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Governor Scott Walker Secretary Dave Ross

ELECTRICAL CODE ADVISORY COMMITTEE MEETING
Room 121C, 1400 East Washington Avenue, Madison
Contact: Dan Smith (608) 261-4463
November 30, 2015

The following agenda describes the issues that the Committee plans to consider at the meeting. At the time of the meeting, items may be removed from the agenda. Please consult the resulting meeting minutes for a description of the recommendations of the Committee.

AGENDA

9:00 A.M.

CALL TO ORDER – ROLL CALL

- A. Adoption of Agenda (1)**
- B. Approval of Minutes of October 19, 2015 (2)**
- C. Department Update**
- D. Consideration of Ground Fault Circuit Interrupter/Arc Fault Circuit Interrupter (GFCI/AFCI) Materials from Tim McClintock (3-24)**
- E. Discussion of Clearinghouse Rule CR 09-029, Relating to Electrical Inspection (25-36)**
- F. Public Comments**
- G. Future Business**
- H. Adjournment**

**SPS 316 ELECTRICAL CODE ADVISORY COMMITTEE MEETING
MEETING MINUTES
October 19, 2015**

PRESENT Steven Bacalzo, Brad Gruenewald, Paul Gruettner, David Helgeson, Gene Jacobson, Charles Johansen, Bill Neitzel, John Nikolai, Cory Schmoll

EXCUSED Shannon Clark

STAFF Dan Smith, Rules Coordinator; Anthony Tadysak, Engineering Consultant; and Nifty Lynn Dio, Bureau Assistant

CALL TO ORDER

Bill Neitzel, called the meeting to order at 9:01 a.m. A quorum of nine (9) members was confirmed.

ADOPTION OF AGENDA

MOTION: Gene Jacobson moved, seconded by Charles Johansen, to adopt the agenda as published. Motion carried unanimously.

APPROVAL OF MINUTES

MOTION: Steven Bacalzo moved, seconded by Brad Gruenewald, to approve the minutes as published. Motion carried unanimously.

ADJOURNMENT

MOTION: Steven Bacalzo moved, seconded by Brad Gruenewald, to adjourn the meeting. Motion carried unanimously.

The meeting adjourned at 2:44 p.m.



2000 ELECTROCUTIONS ASSOCIATED WITH CONSUMER PRODUCTS

**Risana T. Chowdhury
Hazard Analysis Division
Directorate for Epidemiology
July 2003**

Introduction

One of the strategic goals at the U.S. Consumer Product Safety Commission (CPSC) has been to lower the consumer product-related electrocution rate by 20 percent from the level in 1994 by the year 2004. This report contains estimates of the number of electrocutions involving consumer products and the corresponding death rates from 1990 through 2000 in order to evaluate the progress toward reaching the strategic goal.

Results

Based on data from the National Center for Health Statistics (NCHS), the total number of electrocutions in the U.S. has decreased from 670 in 1990 to 400 in 2000, a reduction of 40 percent. Table 1 shows that during this same time period, the estimated number of electrocutions related to consumer products decreased from 270 to 150, resulting in a reduction of 44 percent. In 1990, the age-adjusted rate for consumer product-related electrocutions was 1.09 per million U.S. population. In 2000, that rate dropped to 0.53 electrocutions per million, reflecting a decrease of 51 percent. A regression analysis confirms the statistical significance of the decline in both total electrocutions and consumer product-related electrocutions ($p=0.0005$ and $p=0.0006$ respectively, see Figure 1). The decline in the age-adjusted death rates is also statistically significant ($p=0.0002$).

Table 1. Total Electrocutions, Consumer Product-Related Electrocutions and Death Rates in U.S., 1990-2000

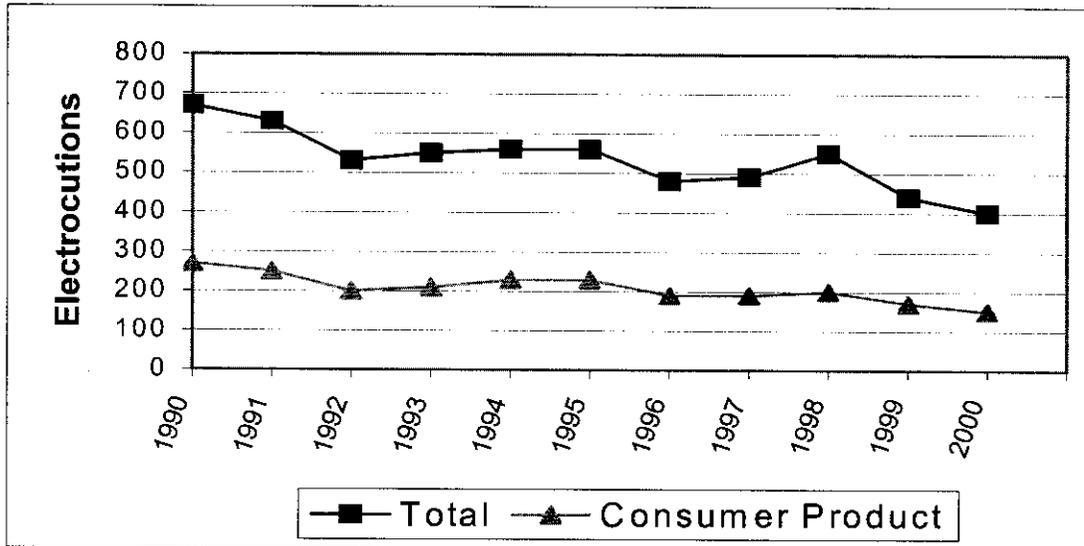
Year	U.S. Total Electrocutions ¹	Consumer Product-Related Electrocutions		
		Estimates	Percent of Total	Age-Adjusted Death Rates per Million Population
1990	670	270	40%	1.09
1991	630	250	40%	0.99
1992	530	200	38%	0.78
1993	550	210	38%	0.82
1994	560	230	41%	0.89
1995	560	230	41%	0.88
1996	480	190	40%	0.72
1997	490	190	39%	0.71
1998	550	200	36%	0.74
1999	440	170	39%	0.62
2000	400	150	38%	0.53

Source:

1. NCHS, Multiple Cause of Death data, 1990-2000.
2. U.S. Census Bureau, Population Division; see References [3] and [4].

¹ Deaths from 1990 -1998 are based on the ninth revision of the International Classification of Diseases (ICD-9) while deaths from 1999-2000 are based on the tenth revision (ICD-10). Statistics for 1990-1999 on total electrocutions, consumer product-related electrocution estimates and age-adjusted death rates are from Reference [1].

Figure 1. Total Electrocutions and Consumer Product-Related Electrocutions in U.S., 1990-2000



Source: NCHS, Multiple Cause of Death data, 1990-2000.

In terms of the strategic goal, the electrocution death rate in the U.S. has been declining since 1994. The age-adjusted rate for consumer product-related electrocutions was 0.89 per million U.S. population in 1994. In 2000, this rate dropped to 0.53 deaths per million U.S. population, representing a reduction of about 40 percent.

Table 2 shows the breakdown of the 150 consumer product-related electrocutions by specific products involved. Large appliances, such as air conditioners, sump pumps, pool pumps, water heaters, furnaces, clothes dryers, refrigerators, and range hoods were responsible for the largest proportion (19%) of the electrocutions. Ladders coming in contact with power lines, ranked second, accounting for 15% of the deaths. Small appliances, such as microwave ovens, electric fans, extension cords, and televisions were the next most frequently reported (11%) group of products. Power tools such as drills, grinding machines, saws, and welding equipment accounted for 10% of the electrocutions. Another 10% of the electrocutions involved some sort of damaged or exposed wiring, although the exact nature of the wiring was unspecified. Lighting equipment (lamps, fixtures, work lights, etc.) was involved in 8% of the deaths. Installed household wiring accounted for 7% of the electrocutions. Sports and recreational equipment such as fishing / bowling equipment, boat lifts and recreational vehicles were responsible for 6% of the deaths. Gardening and farming equipment, antennas that touched overhead power lines, and other unspecified appliances were responsible for 2%, 1%, and 1% of the deaths, respectively. Miscellaneous other products, such as pipes and poles that contacted power lines, electric fences, septic tanks, building structures such as mobile home tongues or metal carport roofs accounted for another 9% of the deaths. No product was specified for the remaining 1% of the electrocutions.

Table 2. Electrocutions by Types of Consumer Products, 2000

Type of Consumer Product	Estimate*	Percent
Total	150	100
Large Appliances	29	19
Air Conditioners	8	
Pumps (sump, pool, other)	7	
Water Heaters	3	
Furnaces	3	
Clothes Dryers	3	
Refrigerators	2	
Range hoods	2	
Ladders	22	15
Small Appliances	17	11
Microwave ovens	7	
Electric Fans	5	
Extension Cords	3	
Televisions	2	
Power Tools	15	10
Drills	5	
Grinding Machines	3	
Saws	2	
Welding Equipment	2	
Unspecified	3	
Wiring – Unspecified	15	10
Lighting Equipment	12	8
Lamps / Light Fixtures (incl. underwater lighting)	10	
Work Lights	2	
Installed Household Wiring	10	7
Sports / Recreational Equipment	8	6
Lawn / Garden / Farm Equipment	3	2
Antennas	2	1
Appliances – Unspecified	2	1
Miscellaneous Other Products	13	9
Pipes / Poles / Fences	7	
Other	7	
Unspecified	2	1

Source: U.S. Consumer Product Safety Commission, Directorate for Epidemiology, Hazard Analysis Division.

*Due to rounding, detail numbers may not add to total.

Methodology

All death certificates filed in the U.S. are compiled by the National Center for Health Statistics into multiple cause mortality data files. The mortality data files contain demographic information on the deceased as well as codes to classify the underlying cause of death and up to 20 contributing conditions. The data are compiled in accordance with the World Health Organization instructions, which request that member nations classify causes of death by the current Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death. The ninth revision of the International Classification of Diseases (ICD) was implemented in 1979 while the tenth revision was implemented in 1999. The 1990-1998 electrocution estimates and age-adjusted death rates presented in this report are based on the ninth revision [1], and the 1999-2000 estimates and rates are based on the tenth revision of the ICD.

The introduction of a new revision of ICD has the potential to create discontinuities in trend data. One measure of the extent of the discontinuity between ICD-9 and ICD-10 is a comparability ratio, which is computed by double coding of a large sample of the national mortality file, once by the old version (ICD-9) and again by the new version (ICD-10). The results can be expressed as a ratio of the number of deaths for a given cause coded and classified by ICD-10 to the number of deaths for the same cause coded and classified by ICD-9. ICD-9 codes for electrocution, E925.0, E925.1, E925.2, E925.8, and E925.9, are now distributed among ICD-10 codes W85, W86, and W87 as shown below. According to a preliminary report [2], the comparability ratio is 1.00. This seems to imply that there is strict comparability between ICD-9 and ICD-10 for electrocution.

ICD-9 Version

ICD-10 Version

E925.0 -----	→ W86
E925.1 -----	→ W85, W86
E925.2 -----	→ W86
E925.8 -----	→ W86
E925.9 -----	→ W87

Definition

ICD-9

E925.0 Accident caused by electric current: Domestic wiring and appliances
E925.1 Accident caused by electric current: Electric power generating plants, distribution stations, transmission lines
E925.2 Accident caused by electric current: Industrial wiring, appliances and electrical machinery
E925.8 Accident caused by electric current: Other
E925.9 Accident caused by electric current: Unspecified

ICD-10

W85 Accident caused by electric current: Electric transmission lines
W86 Accident caused by electric current: Other specified electric current
W87 Accident caused by electric current: Unspecified electric current

Although the classification codes completely map from one ICD version to the next, the locations (where the electrocution incident occurred) within those codes have changed. For code E925.1 and E925.9 in ICD-9, all cases were coded as having occurred at an “industrial location” and at “not specified location”, respectively. There is no similar restriction in ICD-10 because each of the codes W85-W87 allows all possible locations. Since CPSC’s method of estimating consumer product- related electrocutions relies on the location code, this difference affects our estimates. For 1990-1998, the restriction of code E925.1 to the industrial location may have resulted in an underestimate of cases of interest to CPSC under ICD-9. Because the restriction on location is gone in ICD-10, we may now (from 1999 onwards) see cases that we did not see before.

Outlined below are the steps used to estimate the total number of electrocutions associated with the use of consumer products and the corresponding age-adjusted death rates in 2000.

1. *Extract the electrocution data*

Using the following external cause of death ICD-10 codes in the NCHS file, the electrocution incidents were identified (Table 3):

W85 - Accident caused by electric current: Electric transmission lines
W86 - Accident caused by electric current: Other specified electric current
W87 - Accident caused by electric current: Unspecified electric current

Table 3: Electrocution Data Classified by ICD-10 Codes and Location, 2000

ICD-10 Code	Location of Incidents							Total
	Home / Residence	Sport / Recreation	Farm	Street / Public	Industrial Place	Other	Not Specified	
W85	18	1	3	24	15	31	7	99
W86	54	1	8	8	38	25	6	140
W87	45	1	6	19	35	39	16	161
Total	117	3	17	51	88	95	29	400

Source: NCHS, Multiple Cause of Death data.

2. *Estimate the total number of consumer product-related deaths (in Table 1)*

Deaths occurring in homes and residential institutions, sports and recreational areas, and farms were assumed to be related to consumer products. Assuming that electrocutions occurring in “not specified” locations followed the same distribution as those in known locations, an allocation scheme was used. For each ICD-10 code, a proportion of the “not specified” electrocutions was added to the counts for known locations. Finally, the adjusted counts for homes and residential institutions, sports and recreational areas, and farms were summed to get the total estimated number of consumer product-related deaths (150, see Table 4).

Table 4: Allocation of Electrocutions Occurring at “Not Specified” Locations, 2000

ICD-10 Code	Location of Incidents						Total
	Home / Residence	Sport / Recreation	Farm	Street / Public	Industrial Place	Other	
W85	19.37	1.08	3.23	25.83	16.14	33.36	99.01
W86	56.42	1.04	8.36	8.36	39.70	26.12	140.00
W87	49.97	1.11	6.66	21.10	38.86	43.30	161.00
Total	125.76	3.23	18.25	55.29	94.70	102.78	400.01
ROUND	126	3	18	55	95	103	400
Consumer Product-Related Deaths	126	3	18				147*

Source: NCHS, Multiple Cause of Death data.

* Approximately 150 (by rounding to the nearest 10)

3. Obtain product specific death estimates (in Table 2)

Since NCHS data do not provide product-specific information, we made use of CPSC databases to obtain estimates of product-specific electrocutions using the process described below.

- CPSC purchases certificates of deaths due to electrocutions and other external causes from all 50 states, New York City, and the District of Columbia. The death certificates that include sufficient information to identify the consumer product involved in the incident are coded and maintained in the Death Certificate database (DTHS). CPSC also maintains the Injury or Potential Injury Incident database (IPII) which contains data based on reports from newspaper clippings, consumer complaints, and medical examiner reports. These reports describe deaths, injuries, and “near miss” incidents involving consumer products.
- The electrocution incidents from the two databases, DTHS and IPII, were combined and compared by date of death, state, sex, and age to screen out any duplicate reports. Copies of death certificates and IPII source documents such as news clippings, consumer complaints, and coroner / medical examiner reports corresponding to these incidents were reviewed to verify the accuracy of the information (especially incident location) contained in the records from the databases. The CPSC records were then matched to the NCHS records already identified above (to obtain the total electrocution estimate) on the basis of month and day of death, state, age, and sex.
- Counts of the matching records where electrocutions occurred in homes, residential institutions, farms, sports, and recreational areas² were summed to determine the total number of electrocutions based on CPSC databases. To estimate the number of electrocutions associated with each product, the percentage of the CPSC database total for each product category was applied to the total number of estimated consumer product-related electrocutions obtained from the NCHS data. These estimates are shown in Table 2.

² Based on the locations described in CPSC records. Locations in NCHS records were used only when the information was not available in CPSC records.

4. Obtain the age-adjusted death rate (in Table 1)

The electrocution estimates were combined with the estimates of the U.S. resident population from the U.S. Census Bureau [4] to calculate annual mortality rates. It is common knowledge that the distribution of the U.S. population has been shifting over time due to the aging of the “baby boomer” population. While the unadjusted (crude) mortality rate (the total number of deaths in a specific year divided by the population for that year) accounts for the number of events occurring in a population, it does not account for the changing age structure of the population over a specified time period. An alternative measure that can be used to address such changes in the age composition of the population is the age-adjusted (standardized) rate. For the years 1990 through 2000, the “direct method of adjustment” was used to calculate the age-adjusted death rates with the 2000 U.S. resident population as the standard [3]. Direct adjustment entails weighting annual age-specific rates (the number of deaths occurring in a specified age group divided by the population of that age group) by the distribution of the standard population. The steps in computation of the age-adjusted death rate for the year 2000 are shown in Tables 5 – 8.

Table 5: Electrocutions by Location and Age Groups, 2000

Age Group	Location of Incidents							Total
	Home / Residence	Sport / Recreation	Farm	Street / Public	Industrial Place	Other	Not Specified	
Under 15	10	1	1	0	0	5	0	17
15-34	46	2	6	19	45	41	11	170
35-54	45	0	8	27	34	42	14	170
55+	16	0	2	5	9	7	4	43
Total	117	3	17	51	88	95	29	400

Source: NCHS, Multiple Cause of Death data.

Table 6: Allocation of Deaths in “Not Specified” Locations, 2000

Age Group	Location of Incidents						Total
	Home / Residence	Sport / Recreation	Farm	Street / Public	Industrial Place	Other	
Under 15	10.00	1.00	1.00	0.00	0.00	5.00	17.00
15-34	49.18	2.14	6.42	20.31	48.11	43.84	170.00
35-54	49.04	0.00	8.72	29.42	37.05	45.77	170.00
55+	17.64	0.00	2.21	5.51	9.92	7.72	43.00
Total	125.86	3.14	18.35	55.24	95.08	102.33	400.00

Source: NCHS, Multiple Cause of Death data.

Table 7: Rounding Data for Consumer Product-Related Electrocutions, 2000

Age Group	Home / Residence	Sport / Recreation	Farm	Total	Round
Under 15	10.00	1.00	1.00	12.00	12
15-34	49.18	2.14	6.42	57.74	58
35-54	49.04	0.00	8.72	57.76	58
55+	17.64	0.00	2.21	19.85	20
Total	125.86	3.14	18.35	147.35	147

Source: NCHS, Multiple Cause of Death data.

Table 8: Age-Adjusted Rate of Electrocutions Related to Consumer Products, 2000

Age Group	2000 Standard Weight ³	2000 Population ⁴	2000 Electrocutions Related to Consumer Products ⁵	Weighted Age-Specific Death Rate per Million Population	Death Rate per Million Population	
					Age-Adjusted	Crude
	1.000000	281,422,000	150		0.534975	0.533007
Under 15	0.214700	60,254,000	12.24	0.043632		
15-34	0.274219	79,075,000	59.18	0.205239		
35-54	0.297447	82,827,000	59.18	0.212539		
55 +	0.213634	59,266,000	20.41	0.073565		

Source:

1. U.S. Census Bureau, Population Division.
2. NCHS, Multiple Cause of Death data.

³ The year 2000 weights are computed based on year 2000 standard population (prepared by the U.S. Bureau of the Census). See Reference [3].

⁴ Based on the April 1, 2000 population. See Reference [4].

⁵ Computed from Column 6, Table 7 adjusted for Total equals 150.

References

1. Adler, Prowpit : 1999 Electrocution Associated With Consumer Products, July 2002, Directorate for Epidemiology, Division of Hazard Analysis, U.S. Consumer Product Safety Commission.
2. Ault, Kimberly, Ph.D.: Preliminary Comparability Ratios Between the 9th and 10th Revision of Diseases, November 2001, Directorate for Epidemiology, Division of Hazard and Injury Data Systems.
3. Anderson, R.N., Ph.D. and Rosenberg, H.M., Ph.D. Age Standardization of Death Rates: Implementation of the Year 2000 Standard, Centers for Disease Control and Prevention and the National Center for Health Statistics, Volume 47, Number 3, October 1998.
4. U.S. Census Bureau, Statistical Abstract of the United States: 2002, No.12, Resident Population by Age and Sex: 1980 to 2001, <http://www.census.gov/prod/2003pubs/02statab/pop.pdf>.



"Let the Code Decide"
OHIO CHAPTER
International Association of
Electrical Inspectors

Understanding the Cost Impact of the 2008 NEC

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The impact of additional Arc-Fault Circuit Interrupters and the new Tamper Resistant Receptacles in the 2008 NEC has prompted controversy driven by the misunderstood cost impact of moving from the 2005 NEC to the 2008 NEC. The NEC provides for the safe use of electricity from fire and shock. Technology over the years has enhanced that protection with minimal cost impact. Circuit breakers protect the home from overloaded circuits to prevent fires and GFCIs are well recognized in the safe use of electricity to protect us and our children from shock hazards. The GFCI entered the home in the 1970s, AFCIs became part of the NEC in the 1999 NEC and the tamper resistant receptacle in the 2008 NEC.

We will show that the impact of adding AFCI protection and Tamper Resistant Receptacles will have minimal impact on affordable housing. Keep in mind the NEC establishes the requirements for the safe electrical operation of a home. Additional circuits that include extra lighting, specific known loads, or a desire to separate circuits for isolation purposes is an additional cost that may be incurred that is once again not driven by the NEC. The additional lighting loads or appliances are not code driven, they are upgrades similar to windows, roofing configuration, or brick vs siding.

This report has been prepared by the following Ohio Chapter Board of Director Members; Oran P. Post, Electrical Inspector for the City of Tallmadge, Ohio and Thomas E. Moore, Electrical Inspector for the City of Beachwood, Ohio and Tim McClintock, Building Official/Electrical Inspector for Wayne County, Ohio. All three Board Members have extensive experience with the code development process.

This report provides an impact statement based entirely on the 2008 NEC requirements for three different homes. The first is a 900 sq ft home to help understand the impact to affordable housing. The other two homes are typical size homes and will include a 1700 sq ft home and a 2100 sq ft home.

The findings are based on prices obtained at a local electrical distributor and other verifiable resources as follows:

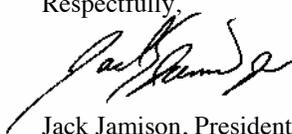
Combination AFCI	\$36.34
Standard Receptacle	\$.50
Tamper Resistant Receptacle	\$1.25
Standards GFCI Receptacle	\$8.00
Tamper Resistant Receptacle with GFCI	\$14.85

Results

900 sqft Home	\$160.18 for 900 sq. ft. dwelling unit or \$.18/sq. ft.
1700 sqft Home	\$205.27 for 1700 sq. ft. dwelling unit or \$.12/sq. ft.
2100 sqft Home	\$241.36 for 2100 sq. ft. dwelling unit or \$.11/sq. ft.

The 2008 NEC impact is minimal at less than a 20 cents per sq ft.

Respectfully,



Jack Jamison, President

***Cost Analysis for a new dwelling based on the minimum 2008 NEC requirements (900 Sq ft)**

2008 NEC Code Section	Description of Code Requirement	Total Required Branch Circuit/Devices	Cost per 2005 NEC	Cost per 2008 NEC	Cost Difference
GENERAL LIGHTING LOADS					
220.12, Table 220.12 & 220.14(J)	900 sq. ft. X 3VA = 2700 VA/120 Volts = 22.5 Amps = 1.5 or 2 circuits. 2 general purpose 15 Ampere circuits which includes family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas is required.	2	\$3.25	\$36.34	\$33.09
			\$25.00 ¹	\$36.34	\$11.34
DINING ROOM					
210.52(A), 220.12, 220.14(J)	210.12(B) requires the dining room outlets to be protected by an arc fault circuit interrupter. 210.52(B)(1) requires this circuit to be on a 20 ampere circuit.	1	\$3.25	\$36.34	\$33.09
KITCHEN					
210.52(C), 210.11(C)(1), 220.14(J), & 406.11	2 Kitchen small appliance branch circuits supplying 2 Tamper Resistant GFCI Receptacles serving the kitchen countertop.	2	\$8.00	\$14.85	\$13.70
210.52(C), 210.11(C)(1), 220.14(J), & 406.11	2 Kitchen small appliance branch circuits supplying 6 Tamper Resistant receptacles located as required by 210.52(B)(1)	6	\$5.00	\$1.25	\$4.50
BATHROOM					
210.52(D), 210.11(C)(3), 220.14(J), & 406.11	1 Tamper Resistant GFCI receptacle required for bathroom	1	\$8.00	\$14.85	\$6.85
GARAGES					
210.52(G), 220.14(J), & 406.11	1 Tamper Resistant GFCI receptacles required for attached garages & unattached garages with power.	1	\$8.00	\$14.85	\$6.85
OUTDOOR & BASEMENT RECEPTACLES					
210.52(E), 220.14(J), & 406.11	2 Tamper Resistant/Weather Resistant receptacles (front & rear of Dwelling)	2	\$5.00	\$7.03	\$13.06 ²
210.52(G), 220.14(J), & 406.11	1 Tamper Resistant GFCI required for unfinished basements	1	\$8.00	\$14.85	\$6.85
LAUNDRY					
210.52(F), 210.11(C)(2), 220.14(J), & 406.11	1 Tamper Resistant GFCI Installed for the Laundry within 6 feet of laundry sink	1	\$8.00	\$14.85	\$6.85
GENERAL PROVISION RECEPTACLE OUTLETS					
210.52(A), 220.12, 220.14(J), & 406.11	which includes family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas	32	\$5.00	\$1.25	\$24.00
				TOTAL	\$160.18

<p>Footnotes</p> <ol style="list-style-type: none"> Standard AFCI breakers as required by the 2005 NEC Alternative method protecting outdoor receptacles fed from basement GFCI receptacle 	<p>This analysis is based on 2-wire home runs for branch circuits. The following consists of alternative wiring methods and their respective prices;</p> <p>250ft NM-B-14/2/2-CU-WG.....\$114.66 250ft NM-B-14/3-CU-WG.....\$75.87 250ft NM-B-14/2-CU-WG.....\$54.13</p>
<p>\$160.18 for 900 sq. ft. dwelling unit is a cost of \$.18/sq. ft. Not a whole lot to pay for safety! Any extra wiring or devices above and beyond this is the choice of the builder and not mandated by the NEC. *Prices obtained from Leff Electric Supply (see attached quote), Lowes, & Home Depot</p>	

***Cost Analysis for a new dwelling based on the minimum 2008 NEC requirements (1700 Sq ft)**

2008 NEC Code Section	Description of Code Requirement	Total Required Branch Circuit/Devices	Cost per 2005 NEC	Cost per 2008 NEC	Cost Difference
GENERAL LIGHTING LOADS					
220.12, Table 220.12 & 220.14(J)	1700 sq. ft. X 3VA = 5100 VA/120 Volts = 42.5/15 Amps = 2.8 or 3 circuits. 2 general purpose 15 Ampere circuits which includes family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas is required.	3	\$3.25	\$36.34	\$66.18
			\$25.00 ¹	\$36.34	\$11.34
DINING ROOM					
210.52(A), 220.12, 220.14(J)	210.12(B) requires the dining room outlets to be protected by an arc fault circuit interrupter. 210.52(B)(1) requires this circuit to be on a 20 ampere circuit.	1	\$3.25	\$36.34	\$33.09
KITCHEN					
210.52(C), 210.11(C)(1), 220.14(J), & 406.11	2 Kitchen small appliance branch circuits supplying 2 Tamper Resistant GFCI Receptacles serving the kitchen countertop.	2	\$8.00	\$14.85	\$13.70
210.52(C), 210.11(C)(1), 220.14(J), & 406.11	2 Kitchen small appliance branch circuits supplying 8 Tamper Resistant receptacles located as required by 210.52(B)(1)	6	\$5.00	\$1.25	\$6.00
BATHROOM					
210.52(D), 210.11(C)(3), 220.14(J), & 406.11	1 Tamper Resistant GFCI receptacle required for bathroom	1	\$8.00	\$14.85	\$6.85
GARAGES					
210.52(G), 220.14(J), & 406.11	1 Tamper Resistant GFCI receptacles required for attached garages & unattached garages with power.	1	\$8.00	\$14.85	\$6.85
OUTDOOR & BASEMENT RECEPTACLES					
210.52(E), 220.14(J), & 406.11	2 Tamper Resistant/Weather Resistant receptacles (front & rear of Dwelling)	2	\$5.00	\$7.03	\$13.06 ²
210.52(G), 220.14(J), & 406.11	1 Tamper Resistant GFCI required for unfinished basements	1	\$8.00	\$14.85	\$6.85
LAUNDRY					
210.52(F), 210.11(C)(2), 220.14(J), & 406.11	1 Tamper Resistant GFCI Installed for the Laundry within 6 feet of laundry sink	1	\$8.00	\$14.85	\$6.85
GENERAL PROVISION RECEPTACLE OUTLETS					
210.52(A), 220.12, 220.14(J), & 406.11	which includes family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas	46	\$5.00	\$1.25	\$34.50
				TOTAL	\$205.27

<p>Footnotes</p> <ol style="list-style-type: none"> Standard AFCI breakers as required by the 2005 NEC Alternative method protecting outdoor receptacles fed from basement GFCI receptacle 	<p>This analysis is based on 2-wire home runs for branch circuits. The following consists of alternative wiring methods and their respective prices;</p> <p>250ft NM-B-14/2/2-CU-WG.....\$114.66 250ft NM-B-14/3-CU-WG.....\$75.87 250ft NM-B-14/2-CU-WG.....\$54.13</p>
<p>\$205.27 for 1700 sq. ft. dwelling unit is a cost of \$.12/sq. ft. Not a whole lot to pay for safety! Any extra wiring or devices above and beyond this is the choice of the builder and not mandated by the NEC. *Prices obtained from Leff Electric Supply (see attached quote), Lowes, & Home Depot</p>	

***Cost Analysis for a new dwelling based on the minimum 2008 NEC requirements (2100 Sq ft)**

2008 NEC Code Section	Description of Code Requirement	Total Required Branch Circuit/Devices	Cost per 2005 NEC	Cost per 2008 NEC	Cost Difference
GENERAL LIGHTING LOADS					
220.12, Table 220.12 & 220.14(J)	2100 sq. ft. X 3VA = 6300 VA/120 Volts = 52.5/15 Amps = 3.5 or 4 circuits. 2 general purpose 15 Ampere circuits which includes family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas is required.	4	\$3.25	\$36.34	\$99.27
			\$25.00 ¹	\$36.34	\$11.34
DINING ROOM					
210.52(A), 220.12, 220.14(J)	210.12(B) requires the dining room outlets to be protected by an arc fault circuit interrupter. 210.52(B)(1) requires this circuit to be on a 20 ampere circuit.	1	\$3.25	\$36.34	\$33.09
KITCHEN					
210.52(C), 210.11(C)(1), 220.14(J), & 406.11	2 Kitchen small appliance branch circuits supplying 2 Tamper Resistant GFCI Receptacles serving the kitchen countertop.	2	\$8.00	\$14.85	\$13.70
210.52(C), 210.11(C)(1), 220.14(J), & 406.11	2 Kitchen small appliance branch circuits supplying 8 Tamper Resistant receptacles located as required by 210.52(B)(1)	6	\$5.00	\$1.25	\$6.00
BATHROOM					
210.52(D), 210.11(C)(3), 220.14(J), & 406.11	1 Tamper Resistant GFCI receptacle required for bathrooms	2	\$8.00	\$14.85	\$6.85
GARAGES					
210.52(G), 220.14(J), & 406.11	1 Tamper Resistant GFCI receptacles required for attached garages & unattached garages with power.	1	\$8.00	\$14.85	\$6.85
OUTDOOR & BASEMENT RECEPTACLES					
210.52(E), 220.14(J), & 406.11	2 Tamper Resistant/Weather Resistant receptacles (front & rear of Dwelling)	2	\$5.00	\$7.03	\$13.06 ²
210.52(G), 220.14(J), & 406.11	1 Tamper Resistant GFCI required for unfinished basements	1	\$8.00	\$14.85	\$6.85
LAUNDRY					
210.52(F), 210.11(C)(2), 220.14(J), & 406.11	1 Tamper Resistant GFCI Installed for the Laundry within 6 feet of laundry sink	1	\$8.00	\$14.85	\$6.85
GENERAL PROVISION RECEPTACLE OUTLETS					
210.52(A), 220.12, 220.14(J), & 406.11	which includes family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas	50	\$5.00	\$1.25	\$37.50
				TOTAL	\$241.36

<p>Footnotes</p> <ol style="list-style-type: none"> Standard AFCI breakers as required by the 2005 NEC Alternative method protecting outdoor receptacles fed from basement GFCI receptacle 	<p>This analysis is based on 2-wire home runs for branch circuits. The following consists of alternative wiring methods and their respective prices;</p> <p>250ft NM-B-14/2/2-CU-WG.....\$114.66 250ft NM-B-14/3-CU-WG.....\$75.87 250ft NM-B-14/2-CU-WG.....\$54.13</p>
<p>\$241.36 for 2100 sq. ft. dwelling unit is a cost of \$.11 /sq. ft. Not a whole lot to pay for safety! Any extra wiring or devices above and beyond this is the choice of the builder and not mandated by the NEC. *Prices obtained from Leff Electric Supply (see attached quote), Lowes, & Home Depot</p>	



LEFFELECTRIC

Leff/Akron Electric
711 Johnston St
AKRON OH 44306

Fax: 330-379-9865



Quotation

QUOTE DATE	QUOTE NUMBER
02/26/08	S1269245
ORDER TO: Leff/Akron Electric 711 Johnston St AKRON OH 44306 330-379-9800	PAGE NO. 1

QUOTE TO:
CASH ACCT TAXABLE (AKRON)
711 JOHNSTON STREET
AKRON, OH 44306

SHIP TO:
CASH ACCT TAXABLE (AKRON)
711 JOHNSTON STREET
AKRON, OH 44306

CUSTOMER NUMBER	CUSTOMER P/O NUMBER	RELEASE NUMBER	SALESPERSON	
6056	post		House Account	
WRITER	SHIP VIA	TERMS	SHIP DATE	FREIGHT ALLOWED
Pat Hinman		Cash On Delivery	03/22/08	No
ORDER QTY	DESCRIPTION		Net Prc	Ext Prc
1ea	LEV T5320-I IVY NEMA5-15R DPLX RCPT		125.00/c	1.25
1ea	LEV T7599-I IVY 15A-125V GFCI RCPT		1485.00/c	14.85
1ea	GE THQL1115AF 15A PLUG IN AFCI CB		36.34/ea	36.34
1ea	LEV TWR15-GY 15A WTR RST DLXRCPT		703.13/c	7.03



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711 Johnston St
AKRON OH 44306

Fax: 330-379-9865



Quotation

QUOTE DATE	QUOTE NUMBER
02/26/08	S1269261
ORDER TO: Leff/Akron Electric 711 Johnston St AKRON OH 44306 330-379-9800	PAGE NO. 1

QUOTE TO:
CASH ACCT TAXABLE (AKRON)
711 JOHNSTON STREET
AKRON, OH 44306

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AKRON, OH 44306

CUSTOMER NUMBER	CUSTOMER P/O NUMBER	RELEASE NUMBER	SALESPERSON	
6056	post		House Account	
WRITER	SHIP VIA	TERMS	SHIP DATE	FREIGHT ALLOWED
Pat Hinman		Cash On Delivery	03/29/08	No
ORDER QTY	DESCRIPTION		Net Prc	Ext Prc
1ea	P&S 1595-TRWR 15A 125V RCPT		18.48/ea	18.48
1ea	P&S 3232-TRWR 15A 125V WR RCPT		2.32/ea	2.32

Panel Meeting Action: Reject

Panel Statement: The current AFCI requirements for branch circuit protection are based on incidents that occurred in dwelling units.

The submitter has not provided sufficient supporting data to justify the inclusion of AFCIs throughout an entire dormitory.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 8 Negative: 2 Abstain: 1

Explanation of Negative:

KING, D.: This Proposal should have been accepted. As the submitter pointed out in his substantiation, there is an increased risk of damage to cords creating a greater hazard of fires due to arcing in Dormitories. These facilities serve as dwelling units to those who reside in them and the occupants should be afforded the same level of protection provided by AFCI Protection as those in dwelling units.

LAROCCA, R.: Dormitories are sleeping areas that are usually inhabited by individuals who are not knowledgeable regarding the use of extension cords, outlet strips and electrical appliance loads. These confined living quarters can lead to damage to the cords which in many cases are undersized for the applied load. Recent news stories regarding tragic fires in dormitories point out the need for the same kind of arc fault mitigation that is required for dwellings. The panel should have accepted the expansion of AFCI protection to dormitories to mitigate the risk of fires resulting from damage to these cords.

Explanation of Abstention:

ORLOWSKI, S.: See my Explanation of Vote on Proposal 2-92.

2-79 Log #2521 NEC-P02 **Final Action: Accept**
(210.12)

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical School, LLC

Recommendation: Add text to read as follows:

See 11-6.3(5) 29.6.3(5) of NFPA 72-2010 National Fire Alarm and Signaling Code, for information related to secondary power supply requirements for smoke alarms installed in dwelling units.

Substantiation: Single and Multiple Station Alarms and Household and household Fire Alarm Systems was chapter 11 in the 2007 NFPA72, but has been relocated to chapter 29 for the 2010 NFPA 72. The reference in the Informational Note should be updated.

Panel Meeting Action: Accept

The panel understands that the action taken on this proposal is in addition to the action taken on Proposal 2-92.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: See my Explanation of Vote on Proposal 2-92.

2-80 Log #2563 NEC-P02 **Final Action: Accept**
(210.12)

Submitter: Jay A. Broniak, GE Appliances & Lighting

Recommendation: Revise text to read as follows:

This form proposal is for requiring arc-fault circuit-interrupt (AFCI) protection on the laundry area circuit.

Section 210.12

(A) Dwelling Units. All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

Substantiation: According to a study published by the National Fire Protection Association (NFPA), from 2003-2007 there was an estimated average of 51,800 reported home structure fires involving electrical failure or malfunctions. CMP-2 has recognized the fire prevention capabilities of AFCIs by expanding the areas requiring AFCI protection during the 2008 NEC code making cycle. Further expansion of the AFCI requirement is necessary to help prevent the risk of fire to laundry circuits.

Electrical distribution equipment is one of the leading causes of home fires. Arc-fault circuit-interrupters (AFCIs) mitigate the potential for fires by sensing unwanted arcing conditions, de-energizing the circuit, and preventing fires before they start. Requiring AFCI protection on the dishwasher circuit will help further mitigate the risks of electrical faults in this area.

¹Hall, John R. Jr., Home Electrical Fires, National Fire Protection Association, May 2010.

Panel Meeting Action: Accept

The panel understands that the action taken on this proposal is in addition to the action taken on Proposal 2-92.

Panel Statement: See the panel action and statement on Proposal 2-92.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 8 Negative: 3

Explanation of Negative:

DUREN, R.: The substantiation does not provide sufficient technical evidence to warrant the expansion of AFCI protection.

HILBERT, M.: See my Explanation of Negative Vote on Proposal 2-90.

ORLOWSKI, S.: NAHB disagrees with the panels decision to accept the expansion of AFCI protection into the laundry areas. While the proponent

throws out that there are over 51,000 electrical fires annual related electrical failure or malfunction, we are getting only half the story. If you read the rest of the report you will find that electrical fires that originated in the laundry room account for approximately 4% of the reported electrical fires. And if you read further you find that for electrical fires that originate in the branch circuit wiring of the laundry room is approximately 30 fires annually. This clearly shows that there is no justification to expand AFCI protection into the Laundry room.

2-81 Log #3362 NEC-P02 **Final Action: Reject**
(210.12)

Submitter: Richard W. Becker, Engineered Electrical Systems, Inc.

Recommendation: Delete entire paragraph.

Substantiation: There has been no data provided, or any demonstration, that AFCI devices would respond to an arcing fault in time to prevent ignition of combustible materials. "Arcing" on 120 volt circuits, using approved wiring methods, has not been documented. There is no indicator available that the "arc detection" circuit has activated a "trip" condition. The argument that there is "no proof" that the device does not work, is logically an impossible statement.

Panel Meeting Action: Reject

Panel Statement: The panel has concluded that the information provided over several code cycles indicates that AFCIs provide protection against arcing incidents in the electrical system.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

ORLOWSKI, S.: See my Explanation of Negative Vote on Proposal 2-81a.

2-81a Log #2705 NEC-P02 **Final Action: Reject**
(210.12)

Submitter: Steven Orłowski, National Association of Home Builders

Recommendation: Delete text as follows:

210.12 Arc-Fault Circuit-Interrupter Protection:

(A) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

Informational Note No. 1: For information on types of arc-fault circuit interrupters, see UL 1699-1999, *Standard for Arc-Fault Circuit Interrupters*.

Informational Note No. 2: See 11-6.3(5) of NFPA 72-2010, *National Fire Alarm and Signaling Code*, for information related to secondary power supply requirements for smoke alarms installed in dwelling units.

Informational Note No. 3: See 760.41(B) and 760.121(B) for power-supply requirements for fire alarm systems.

Exception No. 1: If RMC, IMC, EMT, Type MC, or steel armored Type AC cables meeting the requirements of 250.118 and metal outlet and junction boxes are installed for the portion of the branch circuit between the branch circuit overcurrent device and the first outlet, it shall be permitted to install an outlet branch-circuit type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Exception No. 2: Where a listed metal or nonmetallic conduit or tubing is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install an outlet branch-circuit type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Exception No. 3: Where an individual branch circuit to a fire alarm system installed in accordance with 760.41(B) or 760.121(B) is installed in RMC, IMC, EMT, or steel-sheathed cable, Type AC or Type MC, meeting the requirements of 250.118, with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted.

(B) Branch Circuit Extensions or Modifications — 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 outlet branch-circuit type AFCI located at the first receptacle outlet of the existing branch circuit.

Substantiation: According to the May 2010 Home Electrical Fires Report (John R. Hall, Jr.), annually there are an estimated 15,790 home structure fires were the result of wiring and related equipment. For the past decade NAHB has argued that the mandatory requirement for Arc-fault Circuit Interrupters has been fraught with invalidated research study and testing procedures that has yet been able to justify any effectiveness of these devices preventing fires originated by an arc fault. NAHB has continuously attempted to remove the AFCI requirement from the National Electrical Code, repeatedly showing that these devices do not pass the litmus test when you consider the annual installation cost compared to the estimated direct and societal cost associated with fires in the branch circuit wiring. The Code Panel 2 has continuously dismissed NAHB and other AFCI opponent's arguments without providing any justified technical or statistical evidence that there have been any fires that were prevented by the inclusion of these devices. The panel continues to stand

by the requirements and expanded their use in one- and two- family dwellings, arguing that even though they know these devices may only prevent 50% of fires that are the result of arcing, that they need to remain in the code for fire safety even if they cannot validate that there have been any fires averted by these devices.

The purpose of the National Electrical Code is to provide practical safeguarding of persons and property from hazards arising from the use of electricity, not to be used as a tool to promote products that have not been proven to be an effective safeguard against a perceived problem. It's extremely easy for the committee to continuously reject these proposals and snub off the technical arguments presented by NAHB and others saying "the proposal lacks sufficient data" or "the substantiation presented is unjustified". The simple fact is there are no statistics that support the effectiveness of AFCI's, because there are no organizations out there trying to prove they work.

I have provided a table taken directly from the previously mentioned Home Electrical Fire Report. Under the new NFIRS version 5.0 which has changed data classification, definitions and rules for reporting, you will see the number of fire reported as being associated with branch wiring is approximately 9,070 fires annually, where the AFCI presumably could prevent the fire. These fire resulted in approximately \$293 million dollars. In previous versions of the NFIRS and NFPA reports, these types of fires were lumped together, giving larger numbers that were used in previous cost benefit analysis and were showing negligible benefits over cost. Using the same cost benefit formula from the 2003 CPSC cost model analysis and using the numbers from the 2010 NFPA report, the estimated cost to society for these types of residential fires is \$913 million dollars, less than half of what was previously estimated by CPSC. There are typically 20 (twenty) 120-volt, single phase, 15- and 20-ampere branch circuits in each one- and two-family dwelling unit, and 10 in each multifamily dwelling unit. Using these numbers, there will be approximately 33,128,260 AFCI's in one- and two- family dwellings and 4,136,640 for multifamily units, for a total of 37,264,900 AFCI's. Using a wholesale cost of \$41.20 per breaker, marked-up the industry standard percentage of 66%, produces a cost per breaker of \$68.32 to the home owner. In all, the average annual total cost to the public for the mandatory installation of AFCI's will be \$2,548,621,040 (\$1,535,313,880 wholesale). That is 2 BILLION, 548 MILLION, 621 THOUSAND, and 40 DOLLARS. Using current fire loss data society will be spending \$2,548,621,040 per year to cover losses of only \$913,000,000. That means spending 2.8 times the amount of money that would be lost if the devices were not installed, and that is if the devices work 100% of the time. These figures are just the cost for new construction, not taking into account the million of devices that are now required to be installed in existing housing stock in accordance with Section 406.3(D)(4).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 2-81.

The panel would like to point out to the submitter that the historical records providing all of the data that has been reviewed by the panel on this issue may be found in the ROP and ROC that are available online at www.nfpa.org/70.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

ORLOWSKI, S.: Committees response to our substantiation and the arguments made against the requirement for AFCI is not supported by the committee response. The panel continues that they have made every attempt to provide a valid response or that they have provided references to documents supporting the panels decision to reject our proposal to remove all references of AFCI protection from the national code.

However, if the panel wants to continue to cite historical data as the reason that they continue to reject this proposal then they need to look at all the historical data in context. Up to 1999, every NFPA electrical fires report continued to show an increase in the number of electrical fires associated with arcing. At that same time AFCI protection was first introduced into the National Electrical Code. Common sense would suggest that as these devices began getting implemented, that we would see a reduction in the number of arcing fires and not an increase. According to the latest NFPA report, the number of fires associated with arcing in the branch circuit has steadily increased over the past five years. It seems strange that as more homes are being required to install AFCI devices that the number of fires due to arcing are increasing.

2-82 Log #3337 NEC-P02 **Final Action: Accept in Principle**
(210.12 Exception No. 1 (New))

Submitter: Douglas A. Lee, US Consumer Product Safety Commission
Recommendation: Add new exception before present Exception 1 and renumber the other exceptions as follows:

(new) *Exception No. 1:* Where the cable length does not exceed 15 m (50 feet) between the overcurrent device and the first outlet, it shall be permitted to install an outlet branch-circuit type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Substantiation: It has been suggested that installing metal conduit on the "home run" part of the circuit is too burdensome and does not provide an alternative, cost-effective method of meeting the NEC requirement. A recent study by Underwriters Laboratories Inc. (UL), see link:

[http://www.uluniversity.us/common/lmsform.aspx?Form=WhitePaperAccount](http://www.uluniversity.us/common/lmsform.aspx?Form=WhitePaperAccount&Doc=BreakerMitigationofArcFaults.pdf)

t&Doc=BreakerMitigationofArcFaults.pdf, indicates that a parallel arcing fault would trip 99 percent of circuit breakers 99 percent of the time if the fault occurred within 50 feet of the overcurrent device. Thus, the additional protection of metal conduit in the first 50 feet of a branch circuit could be optional because a conventional circuit breaker provides significant parallel arc-fault protection in this range. By accepting this proposal, consumers and installers have other cost-effective alternatives to meet NEC safety requirements.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 2-92.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: See my Explanation of Vote on Proposal 2-92.

2-82a Log #3526 NEC-P02 **Final Action: Accept in Principle**
(210.12(A))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Revise text to read as follows:

(A) **Dwelling Units.** All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling units ~~family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas~~ shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

Substantiation: AFCIs have been required in the Code since 1999. The initial requirement covered bedrooms only, giving installers an opportunity to gain experience with what was at that time a new product, and for manufacturers to address any unforeseen problems with their designs. 210.12 was modified in 2005 to require combination rather than branch-feeder type AFCIs, and the areas where they are required was expanded in 2008. By the time the 2014 edition is published, the industry will have over a decade of experience with the manufacture and installation of AFCIs and over 6 years of experience with combination type AFCIs. The time has come to complete the arc-fault protection task by requiring AFCI protection on all 15 and 20 ampere 120 volt dwelling unit circuits.

Panel Meeting Action: Accept in Principle

In the existing text of 210.12(A), insert the word "kitchens," before the words "family rooms".

The panel recognizes that the action taken on this proposal is in addition to the action taken on Proposal 2-92.

Panel Statement: The panel has agreed to expanding the use of AFCIs into kitchens and notes that this language mirrors the language in 210.52(A). The panel has chosen this incremental step rather than expanding the requirement to all 15 and 20 amp branch circuits.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 9 Negative: 2

Explanation of Negative:

COLUCCIO, F.: The proposal for full expansion should have been accepted in its entirety.

ORLOWSKI, S.: Other than trying to correlate the areas specified in section 210.12 with the areas referenced in section 210.52(A), no justification was provided to expand AFCI protection into the Kitchen. The proponent has failed to provide and the panel was not given any statistics to justify this change in the code. What testing has been conducted to ensure that we will not run into the same problems with incompatibility between the AFCI and the various products that are used in the kitchen, that we saw when homeowners found that vacuums would trip the AFCI. What effect will microwaves have on the wiring, since we are now learning that high frequencies from radio stations can cause AFCI to trip? Until AFCI manufacturers can show us that blenders, mixers, and other kitchen counter appliances will not cause nuisance tripping, NAHB encourages the panel to reject this proposal and any other proposal that would expand AFCI protection into kitchens.

Comment on Affirmative:

KING, D.: I agree with the submitter that there has been sufficient experience over the past decade to support his recommendation for expansion of AFCI devices to all 120V 15 and 20 ampere branch circuits in dwelling units. The expansion of AFCI devices to Dining rooms has already provided the Panel with experience on the performance and reliability of these devices in Kitchens. Panel 2 should give this Proposal further consideration.

PAULEY, J.: NEMA agrees with the Panel Action to expand AFCIs to kitchens but notes that expansion to all 15A and 20A circuits would increase electrical safety.

2-83 Log #594 NEC-P02
(210.12(A))

Final Action: Reject

Submitter: Robert G. Fahey, City of Janesville

Recommendation: Revise text to read as follows:

210.12 Arc-Fault Circuit-Interrupter Protection. (A) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in within dwelling units, with the exception of kitchens, bathrooms, unfinished basements and garages, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

Substantiation: These changes are submitted in order to eliminate the many interpretations and opinions which are trying to decide when and where AFCI protection is required within dwelling units by 210.12. There are rooms which are in question, such as laundry rooms, mud rooms, entry way rooms, foyers, pantries and similar types of rooms which are not directly mentioned in the present text. The new proposed text should clear up any confusion and eliminate the many different interpretations which are causing confusion in the field as to the proper application of these requirements.

Panel Meeting Action: Reject

Panel Statement: The proposed text attempts to specify where AFCI protection is required by exception. This will likely lead to confusion and misapplication of the requirements.

The current text explicitly states where AFCI protection is required and parallels the language in 210.52(A) which is already being interpreted by the authorities.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: See my Explanation of Vote on Proposal 2-92.

2-84 Log #684 NEC-P02
(210.12(A))

Final Action: Reject

Submitter: Robert A. Jones, IEC Texas Gulf Coast

Recommendation: Revise text to read as follows:

All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

Substantiation: There are situations where a light switch is installed in a bedroom to control an exterior light. The branch circuit supplying the exterior lighting outlet is not supplying an outlet in the bedroom, therefore, the conductors installed from the switch to the exterior light would not require AFCI protection. There are other situations where branch circuits supplying areas not required to have AFCI protection are passing through rooms or areas required to have AFCI protection, but do not supply outlets in these rooms or areas.

Panel Meeting Action: Reject

Panel Statement: The submitter's substantiation does not support his proposed text. A switch is not considered to be an outlet, by definition, in the NEC.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: See my Explanation of Vote on Proposal 2-92.

2-85 Log #685 NEC-P02
(210.12(A))

Final Action: Accept

Submitter: Robert A. Jones, IEC Texas Gulf Coast

Recommendation: Revise text to read as follows:

All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

Substantiation: There are situations where a light switch is installed in a bedroom to control an exterior light. The branch circuit supplying the exterior lighting outlet is not supplying an outlet in the bedroom, therefore, the conductors installed from the switch to the exterior light would not require AFCI protection.

Panel Meeting Action: Accept

The panel understands that this action to add the words "or devices" is in addition to the action taken on Proposal 2-92.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 9 Negative: 2

Explanation of Negative:

DUREN, R.: The substantiation does not provide sufficient technical evidence to warrant the expansion of AFCI protection.

ORLOWSKI, S.: The proponent of the change has failed to provide any substantiation where there has been a problem with arc related fires in the branch circuit supplying devices.

2-86 Log #912 NEC-P02
(210.12(A))

Final Action: Accept in Principle

Submitter: Michael J. Johnston, National Electrical Contractors Association

Recommendation: Add a new last sentence to read as follows:

The arc-fault circuit-interrupter(s) shall be installed in a readily accessible location.

Substantiation: This proposal seeks to align the readily accessible requirement for GFCI devices covered in 210.8(A) and (B) with the rules for arc-fault circuit-interrupter protective devices required by 210.12. Favorable action by CMP-2 on Proposal 2-77 and Comment 2-29 in the 2010 ROP and ROC resulted in a new readily accessible requirement for GFCIs. Justification for the new rule is primarily related to occupant or user accessibility to the monthly testing and reset features of the device. Arc-fault circuit-interrupter protection can also be accomplished by circuit breaker types or device types which have the same test and reset features and requirements for monthly testing. Accessibility to these protective devices should not be different than for GFCI devices.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 2-116 that satisfies the submitter's intent.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: See my Explanation of Vote on Proposal 2-92.

2-87 Log #2098 NEC-P02
(210.12(A))

Final Action: Reject

Submitter: Joseph C. Engel, Monroeville, PA

Recommendation: Revise text to read as follows:

210.12 Arc-Fault Circuit-Interrupter Protection.

(A) Dwelling Units: All 125-volt, single-phase, 15- and 20- ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter combination-type, which includes earth leakage protection (30mA trip sensitivity), installed to provide protection of the branch circuit.

Substantiation: The Problem:

It has been recognized by UL that combining AF and GF protection can be effective in mitigating the fire hazard resulting from a "glowing contact". In fact today it is the only UL proposed solution to this recognized home fire hazard. See photos below of a burning modern receptacle with a glowing contact. The plastic once ignited, will not extinguish in the presence of a glowing contact. These types of fires are "behind the wall" and thus are especially dangerous. By the time a room smoke detector can respond, a major fire may have been started.

Substantiation:

Please refer to web site <http://www.CombinationAFCI.com>.

A paper titled "COMBINATION AFCIs: WHAT THEY WILL AND WILL NOT DO" is available on web site.

From the Summary of 1995 UL/CPSC study:

"...Arc-fault detection appears to be a very promising technology especially when added to residential branch-circuit breakers and combined with other proven technologies, such as ground-fault protection..."

From the 2001 UL report on glowing contacts(see www.mikeholt.com/htmlnews/afci/ULreportonterminals.pdf):

"...By virtue of this worse case configuration, it was demonstrated that a Branch/feeder AFCI incorporating ground fault protection (30mA trip) is capable of terminating a glowing connection ..."*

From a JUNE 23rd 2005 live glowing contact demonstration at UL Chicago headquarters in front of UL, NEMA wiring device and circuit protection manufacturers, and others.

At this UL 1699 STP meeting UL gave me an opportunity to realistically demonstrate the need for a ground fault test; I conducted a simple glowing contact test for all to see. Test was conducted on a UL lab bench. I plugged a 60W lamp (0.5A) load into a new duplex receptacle, turned the lamp on, and then jiggled a loose receptacle wire connection until a glowing contact formed. This took about a minute. Once established the contact was stable, the lamp burned steady with no indication of a problem, while the receptacle plastic near the connection melted and dripped. The plastic wire insulation on the glowing conductor also melted. For about thirty minutes the STP members stood around the bench, observed the glowing contact, and discussed the problem. The value of combining AF and GF protection was obvious to all, no one questioned that.

The following day, after the glowing contact demonstration, a vote was taken to add a 30mA ground fault test to UL1699, the AFCI Standard. The proposal failed to reach the required 2/3 "FOR" votes for passage by a single vote, UL voted against adding he requirement.

UL's vote to block inclusion of a GF test in UL1699 was surprising and



Fact Sheet

Arc-Fault Circuit Interrupters

What are Arc-Fault Circuit Interrupters (AFCIs)?

The 2008 *National Electrical Code® (NEC®)* requirement for AFCI protection considerably expands this fire prevention technology to the majority of circuits installed in new and renovated homes. The type of AFCI currently available commercially is a next-generation circuit breaker that not only provides the conventional safety functions, but its advanced design also rapidly detects potentially dangerous arcs and disconnects power in the circuit before a fire can start. Fire safety officials throughout the U.S. endorse AFCIs as a significant step forward in electrical fire safety.

Why should they be installed in homes?

AFCIs will save lives and make homes safer. According to the U.S. Fire Administration, each year home electrical problems cause about 70,000 fires, resulting in 485 deaths and \$868 million in property loss.

Why mandate AFCIs for newer homes when statistics show the majority of problems have occurred in older homes?

Fire safety officials recommend the use of AFCIs in all dwellings. While it is true that fire statistics in many cases are derived from older dwellings, damage to appliance cords or to wires hidden in a wall can occur regardless of the home's age. In addition, incorrectly performed electrical installations can occur in both new and old homes. As technology evolves and the *NEC* is revised, the enhanced level of safety is typically required only in new construction that is subject to the latest adopted edition. Homes wired per the 2008 *NEC* will have the majority of their circuits protect by AFCIs for the life of the electrical system.

How do you know AFCIs will prevent fires and save lives?

Since 1999, AFCIs have been thoroughly field-tested. Underwriters Laboratories, the National Association of State Fire Marshals (NASFM), the U.S. Consumer Product Safety Commission, and many other experts have found AFCIs to be reliable and effective. By eliminating a significant source of electrically related fires, future statistics will demonstrate a reduction in fires of electrical origin.

Are AFCIs expensive?

The cost of the enhanced protection is directly related to the size of the dwelling and the number of circuits installed. Current retail prices of AFCI-type circuit breakers at several national building supply chains are in the range of \$35 to \$40 per unit. Even for larger homes with more circuits, the cost increase is insignificant compared to the total cost of the home, particularly when the increased level of safety is factored.

Do AFCIs interfere with smoke alarms and appliances, and trip unnecessarily?

AFCIs do not interfere with power supply reliability. These state-of-the-art devices identify problems that current circuit breakers are not designed to protect against, which can result in what appears to be an unexplained circuit breaker trip. By actually identifying these problems, residents are safer.

What is the *NEC*?

The *NEC* is the *National Electrical Code*. The *NEC's* mission is to provide practical safeguards from the hazards that arise from using electricity. It is the most widely adopted safety code in the United States and the world, and it is the benchmark for safe electrical installations. The *NEC* is an evolving document, developed through an open consensus process. A new edition is issued every three years.

For more information, visit www.nfpa.org.

Nancy Mistele, Division Administrator
Attn: SPS 316 Committee
P.O. Box 2599
Madison, WI 53701

Dear Ms. Mistele:

We recently learned of authorization to proceed with amending the public safety rules contained in Wisconsin Chapter SPS 316. The rule changes being contemplated will remove requirements for safety devices that provide protection against electric shock accidents and electrical fires. Requirements for ground-fault circuit interrupters (GFCI), arc-fault circuit interrupters (AFCI) and tamper-resistant receptacles have been codified within the *National Electrical Code*® (NEC®) because they mitigate hazards arising from the use of electricity. The NEC is the minimum safety standard that is used in all 50 states and in several other countries. The rationale supporting the inclusion of the requirements for implementation of these safety devices is compelling and their inclusion minimizes tragedies, including devastating fatalities, severe injuries and extensive property loss. Wisconsin has long been recognized as a leader in electrical safety through the state's adoption and enforcement of the NEC. To proceed with the proposed rules changes is a dangerous disservice to the citizens of your state who have an expectation that they can safely interface with the electrical systems within homes, businesses, institutions and recreational facilities.

The NEC is developed and produced by the National Fire Protection Association (NFPA), an independent, not-for-profit standards developing organization and advocate of fire, building, and electrical safety. Since 1911, NFPA has been the sponsor of the NEC and the requirements of this standard have continued to evolve with America's heavy reliance on reliable and safe electrical energy. The NEC is developed through an open, transparent, and balanced process accredited by the American National Standards Institute. Companies from Wisconsin, such as Appleton Electric and Allan Bradley, participate in the NFPA Codes and Standards development process because they support industry safety standards that provide for the safe use of electricity in Wisconsin and throughout the US.

These proposed rules would be a step backward and stands in the way of public safety. Please review the following information and attached reports that provide factual data, statistics, and information that will demonstrate why removing these important safety devices will compromise the safety and welfare of Wisconsin's citizens.

Background and review of GFCI Requirements.

Since the introduction of the GFCI in the 1971 NEC, published data¹ from the U.S. Consumer Product Safety Commission (CPSC) show a decreasing trend in the number of electrocutions in the United States.

Below is a news link to a story of an electrocution of a six year old Wisconsin girl found dead in a bathtub with a hair dryer. This further puts into perspective the importance of these devices and why the proposed rule change is not in the best interest of public safety. Additionally, please see attached

document: An Evaluation of the U.S. Consumer Product Safety Commission's Electrocutation Reduction Program², which provides valuable insight regarding GFCIs and their evolution.

http://www.kare11.com/news/news_article.aspx?storyid=270712

Background and review of AFCI Requirements.

In 2009, an estimated 44,800 home structure fires reported to U.S. fire departments involved some type of electrical failure or malfunction as a factor contributing to ignition. These fires resulted in 472 civilian deaths, 1,500 civilian injuries, and \$1.6 billion in direct property damage. In 2005-2009, home electrical fires represented 13% of total home structure fires, 17% of associated civilian deaths, 11% of associated civilian injuries, and 21% of associated direct property damage.³

The original call for enhanced branch circuit and cord protection came from the CPSC based on fires attributed to electrical origin. The manufacturers, in concert with Underwriters Laboratories, worked to develop a product and a product standard to address the CPSC concern. The AFCI was the product developed as the means to mitigate the types of circuit malfunctions that circuit breakers and fuses are not designed to protect against. Modern technology has provided us with the opportunity to incorporate this next generation of circuit protection devices into homes. These devices advance the cause of electrical safety by providing early reaction and circuit interruption where wiring systems concealed within walls and ceilings are damaged. Requirements for AFCIs have been included in the NEC since the 1999 edition. These devices also respond to damaged appliance cords, a known cause of home fires. AFCIs will save lives and make homes safer. Removing these requirements will lessen the level of protection provided for the public if the proposed rules move forward.

Background and review of Tamper Resistant Receptacles.

According to a 10-year study⁴ conducted by the CPSC, (1991 – 2001) of National Electronic Injury Surveillance Systems (NEISS) data 24,000+ children under 10 years old were treated in emergency rooms for incidents related to electrical receptacles. On average, this translates to about seven children per day. These statistics clearly represent a need to protect our children from the inherent hazards associated with electrical receptacle outlets.

Summary

Opposition to these important and needed safety devices in the NEC have been based primarily on cost. A cost impact study⁵ was prepared by three board members of the Ohio Chapter of the International Association of Electrical Inspectors in 2008, that summarizes the cost impact is minimal compared to the enhanced protection provided:

- \$160.18 for 900 sq. ft. dwelling unit or \$.18/sq. ft.
- \$205.27 for 1700 sq. ft. dwelling unit or \$.12/sq. ft.
- \$241.36 for 2100 sq. ft. dwelling unit or \$.11 /sq. ft

This study includes the cost impact of the expanded AFCI provisions, tamper-resistant receptacle requirements and revisions to existing GFCI requirements. The CPSC conducted an economic analysis

costs and benefits of a proposal for additional GFCIs in new residential installations.⁶ As reflected in this study, the expected benefits would be a reduction of societal costs associated with residential electrocutions, which translates to the benefit of this life-saving technology being greater than the cost.

The SPS 316 Committee has an opportunity to stand-up for the safety of all Wisconsin residents by not allowing these rule changes to proceed. NFPA, as an advocate for safe electrical installations performed in accordance with the latest edition of the NEC, urges you to maintain the exemplary record that the state of Wisconsin has achieved as being a leader in electrical safety. It is a decision that we can all live with.

Sincerely,

Tim McClintock
Regional Electrical Code Specialist
National Fire Protection Association
Office: 330-567-2030
Cell: 330-749-9782
tmclintock@nfpa.org

REFERENCES

¹Consumer Product Safety Commission-*2000 Electrocutions Associated With Consumer Products*

² Consumer Product Safety Commission- *U.S. Consumer Product Safety Commission's Electrocution Reduction Program*

³John Hall, Jr – *Home Electrical Fires*

⁴Consumer Product Safety Commission Study

⁵Ohio Chapter IAEI – *2008 NEC® vs 2005 NEC® Cost Impact*

⁶Consumer Product Safety Commission – *Economic Considerations – GFCIs*

ADDITIONAL REFERENCES

NFPA – AFCI Fact Sheet

NFPA – TRR Fact Sheet

SECTION 1. SPS 305.01 (4) (j) is created to read:

SPS 305.01 (4) (j) Inspection agency.

SECTION 2. SPS 305.02 Table 305.02 line 37m. is created to read:

**Table 305.02
(Partial Table)
FEES**

	License, Certification or Registration Category	Type	Application Fee	Examination Fee	License, Certification or Registration Fee
37m.	Inspection Agency	Registration	\$15	NA	\$40

SECTION 3. SPS 305.06 Table 305.06 line 32m. is created to read:

**Table 305.06
(Partial Table)
TERMS**

	License, Certification or Registration Category	Term	Expiration Date	Continuing Education Cycle
32m.	Inspection Agency	4 years	Date of Issuance	NA

SECTION 4. SPS 305.62 (6) is repealed and recreated to read:

SPS 305.62 (6) RESPONSIBILITIES. A person who inspects electrical construction work as a certified commercial electrical inspector shall do all of the following:

- (a) Maintain a record of the inspections made including the dates and the findings of the inspections.
- (b) Document any compliance deficiencies in the inspection report, and include the specific code reference or citation relative to the deficiency.
- (c) Provide a copy of the inspection report to the property owner or his or her agent.
- (d) Make available to the department upon request his or her inspection records.
- (e) Contact and indicate to the electrical utility, cooperative or other entity furnishing electric current when an electrical service installation complies with ch. SPS 316 within 2 business days of the determination of compliance.

SECTION 5. SPS 305.627 is created to read:

SPS 305.627 Inspection agency. (1) GENERAL. No person or municipality may engage in or offer to engage in providing plan review, permit issuance or inspections regarding electrical wiring under the scope of ch. SPS 316 unless the person or municipality holds a registration from the department as a registered inspection agency.

(2) APPLICATION FOR REGISTRATION. A person applying for an inspection agency registration shall submit all of the following:

(a) An application in accordance with s. SPS 305.01.

(b) An application fee and a registration fee in accordance with s. SPS 305.02, Table 305.02.

(3) QUALIFICATIONS FOR REGISTRATION. The person applying for an inspection agency registration shall be one of the following:

(a) If a municipality, the department head of the agency administering the electrical program.

(b) If not a municipality, the owner of the business, a partner in the business applying on behalf of a partnership, or the chairman of the board or chief executive officer applying on behalf of the corporation.

(4) RESPONSIBILITIES. A person or municipality who is responsible for facilitating plan review, permit issuance or inspection regarding electrical wiring under ch. SPS 316 as a registered inspection agency shall be responsible for all of the following:

(a) Utilizing persons appropriately certified under s. SPS 305.62 to conduct the inspections.

(b) Maintaining a record of the electrical permits issued under s. SPS 316.012.

(c) Making the records relative to permit issuance and inspections available to the department upon request.

(d) Providing inspection services for all inspections required under s. SPS 316.013.

(e) Cooperating with the department in any program monitoring, enforcement activities, and investigations related to electrical wiring under the scope of ch. SPS 316.

(f) Following all procedures established by the department for enforcement.

(5) RENEWAL. (a) A person may renew his or her registration as an inspection agency.

(b) An inspection agency registration shall be renewed in accordance with s. SPS 305.07.

SECTION 6. SPS 305.63 (5) is repealed and recreated to read:

SPS 305.63 (5) RESPONSIBILITIES. (a) A person who inspects one- and 2-family dwellings as a certified UDC-construction inspector, certified UDC-electrical inspector, certified UDC-HVAC inspector, certified UDC-plumbing inspector, or certified soil erosion inspector shall do all of the following:

1. Maintain a record of the inspections made including the dates and the findings of the inspections.

2. Document any compliance deficiencies in the inspection report, and include the specific code reference or citation relative to the deficiency.

3. Provide a copy of the inspection report to the property owner or his or her agent.

4. Make available to the department upon request his or her inspection records.

(b) A person who inspects one- and 2- family dwellings as a certified UDC-electrical inspector shall contact and indicate to the electrical utility, cooperative or other entity furnishing electric current when an electrical service installation complies with ch. SPS 316 within 2 business days of the determination of compliance.

SECTION 7. Chapter SPS 316 Subchapter I (title) is repealed and recreated to read:

Subchapter I – Purpose, Scope and Application

(Note to Code Editor: Subchapter I includes ss. SPS 316.001 through 316.007.)

SECTION 8. SPS 316.002 is repealed and recreated to read:

SPS 316.002 Scope. (1) GENERAL. Except as provided in sub. (2), this chapter applies to electrical wiring installations.

(2) EXCLUSIONS. This chapter does not cover any of the following electrical wiring installations:

(a) Installations in ships, watercraft, railway rolling stock, aircraft, or automotive vehicles.

(b) Installations for generation, transformation or distribution of power used exclusively by railways for signaling and communication purposes.

(c) Installations of communication equipment under exclusive control of communication utilities, located outdoors or in building spaces used exclusively for such installations.

(d) Installations in manufactured homes, other than electrical wiring alterations in existing manufactured homes.

(e) Installations under the exclusive control of an electric utility, an electric cooperative or a wholesale merchant operator where such installations meet any of the following situations:

1. Consist of service drops or service laterals, and associated metering.
2. Are located in legally established easements or right-of-ways designated by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations.
3. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy.

SECTION 9. SPS 316.003 is repealed and recreated to read:

SPS 316.003 Application. (1) STANDARDS. The standard that is referenced in this chapter, and any additional codes and standards which are subsequently referenced in that standard, shall apply to the prescribed extent of each such reference, except as modified by this chapter.

(2) RETROACTIVITY. A rule of this chapter does not apply retroactively to an electrical wiring installation existing prior to the effective date of the rule unless specifically stated in the rule.

(3) DIFFERING RULES. (a) Where any department-written rule in this chapter differs from a requirement within a standard referenced in this chapter, the department-written rule shall govern.

(b) Where a provision of this chapter prescribes a general requirement and another provision of this chapter prescribes a specific or more detailed requirement regarding the same subject, the specific or more detailed requirement shall govern, except as provided in par. (a).

(c) Where different sections of this chapter specify conflicting requirements, the most restrictive requirement, as determined by the department, shall govern, except as provided in pars. (a) and (b).

(4) LOCAL ORDINANCES. (a) Except as provided in par. (b), pursuant to s. 101.02 (7), Stats., a city, village, town or local board of health may enact and enforce additional or more restrictive standards for electrical wiring installations, provided the standards do not conflict with this chapter.

Note: Pursuant to s. 66.0628 (2), Stats., “an fee that is imposed by a political subdivision shall be a reasonable relationship to the service for which the fee is imposed”.

(b) 1. Pursuant to ss. 66.1019 (1) and 101.02 (7m), Stats., a city, village, town or county may not enact and enforce additional or more restrictive standards for electrical wiring installations in one- and 2- family dwellings and multifamily dwellings, except as provided under subd. 2.

2. Any municipality exercising or intending to exercise jurisdiction under this chapter may apply to the department for a variance permitting the municipality to adopt an ordinance pertaining to one- and 2- family dwellings or multifamily dwellings not in conformance with this chapter. The

department shall review and make a determination on a municipal request under this section within 60 business days of receipt of the request.

3. a. The department may grant a municipal variance only where all of the conditions in subds. 3. b. and c. are demonstrated.

b. The municipality demonstrates that the variance is necessary to protect the health, safety, and welfare of individuals within the municipality because of specific climate or soil conditions generally existing within the municipality.

c. The municipality demonstrates that the granting of the variance, when viewed both individually and in conjunction with other variances requested by the municipality, does not impair the statewide uniformity of this chapter.

d. Prior to making a determination on a municipal variance, the department shall solicit within the municipality and consider the statements of any interested persons as to whether the variance should be granted.

e. This subdivision shall be strictly construed in accordance with the goal of promoting statewide uniformity.

4. Pursuant s. 101.121, Stats., a city, village, town or county may not enact or enforce additional or more restrictive standards regarding issues addressed under this chapter that would apply to alteration or change of occupancy for a historic building.

(5) TYPES OF INSTALLATIONS. The provisions of this chapter apply to all new electrical wiring installations, electrical alterations and electrical additions.

(6) EXISTING INSTALLATIONS. (a) Unless otherwise specifically stated in this chapter, existing electrical wiring installations shall be maintained to conform to the electrical code that applied when the installations were installed.

(b) The existing electrical wiring for a building or portion of building which undergoes a change of use shall be evaluated by the building owner, tenant or their agent to determine whether the electric wiring conforms to the current provisions of this chapter for the use.

(7) REPAIRS. Repairs to electrical wiring installations shall conform to the electrical code that applied when the installations were installed.

(8) TESTING. Rooms which are used exclusively for routine or special electrical test work shall comply with this chapter where practicable for the character of the testing done.

SECTION 10. SPS 316.004 (2) is repealed and recreated to read:

SPS 316.004 (2) INTERPRETATIONS. Any departmental interpretation of the requirements in this chapter or in the codes and standards that are adopted in this chapter shall supersede any differing interpretation by either a lower level jurisdiction or an issuer of the adopted code or standard.

SECTION 11. SPS 316.004 (2) Notes are repealed.

SECTION 12. SPS 316.007 is repealed.

SECTION 13. SPS 316.014 is renumbered SPS 316.007.

SECTION 14. SPS 316.006 is renumbered SPS 316.014.

SECTION 15. SPS 316.006 is created to read:

SPS 316.006 Definitions. In this ~~subchapter~~ chapter:

(1) “Department” means the department of safety and professional services.

(2) “Electrical wiring” has the meaning given in s. 101.80 (1m), Stats.

Note: Under s. 101.80 (1m), Stats., “electrical wiring” means all equipment, wiring, material, fittings, devices, appliances, fixtures, and apparatus used for the production, modification, regulation, control, distribution, utilization, or safeguarding of electrical energy for mechanical, chemical, cosmetic, heating, lighting, or similar purposes, as specified under the state electrical wiring code. “Electrical wiring” does not include the equipment, wiring, material, fittings, devices, appliances, fixtures, and apparatus used by a public utility, an electric cooperative, or a wholesale merchant operator for the purpose of generating, transmitting, distributing, or controlling heat, light, power, or natural gas to its customers or members.

(3) “Farm” means a place where farming is conducted.

(4) “Farming” has the meaning given in s. 102.04 (3), Stats.

Note: Under s. 102.04 (3), Stats., “farming” means the operation of farm premises owned or rented by the operator. “Farm premises” means areas used for operations herein set forth, but does not include other areas, greenhouses or other similar structures unless used principally for the production of food and farm plants.

Note: Section 102.04 (3), Stats., states that the operation of farm premises shall be deemed to be the planting and cultivating of the soil thereof; the raising and harvesting of agricultural, horticultural or arboricultural crops thereon; the raising, breeding, tending, training and management of livestock, bees, poultry, fur-bearing animals, wildlife or aquatic life, or their products, thereon; the processing, drying, packing, packaging, freezing, grading, storing, delivering to storage, to market or to a carrier for transportation to market, distributing directly to consumers or marketing any of the above-named commodities, substantially all of which have been planted or produced thereon; the clearing of such premises and the salvaging of timber and management and use of wood lots thereon, but not including logging, lumbering or wood cutting operations unless conducted as an accessory to other farming operations; the managing, conserving, improving and maintaining of such premises or the tools, equipment and improvements thereon and the exchange of labor, services or the exchange of use of equipment with other farmers in pursuing such activities.

(5) “Multifamily dwelling” has the meaning given in s. 101.971 (2), Stats.

Note: Under s. 101.971 (2), Stats., “multifamily dwelling” means an apartment building, rowhouse, town house, condominium or manufactured building, as defined in s. 101.71 (6), that does not exceed 60 feet in height or 6 stories and that consists of 3 or more attached dwelling units the initial construction of which is begun on or after January 1, 1993. ‘Multifamily dwelling’ does not include a facility licensed under ch. 50.”

(6) “Municipality” means a city, village, town or county in this state.

(7) “One- and 2- family dwelling” means any building that contains one or 2 dwelling units that construction of which commenced on or after December 1, 1978.

(8) “Place of employment” has the meaning given in s. 101.01 (11), Stats.

Note: Under s. 101.01 (11), Stats., “place of employment” includes every place, whether indoors or out or underground and the premises appurtenant thereto where either temporarily or permanently any industry, trade or business is carried on, or where any process or operation, directly or indirectly related to any industry, trade or business, is carried on, and where any person is, directly or indirectly, employed by another for direct or indirect gain or profit, but does not include any place where persons are employed in private domestic service which does not involve the use of mechanical power or in farming. “Farming” includes those activities specified in s. 102.04 (3), and also includes the transportation of farm products, supplies or equipment directly to the farm by the operator of said farm or employees for use thereon, if such activities are directly or indirectly for the purpose of producing commodities for market, or as an accessory to such production. When used with relation to building codes, “place of employment” does not include an adult family home, as defined in s. 50.01 (1), or, except for the purposes of s. 101.11, a previously constructed building used as a community-based residential facility, as defined in s. 50.01 (1g), which serves 20 or fewer residents who are not related to the operator or administrator.

(9) “Public building” has the meaning given in s. 101.01 (12), Stats.

Note: Under s 101.01 (12), Stats., “public building” means any structure, including exterior parts of such building, such as a porch, exterior platform or steps providing means of ingress or egress, used in whole or in part as a place of resort, assemblage, lodging, trade, traffic, occupancy or use by the public or by 3 or more tenants. When used in relation to building codes, “public building” does not include a previously constructed building used as a community-based residential facility as defined in s. 50.01 (1g) which serves 20 or fewer residents who are not related to the operator or administrator or an adult family home, as defined in s. 50.01 (1).

SECTION 16. SPS 316.008 is renumbered SPS 316.015.

SECTION 17. Chapter SPS 316 Subchapter II (title) is repealed and recreated to read:

Subchapter II – Administration and Enforcement

(Note to Code Editor: Subchapter II includes ss. SPS 316.011 through 316.015.)

SECTION 18. SPS 316.009 is renumbered SPS 316.020.

SECTION 19. SPS 316.010 is renumbered SPS 316.021 and amended to read:

SPS 316.021 ~~Inspection and maintenance~~ Maintenance. All electrical wiring installations and equipment shall be cleaned and inspected at intervals as experience has shown to be necessary.

Any equipment or electrical wiring installation known to be defective so as to endanger life or property shall be promptly repaired, permanently disconnected, or isolated until repairs can be made. ~~Construction, repairs, additions and changes to electrical equipment and conductors shall be made by qualified persons only.~~

SECTION 20. SPS 316.011 is repealed.

SECTION 21. SPS 316.012 and 16.013 are renumbered SPS 316.022 and 316.023.

SECTION 22. SPS 316.015 is renumbered SPS 316.080.

SECTION 23. SPS 316.011 to 316.013 is created to read:

SPS 316.011 Administration (1) MUNICIPAL ADMINISTRATION. (a) *Jurisdiction conditions.* Pursuant to s. 101.86 (1), Stats., municipalities may exercise jurisdiction over the inspection of electrical wiring installations at farms, public buildings, places of employment, campgrounds, manufactured home communities, public marinas, piers, docks, or wharves and recreational vehicle parks provided the municipality complies with all of the following:

1. The municipality holds a registration issued by the department as an inspection agency for the purpose of issuing permits and inspecting electrical wiring at farms, public buildings, places of employment, campgrounds, manufactured home communities, public marinas, piers, docks, or wharves and recreational vehicle parks.
2. The municipality notifies the department at least 60 days prior to the date upon which the municipality intends to assume the jurisdiction.
3. The municipality provides the department with a copy of its electrical ordinances and subsequent revisions to the ordinances.
4. The municipality's ordinances adopt this chapter in its entirety, except as provided under s. SPS 316.003 (4) (b) 2.
5. The municipality employs or contracts with certified commercial electrical inspectors or independent inspection agencies to perform electrical inspection activities.
6. The municipality provides the department with the names of its certified commercial electrical inspectors and independent inspection agencies employed or contracted by the municipality, if applicable.

Note: Section 13.48 (13), Stats., exempts state buildings from local ordinances or regulations relating to building construction, permits and similar restrictions.

Note: These provisions do not limit municipal authority to implement regulatory oversight for other electrical wiring installations at other locations not addressed under this section. The permitting and inspection of electrical wiring installations for the construction of new one- and 2- family dwellings are addressed under ch. SPS 320.

(b) *County.* Ordinances enacted by a county under this subsection establishing electrical inspection functions may not prevent or prohibit a municipality within that county from assuming those functions at any time.

Note: Pursuant to s. 101.86 (1) (a), Stats., a county ordinance shall apply in any city, village or town which has not enacted such an ordinance.

(c) *Relinquishing of jurisdiction.* A municipality shall notify the department, in writing, at least 60 days prior to the date upon which the municipality intends to relinquish jurisdiction responsibilities.

(2) DEPARTMENT ADMINISTRATION. (a) In municipalities not exercising jurisdiction under sub. (1), the department shall provide permit and inspection services for the installation of electrical wiring on farms and in public buildings, places of employment, campgrounds, manufactured home communities, public marinas, piers, docks, or wharves and recreational vehicle parks.

(b) Pursuant to ss. 101.02 (5) and (15) and 101.82 (2m), Stats., municipalities engaging in providing plan review, permit issuance or inspections regarding electrical wiring under the scope of ch. SPS 316 as a designated inspection agency may be monitored or audited by the department for compliance with administrative requirements of this chapter and s. SPS 305.627.

SPS 316.012 Permits. (1) (a) Except as provided in par. (b), no electrical wiring project may commence unless the owner of the premises where the installation is to occur or their agent holds a permit from the designated inspection agency if the project involves the installation of a new or additional electrical service, feeder or branch circuit serving any of the following:

1. A farm.
2. A public building.
3. A place of employment.
4. A campground.
5. A manufactured home community.
6. A public marina, pier, dock, or wharf.
7. A recreational vehicle park.

(b) Under emergency conditions, the necessary electrical wiring may commence without obtaining a permit, provided the owner of the premises where the installation is to occur or their agent submits a permit application to the inspection agency designated by the department to provide

electrical inspections for the installation no later than the next business day after commencement of the installation.

Note: These rules do not limit municipality authority to require permits for other electrical wiring projects beyond the scope of this section.

(2) The application for a permit required under sub. (1) shall contain at least all of the following information:

- (a) The name of the applicant.
- (b) The name of the building or property owner.
- (c) The location of the electrical wiring installation.
- (d) The scope and extent of the electrical wiring installation.
- (e) 1. The name of the person responsible for the installation.

2. The name and license number of the master electrician or residential master electrician responsible for the installation on or after April 1, 2013, unless exempted under s. 101.862 (4), Stats.

(3) (a) The issuing inspection agency shall indicate on the electrical permit the date of issuance.

(b) A permit required under sub. (1) shall expire 12 months after the date of issuance, if installation of the electrical wiring has not commenced.

SPS 316.013 Inspections. (1) Electrical wiring installations shall be subject to inspection.

Note: See s. SPS 320.10 regarding the inspections for the construction of new one- and 2- family dwellings.

(2) Inspections of electrical wiring installations described under s. SPS 316.012 (1) (a) shall be conducted by a certified commercial electrical inspector.

Note: See SPS 305.62 for certification provisions for commercial electrical inspectors.

(3) (a) The building owner or their agent shall notify the inspection agency designated by the department to provide electrical inspections when the electrical wiring installation is ready for inspection.

(b) Except as provided in par. (c), to facilitate inspection all of the following shall apply:

- 1. Electrical wiring shall remain accessible and exposed for inspection purposes.
- 2. Electrical wiring may not be energized.

(c) 1. The concealment or energizing of electrical wiring, other than an electrical service, may proceed if inspection has not been completed within 2 business days after notification is received or as otherwise agreed between the wiring installer and the designated inspection agency providing the inspection.

2. The notification that an electrical wiring installation is ready for final inspection shall be made to indicate when all electrical fixtures, outlets and face plates are in place and the installation or that portion of the installation is energized.

(d) 1. If upon inspection, it is found that the installation is in compliance with this chapter, the certified inspector shall approve the installation prior to concealing or energizing the electrical wiring.

2. If upon inspection, it is found that the installation is incomplete or not in compliance with this chapter, orders to correct shall be issued. An order may include the condition that the electrical wiring is to remain unconcealed and non-energized until re-inspected.

SECTION 24. Chapter SPS 316 Subchapter III (title) is repealed and recreated to read:

Subchapter III – General Requirements

(Note to Code Editor: Subchapter III includes ss. SPS 316.020 through 316.023.)

SECTION 25. SPS 316.020 (3) is created to read:

SPS 316.020 (3) LIGHTING. Installations for the purpose of street or area lighting owned and under exclusive control of electrical utilities or municipalities where located outdoors on property owned or leased by the utility; on or along public highways, streets, roads or similar public thoroughfares; or outdoors on private property by established rights such as easements shall comply with this chapter or ch. PSC 114.

SECTION 26. SPS 316.100 is repealed and recreated to read:

SPS 316.100 Definitions. (1) ADDITIONS. The following are department definitions in addition to the definitions in NEC 100:

(a) “Floors” means stories as specified in chs. SPS 361 to 366.

(b) “Nonrated construction” means Types III, IV and V construction in accordance with chs. SPS 361 to 366 and is considered to be nonfire-rated for the purposes of this chapter.

(c) “Private on-site wastewater treatment system” has the meaning specified under s. 145.01 (12), Stats.

Note: Under s. 145.01 (12), Stats., “Private on-site wastewater treatment system” means a sewage treatment and disposal system serving a single structure with a septic tank and soil absorption field located on the same parcel as

the structure. This term also means an alternative sewage system approved by the department including a substitute for the septic tank or soil absorption field, a holding tank, a system serving more than one structure or a system located on a different parcel than the structure. A private on-site wastewater treatment system may be owned by the property owner or by a special purpose district.

(2) SUBSTITUTIONS. The following department definition is substitution for the respective definitions in NEC 100: “Building” means a structure that stands alone or is separated from adjoining structures by fire walls with all openings therein protected with approved fire doors”.

Note: See chs. SPS 361 to 366 and IBC section 706 for fire-resistance standards to create separate buildings.

SECTION 27. Chapter SPS 316 Subchapter IV (title) is repealed and recreated to read:

Subchapter IV – Changes, Additions or Omissions to the NEC

(Note to Code Editor: Subchapter IV includes ss. SPS 316.080 through 316.701.)

SECTION 28. SPS 316.900 to 316.960 are repealed.

SECTION 29. Pursuant to s. 227.22 (2) (intro.) and (b), Stats., these rules shall take effect on the first day of the month following publication in the Wisconsin Administrative Register, except ss. SPS 316.012 and 316.013 (1) which shall take effect on April 1, 2014.

END