care at 1-800-688-3626.

### Summary

Infrared thermography can be a valuable tool to detect adverse conditions and help avoid equipment breakdowns due to electrical problems. The key is to choose a qualified thermographer. Both you and the thermographer should understand what results are expected and how success will be measured. And you must have the commitment to accept recommendations about repairing equipment and follow up to make sure the work is properly completed.

This material was developed in conjunction with Hartford Steam Boiler Inspection and Insurance Company and is for information only and is not intended to provide legal or professional advice.

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You are encouraged to consult with your own attorney or other expert consultants for a professional opinion specific to your situation.



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