

# NFPA Document Proposal Form

NOTE: All Proposals must be received by 5:00 pm EST/EDST on the published Proposal Closing Date.

For further information on the standards-making process, please contact the Codes and Standards Administration at 617-984-7249 or visit [www.nfpa.org/codes](http://www.nfpa.org/codes).

For technical assistance, please call NFPA at 1-800-344-3555.

## FOR OFFICE USE ONLY

Log #: \_\_\_\_\_

Date Rec'd: \_\_\_\_\_

Please indicate in which format you wish to receive your ROP/ROC  electronic  paper  download  
(Note: If choosing the download option, you must view the ROP/ROC from our website; no copy will be sent to you.)

Date \_\_\_\_\_ Name Joseph C Engel Tel. No. 724-733-1263  
Company retired Email jeng1013@aol.com  
Street Address 107 Overlook Circle City Monroeville State PA Zip 15146

\*\*\*If you wish to receive a hard copy, a street address MUST be provided. Deliveries cannot be made to PO boxes.

Please indicate organization represented (if any) \_\_\_\_\_

1. (a) NFPA Document Title National Electrical Code International Electrical Code Series NFPA No. & Year NFPA 70: NEC 2011

(b) Section/Paragraph 210.12 Arc-Fault Circuit-Interrupter Protection

2. Proposal Recommends (check one):  new text  revised text  deleted text

3. Proposal (include proposed new or revised wording, or identification of wording to be deleted): [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

210.12 Arc-Fault Circuit-Interrupter Protection.

~~Exception No. 1~~ (delete entire exception)

~~Exception No. 2~~ (delete entire exception)

Exception No. 3:

**(B) Branch Circuit Extension or Modification – Dwelling Units.** In any of the areas specified in 210.12(A), where branch-circuit wiring is modified, replaced, or extended, the branch circuit shall be protected by ~~one of the following~~:

~~(1) A listed combination-type AFCI located at the origin of the branch circuit~~

~~(2) A listed combination-type AFCI located at the first receptacle outlet of the existing branch circuit~~

4. **Statement of Problem and Substantiation for Proposal:** (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Proposal, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

### The Problem:

The text to be deleted is required to insure that a home's receptacles are safely protected, including "the first receptacle outlet of the existing branch circuit". It is assumed that the performance of an AFCI packaged as a receptacle is equivalent to one packaged as a circuit breaker. This is not true. There at least two major safety related differences:

#### Short Circuit Current Tests:

- An AFCI circuit breaker must pass all UL circuit breaker tests (UL489) which includes two short circuit current tests at 10,000A (minimum) and 50% lagging.
- In contrast an AFCI receptacle is tested with only a single 2,000A and 90% lagging (resistive) current. This is less than the anticipated current value.

#### Case:

- The case of a circuit breaker must not melt or burn should a glowing contact terminal condition develop. From UL489, "The case shall be of such material that it will withstand the most severe conditions likely to be met in service." I believe this requires the use of thermal set plastics.
- In contrast the AFCI standard allows receptacle designs to utilize thermal plastic materials that melt and burn when subjected to a glowing contact. From the UL AFCI standard (UL1699), "An outlet circuit AFCI shall comply with the materials requirements in 8.1 – 8.5 of the Standard for Attachment Plugs and Receptacles, UL 498."

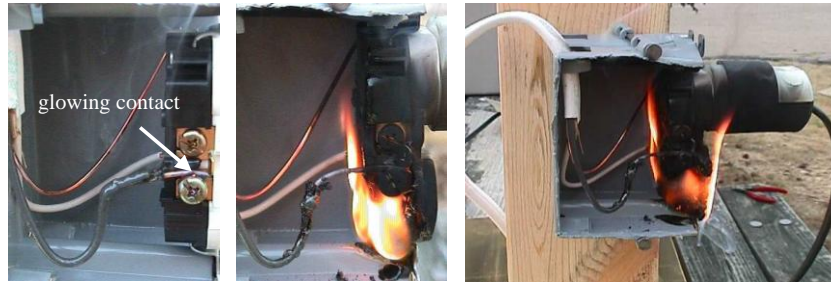
Substantiation:

Short Circuit Current Tests:

I have not been able to purchase and test an outlet circuit AFCI (they are not available) but I did perform a test on a ground fault receptacle GFR. I believe the AFCI will use the same circuit interrupting mechanism. To duplicate a home condition where the outlet AFCI was located near the load center, a standard GFR was connect, via a 4' length of 12AWG wire, to a circuit breaker with a 10KA lsc rating. The available current at the circuit breakers input terminals was set at 10,000A. When various GFRs were tested with a short at the receptacle's load terminals, most of the outlet circuit AFCIs failed. The actual fault current was measured at 5000A, 2.5 times the UL1699 outlet circuit AFCI requirement.

Case:

The fire hazard resulting from a glowing contact at UL 498 Listed receptacle terminals is well know and documented. See photos below.



Please also see:

1. Author's web site: <http://www.CombinationAFCI.com> and
2. [www.mikeholt.com/htmlnews/afci/ULreportonterminals.pdf](http://www.mikeholt.com/htmlnews/afci/ULreportonterminals.pdf)

The latter contains the following UL report.

SPECIAL SERVICES INVESTIGATION  
ON  
BRANCH/FEEDER ARC FAULT CIRCUIT INTERRUPTER  
INCORPORATING EQUIPMENT GROUND FAULT PROTECTION

The report describes the hazard of glowing contacts associated with receptacle terminals and the ability of an AFCI with 30mA to mitigate them. The paper describes how easy it is to convert a loose connection into a glowing contact. A CPSC paper entitled "What Causes Fires in Residences?" by Linda E. Smith & Dennis McCoskrie, Fire Journal January/February 1990 is cited. The CPSC authors found from an investigation of 149 residential electrical distribution system fires, that receptacle outlets and switches accounted for 29 (19%) of the fires. Twenty-six of the 29 investigated fires were attributed to electrical system components associated with receptacle outlets.

Clearly the terminals of all receptacles must be protected against a glowing contact, including the line terminals of the first receptacle of an existing branch circuit. This can only be done by an AFCI "located at the origin of the branch circuit".

**5. Copyright Assignment**

- (a)  I am the author of the text or other material (such as illustrations, graphs) proposed in the Proposal.
- (b)  Some or all of the text or other material proposed in this Proposal was not authored by me. Its source is as follows: (please identify which material and provide complete information on its source)

*I hereby grant and assign to the NFPA all and full rights in copyright in this Proposal and understand that I acquire no rights in any publication of NFPA in which this Proposal in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Proposal and that I have full power and authority to enter into this assignment.*

**Signature (Required)**

**PLEASE USE SEPARATE FORM FOR EACH PROPOSAL**

Mail to: Secretary, Standards Council · National Fire Protection Association  
1 Batterymarch Park · Quincy, MA 02169-7471 OR  
Fax to: (617) 770-3500 OR Email to: [proposals\\_comments@nfpa.org](mailto:proposals_comments@nfpa.org)

11/1/2011