



MONTHLY

News and Views from the Connecticut Association of Home Inspectors, Inc.

September 2007

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AFCI's Because

Submitted by Pete Petrino

Electrical shorts that cause fires produce arcs. These miniature fireworks create sparks and temperatures that approach 10,000 F. This intense heat can rapidly ignite plastic insulation, wood, carpeting or any other combustible material in the vicinity of the arcing wires. Arcs happen frequently in appliance electrical cords where insulation has become brittle or is cracked. Hidden wires behind walls nicked by nails or pinched by fasteners can also be sources of sinister arcing. Loose connections where wires are attached to switches and outlets are often arc hot spots.

The traditional circuit breakers in an electrical panel do not prevent fires for a simple reason. They are not designed to sense arc faults. Traditional circuit breakers are actually designed to protect just the wire behind the walls and the switches and outlets that they are connected to. The circuit breakers are designed to trip when they sense a short that causes an avalanche of electricity coursing through a circuit. They also will trip when a constant massive amount of electricity passing through the circuit causes a heat buildup within the breaker. Traditional breakers are not designed to protect lightweight appliance wires and extension cords that are plugged into wall outlets.

Fire producing arcs can occur in wiring before traditional breakers react. Electrical manufacturers recognized this problem and decided to attempt to stop as many of these electrical fires as possible. The result of the hard work of many is a new arc fault circuit interrupter breaker. These devices work and act like a traditional circuit breaker except that they are smarter. Many of these new devices contain small filters and logic devices that allow them to sense an arc just as it is about to produce the sparks and intense heat, if arcing conditions are present.

Arc Fault Circuit Interrupters and the 2002 National Electrical Code.

By Mike Holt
For EC&M Magazine
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The new arc fault circuit breakers are identified in section 210-12 of the 1999 edition of the National Electric Code. Beginning January 1, 2002 they will be required to protect branch circuits that serve residential bedrooms. These areas of the house have been identified as the source of many electrical arc related fires. The state of Vermont has taken a slightly more aggressive stance. They are requiring that these new life saving circuit breakers be used in all circuits that feed residential living areas. Their regulation goes into effect on January 1, 2001.

These new arc fault breakers can be purchased now in every state in the USA. These breakers are the same size as your existing traditional circuit breakers. The new arc fault breakers cost about \$25 - \$50 each depending upon manufacturer, but it is a very small price to pay for peace of mind. An experienced electrician can install a new arc fault breaker in a matter of minutes. It actually takes longer to remove and replace the cover to the circuit breaker panel than it does to switch out the breaker.

Meeting Dates

- Sep 26** *Electrical issues – Tim Mikloche from Electrical Training Services, LLC*
- Oct 24** *Neutocrete Systems*
- Nov 28** *Brackets & Hangers – Lou Daviau from Simpson Strong Tie*
- Jan 12** *CT Law Seminar*

Holiday Inn
201 Washington Ave
North Haven
(203) 239-6700

President's Corner

Bernie Caliendo

As we approach the fall, we see the end of a slow summer and uncertain year ahead. You would think with the foreclosure market booming from the now abandoned sub-prime mortgage rates, people would be flocking to take advantage of the deals out there. But money is tight and expensive, and sales are way down which leaves little work out there. Hopefully this won't last until we have a new President.

On a much lighter and happier note, our 15th anniversary outing is just a couple weeks away. Make sure you take advantage of it and attend. Sign up if you haven't already. We will have activities for the young kids as well as the big ones. The food and drink will be plentiful, and we have ordered a great weather day. Don't delay in signing up, do it today. Please see the notice for sign-up instructions in this newsletter.

At the time of this writing, I have received a copy of the audit notice for continuing education requirements in the agenda for the Sept. 6th licensing board meeting. By the time you receive this newsletter, you may have already received the notice. Make sure you read it carefully and comply with the requirements. There are 4 boxes, with descriptions for each box, and you are to check off the appropriate box for your situation.

- The first box states you have completed the required amount of continuing education, attach copies of your course certificates to the notice, sign the notice at the bottom and return it to the DCP immediately.
- The second box states you have not completed the continuing education requirements but wish to do so. If you want to retain your license, you must: complete the course requirements, pay a civil penalty of \$250.00, and contact a course provider or call DCP. When you have completed the requirements, you must attach your course certificates to the notice, enclose payment and return all no later than 60 days from receiving the notice.
- The third box gets checked off if you have not completed your continuing education requirements and decide to voluntarily surrender your license. For this option you must: surrender your license immediately, provide a written statement indicating your wish to voluntarily surrender your license and send the written notice and your license to DCP.
- The fourth box is if you are exempt from continuing education requirements. This box should be checked off if you received your license between July 1, 2005 and June 30, 2007.

As most of you are well aware, it is advantageous to belong to CAHI and attend our monthly meeting and seminars. Stay with us and you will be supplied with the best continuing education available.

Last but not least, September brings us our Board of Directors and Election meeting. We will announce the results and a couple changes that are anticipated at the September 26th electrical seminar. I ask that you support the newly elected officers and help keep CAHI moving ahead.

Thanks, Bernie

P.S. At the September 26th monthly meeting, CAHI will be passing the hat to help raise money to purchase savings bonds for the future education of Bob Bowen's 2 young daughters. CAHI member Bob Bowen was killed in an ATV accident in Vermont in July.

Please be as generous as you can.

September Keynote Speaker

This month's meeting topic is **Electrical**

Our meeting will feature Tim Mikloche from Electrical Training Services, LLC. Tim was here in Sept 05 and we are pleased to bring him back. His expertise in electrical issues are second to none. Don't miss this one!

2 hours of Continuing Education Credits

CAHI'S 15TH ANNIVERSARY

FREE FAMILY OUTING CELEBRATION

To celebrate our 15th Anniversary, CAHI is throwing a party. All members in good standing, their spouse and children 18 & under are invited!

Saturday, September 29th
12:00 to 5:00 pm

The Colonial Tavern
24 Hawley Road
Oxford, CT

FOOD:

NE Clam Chowder, Pork Ribs, Hot Dogs, Hamburgers, Cheeseburgers, Veggie Burgers, Grilled Chicken, Green Salad, Potato Salad, Roasted Potatoes, Vegetarian Baked Beans, Corn on the Cob, Watermelon, Lemon or Italian Ice, Cheesecake, Soda, Lemonade, Ice Tea. Cash Bar

FUN:

Horseshoe Pits, Basketball Court, 2 Volleyball Courts, Ping Pong Tables, Video Game Room, Large Playing Field ~ Bring your gloves, bats & softballs, Kids Games.

Depending on the weather, the in-ground pool may still be open. Bring a bathing suit and towel.

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Sign up for the Outing

- o CAHI's web site - www.ctinspect.com At the top, click on "Special Events", click on "Sept 29th Outing". Fill in your name, number of adults (includes 13 -18 years old) attending and number of children 12 years old or under attending.

- OR -

- o Fill out the form below and mail to: CAHI c/o Bernie Caliendo, P.O. Box 368, Windsor, CT 06095

Member's Name _____

Total # of Adults _____ (includes children 13 – 18 years old)

of children 12 or under _____

Member's phone: # _____ - _____ - _____

Member's e-mail address: _____

If you sign up and must cancel, please contact CAHI at: info@ctinspect.com ASAP.

Directions:

From 84 Westbound: Exit 16. Left off of the exit ramp. 2.25 mi. to 1st light. Turn left onto Rte. 67. Sign for the Colonial Tavern is 1/4 mile on the left. Turn left onto Hawley Road. The Colonial Tavern is the 2nd driveway on the right.

From 84 Eastbound: Exit 15. Right at the end of the ramp onto Rte. 67. Sign for the Colonial Tavern is 3 miles on the left(1/4 mile past Rte. 188 intersection). Turn left onto Hawley Road. The Colonial Tavern is the 2nd driveway on the right.

From Route 8 Northbound (from Bridgeport): Exit 22. Left off of the exit ramp, then bear left onto Rte. 67. The sign for the Colonial Tavern is 6.5 miles on the right. Turn right onto Hawley Road. The Colonial Tavern is the 2nd driveway on the right.

From New Haven: Route 63(Amity Road)North. Turn left onto Rte. 67. The sign for the Colonial Tavern is 10.9 miles on the right. Turn right onto Hawley Road. The Colonial Tavern is the 2nd driveway on the right.

From Stamford: Merritt Parkway or 95 North to Route 8, then follow directions for Route 8 Northbound.

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Wiring and equipment installed in accordance with the National Electrical Code will be protected against arcing faults to a certain degree by a circuit breaker, fuse or ground-fault circuit-interrupter. Circuit breakers and fuses are reasonably effective in preventing fire causes for conditions under which they are designed to operate. That is, when a bolted short circuit or ground fault occurs the circuit's overcurrent protection device opens, fires are frequently prevented.

However, the current flow of a high-impedance arc is often too low to cause operation of the protection device, and a fire could occur.

To help reduce the hazard of electrical fires from a parallel arcing fault in the branch circuit wiring, the NEC requires a listed AFCI protection device be installed in branch circuit wiring in dwelling unit bedrooms.

The 1999 NEC Rule 210-12. Arc-Fault Circuit-Interrupter Protection

(a) Definition. An arc-fault circuit interrupter is a device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

(b) Dwelling Unit Bedrooms. All branch circuits that supply 125-volt, single-phase, 15- and 20-ampere receptacle outlets installed in dwelling unit bedrooms shall be protected by an arc-fault circuit interrupter(s).
This requirement shall become effective January 1, 2002.

The 1999 NEC Rule 210.12 Arc-Fault Circuit-Interrupter Protection.

(A) Definition. An arc-fault circuit interrupter is a device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

(B) Dwelling Unit Bedrooms. All branch circuits that supply 125-volt, single-phase, 15- and 20-ampere receptacle outlets installed in dwelling unit bedrooms shall be protected by an arc-fault circuit interrupter listed to provide protection of the entire branch circuit. Strike through indicates text that was deleted and underline text indicates text that was added to the 2002 NEC.

Author's Comment: The 125V limitation to the requirement means that AFCI protection would not be required for a 240V baseboard heater or room air conditioner. For more information, visit "<http://www.mikeholt.com/articlecategories.php>". Go to the "Miscellaneous" section and visit my "AFCI" links.

NOTE: There are 47 articles in this link about AFCI's - Pete

The intent of the change from the 1999 NEC is that arc fault protection be provided for all branch circuits that supply 125-volt, single-phase, 15- and 20-ampere outlets, not just receptacle outlets. In addition, the AFCI must be listed so that it will protect the 'entire branch circuit' by de-energizing the circuit when an arc fault is detected.

Controversy exists between circuit breaker manufactures and wiring device manufactures that make listed AFCI devices. The circuit breaker manufacturer insists that the only acceptable device is the AFCI circuit breaker. Wiring device manufacturers take the position that AFCI receptacles listed to protect the entire branch circuit should be suitable and Code compliant.

Both make excellent arguments, but the NEC is very specific. It requires the AFCI protection device to de-energize the circuit and protect the entire circuit from an arc fault. The only device that can de-energize the circuit when an arc fault is detected is the AFCI circuit breaker. AFCI receptacles of the type listed to detect upstream series arc faults will not de-energize the circuit from parallel type arcing faults that may occur upstream of the device. Therefore they cannot be used to meet the NEC requirement of 210.12.

Considerations:

At the time a dwelling unit is wired, it is hard to tell from looking at the bare walls whether a room will be used as a home office or a bedroom. Also, if you are looking at an efficiency apartment, a room may well be furnished with a foldout couch that is used for sleeping on every night, making it look as much like a bedroom as a living room.

If you are in the practice of using one branch circuit for both lighting and receptacles, the 2002 change will have no effect. But, the practice of separating the lighting from the receptacle circuits in dwelling unit bedrooms will now require two AFCI circuit breakers, or you'll place them all on the same circuit.

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A new subsection (B) was added to 550.25 to require all branch circuits that supply 15 and 20A, 125V outlets in bedrooms of mobile homes and manufactured homes to be protected by arc-fault circuit interrupter.

Why is AFCI protection only required for dwelling unit branch circuits? The NEC Code wanted the industry to gain experience with these devices in bedroom circuits so that in the future their usage might be expanded to other rooms and facilities that could benefit by the added protection to provide. Studies have shown that over 60 percent of fires are from causes in the fixed wiring, switches, receptacle outlets and lighting fixtures that are part of the fixed electrical system of a residence.

The following proposals for the 2002 NEC were all rejected:

- The U. S. Consumer Product Safety Commission request that existing bedroom branch circuit be protected by an AFCI when the service equipment is replaced.
- Omit AFCI protection for the lighting outlets, because light may be needed when the AFCI device operates. Extend AFCI protection guest room branch circuits of motels and hotels. Permit the AFCI receptacle outlet to provide the required protection. Omit AFCI protection for the smoke detector circuit conductors. Delete the AFCI requirement completely.

Common questions about AFCI's:

- 1. Question:** What happens when an appliance has a locked rotor condition (bedroom window air-conditioner)? Will the AFCI breaker respond?

Answer: No and Yes. The waveform signature of locked rotor current is not

typical of an arc fault, so the AFCI will not respond, but once the motor winding shorts out, the overcurrent protection device will open.

- 2. Question:** Will there be lots of nuisance tripping of these devices?

Answer: Honestly there has not been sufficient experience in the field to answer this question, but what might appear to be a nuisance tripping condition might be an actual arc fault. The industry will have to learn how to troubleshoot these failures.

- 3. Question** Will an AFCI prevent fires from loose connections at terminals or splicing devices?

Answer: No, this product is not designed to protect against this type of series (glowing) fault.

- 4. Question:** Are there any AFCI/GFCI combination breakers?

Answer: Yes

If you have any comments or suggestions, please let me know: Mike@MikeHolt.com.

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1-888-NEC-CODE (1-888-632-2633)



Early Registration CONNECTICUT LAW SEMINAR 2007-2009

CAHI is sponsoring the required 3-hour Law Seminar on Saturday, January 12, 2008, 8:30 am to 11:30 am. Again, the one and only Attorney Kent Mawhinney will present the course at the Holiday Inn, 201 Washington Ave, North Haven, CT. Exit 12 off I-91 north and south.

We are making this available for registration now!

If you need this course for the last license renewal cycle, sign up on our web site at www.ctinspect.com. On the top of our home page click on "Special Events." Click "CT Law Seminar, January 12, 2008". Click "Add to Cart", fill out the form and pay by credit card. That's it! If you would rather register and pay by mail, fill out the form below, enclose a check made out to "CAHI" or fill in your credit card info and sign, then mail it to CAHI at the address below.

Those of you who would like to sign up and get this seminar under your belt the first year of the new continuing education cycle (2007-2009) and do not want to worry or wait, go ahead and sign up in advance.

As always, continental breakfast and refreshments at breaks are included in the fee.

FEE \$99.00

Name: _____

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Account #: - - -

Exp Date: _____ / _____ Amount Authorized: \$99.00
Month / Year

Mail to: CAHI, Pond View Circle, Beacon Falls, CT 06403

Make a copy for your records

Arc Fault Testers

Submitted by Pete Petrino

Quote from Ideal Mfg. SureTest® manufacturer:

A SureTest® w/AFCI, #61-165, tests arc fault circuit interrupter (AFCI) is a device that ensures that AFCI breakers protecting the circuit have been installed correctly. This test disrupts the electrical supply if a functional AFCI is present. "Plug in the SureTest and check for correct wiring of receptacle and all remotely connected receptacles on the branch circuit. Then, go to the panel and operate the test button on the AFCI installed in the circuit. The AFCI must trip. If it does not, do not use the circuit - consult an electrician. If the AFCI does trip, reset the AFCI...Then, press the AFCI button to activate the test. The TEST icon and lightning bolt symbol lights brightly on the display to let the user know that the AFCI test is being performed. The AFCI device should trip causing the display to blank out with the loss of power. If the AFCI fails to trip, the SureTest® will not lose power and the display shows a dimly lit lightning bolt. This non-trip condition would suggest:

- a. A wiring problem with a totally operable AFCI, or
- b. Proper wiring with a faulty AFCI".

Quote from UL:

There is no such thing as an AFCI tester, other than the test button that is an integral part of the AFCI device itself. The reason for this is that an AFCI device is very complex, and recognizes the actual waveform of an arcing fault. While the advertised "AFCI Testers" do produce a waveform similar to that of an arc fault, they cannot produce an actual arc fault. Because of this, the "tester" may not trip the AFCI circuit breaker, despite the breaker having nothing wrong with it. For this reason, UL classifies these devices not as "testers", but as "indicators", which is much more accurate.

These devices are tested under the UL 1436 standard, and are required to have included in the

instructions the following clause (or equivalent):

"CAUTION: AFCI's recognize characteristics unique to arcing, and AFCI indicators produce characteristics that mimic some forms of arcing. Because of this the indicator may give a false indication that the AFCI is not functioning properly. If this occurs, recheck the operation of the AFCI using the test and reset buttons. The AFCI button test function will demonstrate proper operation."

While these indicators may have some value for convenience to determine if the outlet in question is on an AFCI protected circuit, they are not to be substituted for the test button of the AFCI circuit breaker, and they are not an AFCI tester.

Response by Ideal:

We would like the opportunity to provide a little bit of background. Arc fault protection has been a subject of controversy for the last few years. Adoption is growing at a cautious rate. Even though arc fault protection was adopted into the Code in 2002, many states and local municipalities have been hesitant to implement this evolving technology. Concerns continue to arise on being able to detect "bad arcs" that lead to fires and discern them from "good arcs" produced normally by appliances. The objective evidence of good performance is no house fires from electrical arcing by detecting the bad arcs and no nuisance tripping of the AFCI devices by recognizing the good arcs. Each AFCI device manufacturer has their own ideas and technology on how to best accomplish these two tasks.

Because of the evolving technology, the different product designs on the market, and the significance of having good performance, IDEAL believes that an independent, consistent, objective test standard needs to be available in the field to ensure protection exists. Additionally, it's important to

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check the entire branch circuit installation for protection -- not just the AFCI device.

These AFCI protection concerns were heightened, during a period of a few months earlier this year, when some AFCI devices stopped recognizing the 100+ amp arcing signal of AFCI testers being used to inspect installations. This caused one AFCI device manufacturer to take a stand that AFCI testers are not needed. And, UL backed this posturing. Please refer to Square D's white paper entitled "AFCI Tester - not really". To see how this can happen, please note that UL has two standards in regards to AFCI: UL1699 for devices and UL1436 for outlet testers. And, there is a gray area where these two standards do not meet. The testing method in UL1699 for devices is certainly not able to be duplicated in the field for proper installation verification. UL1436 for testers has specific, repeatable parameters that UL Listed AFCI testers are required to produce to mimic a "bad arcing" signature that does allow field verification of installation and protection. It is important to note that AFCI testers actually pulse over 100 amps on the branch circuit! But, there are no requirements for the AFCI breakers that mandate detection of this "bad arcing" signature and safely trip. In fact, UL further weakens the stance of AFCI testers by referring to them as "indicators" and requiring specific language in the instructions included with AFCI testers that places more weight on the "test button" on the AFCI device over the "test button" on the tester. So, if the tester does not trip the AFCI device but the device's own test button does trip itself, then the device is ok.

As the leader in branch circuit testing, IDEAL has a few concerns with this testing methodology. First, the "test button" on the AFCI device does not have the ability to check the entire branch circuit for proper installation and protection. An AFCI tester does give

Installers, Service Personnel, and Inspectors the ability to test a branch circuit for proper wiring and that each device on the circuit is properly protected. Second, each AFCI device manufacturer has its own "test button" and test routine on the device; hence, no testing consistency is present across manufacturers. Third, arc fault protection is an evolving technology with significant changes still ahead. AFCI devices currently on the market detect parallel arcing faults. By 2008, the NEC is to require Combination devices that detect parallel and series arcing faults. So, an independent field verification through an established, objective test standard that device manufacturers must comply with is important to assure consistency in arcing protection across manufacturers and installations.

IDEAL has offered to work with UL and the AFCI device manufacturers to remove the gray area between the AFCI device standard and the AFCI tester standard. But now, there is actually a growing movement to remove all AFCI testing parameters from UL1436, which would remove any ability for Installers and Inspectors to verify that a home's bedrooms are sufficiently protected from parallel arcing faults. So, the controversy will continue until these issues are acknowledged and resolved.

IDEAL firmly agrees with the Inspection community that they need the proper tools and methods to conduct their third-party testing and to verify installations are to Code. And, we strongly feel that our SureTest® line of branch circuit testers (not indicators) meets those needs. In fact, the SureTest® 165 is the only test tool that looks behind walls to verify protection from both types of fire hazards: arcing faults and high resistance points.

I'd be happy to further discuss these issues along with a thorough review of our product offering to remove any doubt on whether our

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test tools are "testers" or "indicators".

Sincerely,

Jim Gregorec,
Group Manager T&M Division
Ideal Industries, Inc 815-895-1233
Fax 815-899-7712

Concerns and facts,

A SureTest® w/AFCI, #61-165, tests arc fault circuit interrupter (AFCI) is a device that ensures that AFCI breakers protecting the circuit have been installed correctly. This test disrupts the electrical supply if a functional AFCI is present.

Articles published in the CAHI Reporter are the sole opinion of the author.
CAHI does not endorse or state a position for or against the content of said articles.

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Contact CAHI

75 Pond View Circle
Beacon Falls, CT 06403

E-mail: info@ctinspect.com

Web: www.ctinspect.com

Artemis

Publications

Artemis13@bigfoot.com

CT Home Inspection Licensing Board

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The Licensing Board meetings are held at 9:30 am,
Department of Consumer Protection, Room 117, 165
Capitol Avenue, Hartford.

The public is always welcome.

E-mail Bernie Caliendo for the latest meeting schedule
at bsurehomeinspect@juno.com