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## Important Update to NFPA 70E

Thermographers are becoming more and more aware of the potential safety risks associated with inspecting electrical systems. The National Fire Protection Association (NFPA) has recently updated a key standard *NFPA 70E, Electrical Safety in the Workplace, 2004 Edition*, that relates to these important issues. Thermographers will be interested in this standard because it discusses how to conduct such work while minimizing the risk of life-threatening injury. Also, and perhaps of even greater interest, is due to the fact that *NFPA 70E* carries the weight of law in much of the industry and throughout most of the United States.

The scope of the standard addresses safety for all employees who work with or around exposed electrical equipment, from contractors to licensed electricians. Given that two people die each day in the workplace from injuries related to electrical accidents, safety is an issue that we must all deal with. Beyond the implications for personnel safety, the economic consequences are also immense (an average arc-flash incident costs \$1.5 million). Injuries are attributed to three main causes: electrocution, arc-flash and arc-blast. The basic premise of *NFPA 70E* is that work can be done safely.

An arc-flash, and the resulting arc-blast, can occur whenever circumstances allow current to flow through ionized air from a conductor to ground or between phases. The result is the rapid heating of the area and a

catastrophic release of high-energy light, sound, and air pressure. Even though the flash is over in a fraction of a second, temperatures in the arc can reach 35,000°F (approximately 19,400°C) with disastrous consequences to anyone standing close enough to be impacted.

Although thermography is a non-contact inspection technique, it is often conducted when enclosures are open and the thermographer is in close proximity to energized equipment. If an arc-flash occurs, an unprotected thermographer within the flash protection boundary can incur life-threatening burns and injuries.

*NFPA 70E* requires that employees be given safety training appropriate to their task and be educated regarding the risks they may face and how to evaluate those risks. They must also be given the means to maintain an electrically safe workplace. Typically this involves, among other things, access to Personal Protective Equipment (PPE), which, for thermographers, includes flame-resistant (FR) clothing and arc-rated face shields.

A flash hazard analysis, which must be conducted for all electrical equipment, involves a determination of the available fault current and the clearing time necessary should a fault occur. The values (in J/cm<sup>2</sup> or cal/cm<sup>2</sup>) resulting from this analysis, as well as the associated Hazard/Risk Category (from 0 to 4), must then be posted on the equipment so that an appropriate level of protection can be employed for the task being done. The flash protection boundary is the distance at which the incident energy level is 6.24 j/cm<sup>2</sup> (1.5 cal/cm<sup>2</sup>), a level that can cause burns to

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exposed skin. Clearly the exact distance depends on the available fault current and the clearing time and, importantly, also assumes the electrical equipment is in good working condition. This last assumption, while not clearly spelled out in *NFPA 70E*, makes a strong case for close relationship between electrical maintenance and electrical safety!

So what does *NFPA 70E* imply thermographers must do to work safely? First, they must be trained regarding the hazards and qualified as to how to recognize them. Second, they should work according to written procedures and, prior to the start of a job, be involved in a brief safety meeting that details the scope of work and hazards that may be present.



Work conducted inside the flash protection boundary must be done with appropriate levels of PPE. Thermography work on equipment under 600V appears to fall in the Hazard/Risk Category of 1 or 2, as detailed in Table 130.7(C0(9)(a)). Table 130.7(C)(10) details the PPE needed for each Category rating. Categories 1 and 2 can be met with FR coveralls over non-melting or untreated natural fiber clothing and eye protection using safety glasses and, for Category 2, an arc-rated face shield. At higher voltages more substantial levels of PPE are required. Labels on new PPE should indicate the level of protection they give. Thermographers should also be aware that proper care of PPE is essential to specified levels of protection being provided [130(16)].

General Motors and Ford Motor Company have both recently announced their intent to comply with *NFPA 70E*. Many other companies are also implementing programs. While some utility installations are exempt [under 90.1(B)(5)], many utility companies are complying as well. Consulting thermographers may find themselves “between a rock and a hard place” when dealing with customers who have not yet performed the Risk Hazard Analysis. A careful reading of the new edition of the standard suggests this does not exempt either the consultant or the customer from responsibility (110.3).

It is impossible to cover all the changes found in this new edition in a brief article. Readers are encouraged to obtain a copy of this standard, read it closely, and discuss it with their management and safety team. Copies of *NFPA 70E* can be obtained from the National Fire Protection Association by calling 800-344-3555 or visiting their website at <http://www.nfpa.org>.

## SOYBEANS USED AS INSULATION MATERIAL

“You’re full of beans” is a phrase many have heard. Now it may be more appropriate to say “Your house is full of beans.” Soybeans are now being used in BioBase Insulation as part of a new semi-rigid foam polyurethane insulation. With 60% soy oil and 40% petroleum-based oil the product has a 10% lower cost and a “green” advantage in the market. The National Association of Home Builders Green Building Conference recognized the product as the “2003 Outstanding Green Product of the Year.”

As with other similar foams it expands tremendously (about 100 times) upon mixing and has excellent insulating, sound dampening, and air sealing qualities. Of course an infrared inspection, along with a blower door test, will assure the building owner or occupants that the insulation is performing as designed!

## “Preventative” Maintenance

Maintenance has become an alphabet-soup of terms and jargon. The meaning of many terms is often not clear. Sometimes the spelling is even less clear!

If you ask your high school English teacher if “preventative” is a word, she or he will unequivocally say “No!” Why then do we keep seeing it show up in the literature? Good question. If you can’t find your old English teacher, check the dictionary. In fact, the correct spelling is “preventive.”

Preventive maintenance is a concept that is not hard to understand. It means conducting maintenance activities, typically called PMs, in an effort to prevent problems from happening. Changing oil in your car engine is an example of preventive maintenance. Often PMs are completed on a time-based interval with little regard for the actual condition of the machine. Thus, they can be unnecessary or inadequate to the actual needs of the equipment. PMs are probably best considered to be part of a more comprehensive maintenance effort called asset health management.

“Preventative” may not be a word, but, regardless, thermography should be a part of any maintenance program!

# Thermal Solutions® 2005 Thermography Conference



The Thermal Solutions® thermography conference returns to Clearwater Beach, Florida, January 24–27, 2005. All thermographers are welcome, regardless of equipment preference or previous training. Join Snell Infrared and become part of a growing community of professionals worldwide who value this personalized educational experience.

Thermal Solutions® participants are immersed in an environment unique to the world of infrared. Past attendee Carl Schultz agrees, stating that he sees Thermal Solutions® as “By far, the best information exchange and networking forum the industry has to offer.” Starting the conference off on Monday, January 24 are the always popular short courses with six topics planned between morning and afternoon sessions.

The Thermal Solutions® Exhibit Hall is just one of the many interactive events included in this year’s conference. Attendees can view the latest in infrared technologies from the industry. Publishers and related technology vendors will also be present.

Educational opportunities are endless at Thermal Solutions® with 20 paper presentations from industry professionals. New this year is an “Ask the Expert” interactive presentation session between application specialists and conference attendees. Presenters will give a short poster board presentation on a particular topic and then finish by taking questions from participants.



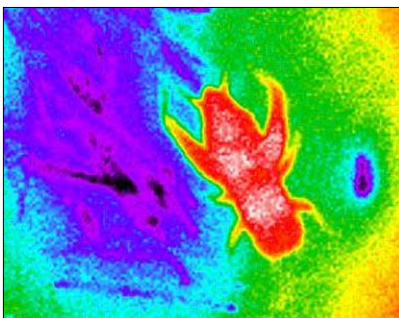
The panel discussions are back by popular demand and will feature a keynote speaker as part of the event. This year’s topics are “Program Management” and “Infrared & the Insurance Industry”. Each address is followed with a 45-minute question and answer session between conference attendees and panel members.

Rounding out the variety of events at Thermal Solutions® 2005 are the countless networking opportunities available for each participant. A dinner reception, a Tuesday afternoon Vendor appreciation function and lunches throughout the week allow attendees to develop both personal and professional relationships with others that are active in the industry.

For more information on Thermal Solutions® 2005, including a listing of all exhibitors, the conference schedule and topics for papers, please visit the conference web site at [www.thermalsolutions.org](http://www.thermalsolutions.org) or contact Snell Infrared directly at 1-800-636-9820.



## Forecast: 60 Chirps and Warming



There are many ways to measure temperature. An integral part of all Snell Infrared training courses is refining students’ abilities to Think Thermally®. All methods, including radiometric measurements, have their inherent advantages and problems. The fact that thermography is non-contact is a huge benefit; that not all surfaces emit efficiently presents many difficulties.

When your faith in modern temperature measurement tools pales, you may instead want to turn to nature. The rate at which some species of crickets, particularly tree crickets, chirp corresponds directly to air temperature. Simply count the number of times they chirp in 13 seconds, add 40 and you have a good estimate the temperature in Fahrenheit. Clearly the method has some limitations, but isn’t that the nature of our business?



# Snell Infrared Remaining 2004 Course Schedule

## Level I (\$1,495)

Charlotte, NC	October 4–8
Dallas, TX	November 8–12
Toronto, ON Canada	November 22–26
Montpelier, VT	December 6–10

## Level II (\$1,495)

Dallas, TX	November 8–12
Toronto, ON Canada	Nov. 29–Dec. 3

## Specialty Courses (\$750)\*

### Building Applications:

Toronto, ON Canada	December 7–8
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\* Level I or extensive thermographic experience is a recommended pre-requisite for these two-day Specialty Courses.

— 2005 Course Schedule coming soon! —  
Call 800-636-9820 for details.

**Thermal Solutions®** 

*January 24–27, 2005*

*Clearwater Beach, Florida*

*<http://www.thermalsolutions.org>*

*2005 Course Schedule  
coming soon!*

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