



NATIONAL FIRE PROTECTION ASSOCIATION

The leading information and knowledge resource on fire, electrical and related hazards

MEMORANDUM

TO: Code-Making Panel 2

FROM: Sarah Caldwell, *Senior Committee Administrator*

DATE: September 20, 2023

SUBJECT: NEC® Proposed TIA No. 1749 **FINAL TC BALLOT RESULTS**

The public comment circulation has passed, therefore, according to Section 5.7(a) in the NFPA *Regs*, the final results show this TIA **HAS NOT** achieved the $\frac{3}{4}$ majority vote needed on both Ballot Item No. 1 (**Technical Merit**) and Ballot Item No. 2 (**Emergency Nature**).

19 Eligible to Vote
2 Not Returned (*Abbassi, Harman*)

Technical Merit:

0 Abstentions
9 Agree (*w/comment: Reyes*)
8 Disagree (*Campolo, Domitrovich, El-Sherif, Humphrey, Johnson, Manche, McCamish, Pavese*)

Emergency Nature:

0 Abstentions
8 Agree
9 Disagree (*Campolo, Cook, Domitrovich, El-Sherif, Humphrey, Johnson, Manche, McCamish, Pavese*)

There are two criteria necessary to pass ballot [(1) simple majority (2) affirmative vote of $\frac{3}{4}$ of ballots received]. Both questions must pass ballot in order to recommend that the Standards Council issue this TIA.

- (1) In all cases, an affirmative vote of at least a simple majority of the total membership eligible to vote is required.

$$[19 \text{ eligible} \div 2 = 9.5 = \mathbf{(10)}]$$

- (2) The number of affirmative votes needed to satisfy the $\frac{3}{4}$ requirement is **13**.
(19 eligible to vote - 2 not returned - 0 abstentions = $17 \times 0.75 = 12.75$)

Ballot comments are attached for your review.

The *Regs* at Section 1.6.2.(c) state: An appeal relating to a proposed Tentative Interim Amendment that has been submitted for processing pursuant to Section 5.2 shall be filed no later than 5 days after the notice of the TIA final ballot results are published in accordance with Section 4.2.6.

Appeal Closing Date for this TIA is **September 25, 2023**.

NEC CMP-2 TIA No. 1749 Ballot Final Report
Election:70_A2025_NEC_P02_Log1749_Ballot
Results by Revision

QUESTION NO. 1: I AGREE with the TECHNICAL MERITS of the NEC Proposed TIA Log No. 1749 to Add a new Exception No. 6 to Section 210.8(A) and to Add a new Exception to Section 210.8(D).

Eligible to Vote: 19

Not Returned : 2

Thomas L. Harman,Mathher
Abbassi

<u>Vote Selection</u>	<u>Votes</u>	<u>Comments</u>
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Agree	9	
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Daniel Buuck	Agree	
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Greg Woyczynski	Agree	
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Fred Neubauer	Agree	
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Jeremy Mark Tidd	Agree	
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Charles L. Boynton	Agree	
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Mark Daniel Cook	Agree	
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Frederick P. Reyes	We have been consistently supporting the use of GFCI protection to advance safety of electrical systems. We have additionally been active in trying to support reconciliation of the utilization equipment requirements and protective technology requirements to obtain the best coordinated results. We also see that time is needed to fully accomplish the systemic solution and are not opposed to additional timing being allocated to accomplish this	
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David W. Johnson	F.	
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Tyler James Doering	Agree	
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Disagree	8	
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Steve Campolo

I continue to vote NO on both the proposed changes as well as the emergency nature. Embedded in the TIA's substantiation mention is made regarding the Department of Energy's energy efficiency requirements necessitating the product designs producing the harmonic content causing the unwanted tripping. Several times I questioned if the DOE was ever petitioned for a waiver or extension of the energy efficiency requirements. Additionally, I asked if filtering could reduce unwanted tripping. To date, no requests (and denials) to the DOE have been received.

Thomas A. Domitrovich

This proposed TIA Log #1749 severely compromises electrical safety. This proposed TIA does not merely negate the intentional deletion of the "kitchen countertop" GFCI limitation in 2023 NEC® 210.8(A)(6), but actually removes previously required GFCI protection of receptacle outlets serving these appliances within 6 feet of a sink in place since the 2011 NEC®, and of receptacle outlets serving these appliances in garages mandated since the 2008 NEC® appliance Exception removal. GFCIs historically have not had tripping issues with these appliances. The supposed unwanted tripping issues recently emerged because of the introduction of energy-efficiency technologies to meet Energy Star mandates but only employed essential filtration selectively, dictated largely by economics. These technologies (switching power supply, variable frequency, etc.) generate high-frequency (beyond 60 Hz) components that did not previously exist in these appliances. Other appliances and utilization equipment subject to these same energy-efficiency directives are not seeing these supposed tripping issues. Indeed, GFCI protection was added for residential dishwashers to 2014 NEC® 210.8(D) [relocated to 2020 NEC® 422.5(A)(7)] at the behest of the appliance industry to address shock hazards occurring at dishwasher end-of-life that resulted in liability litigation; incorporation of these energy-efficiency technologies for dishwashers in fact did address necessary high-frequency filtration to avoid instigating unwanted tripping of GFCIs. Where there's a will, there's a way or, more to the point, where there's NOT a will, there's a TIA seeking exemption from consensus safety requirements. The submitter substantiation states that energy efficiency requirements from the U.S. Department of Energy (DOE) are forcing technology changes that is driving incompatibility. Delayed implementation dates of energy efficiency requirements would be more appropriate approach than delay/remove public safety requirements. Other industries have successfully petitioned the DOE for delayed implementation dates, it would be recommended for the appliance industry to evaluate future technology for compatibility. The reference to central air conditioner equipment is not relevant to this substantiation as it is a different voltage, power and application. There has been GFCI protection provided at receptacle outlets for countertop appliances and utilization equipment, including microwave ovens, since the 1987 NEC® without reported issues." The proposed TIA would roll back electrical safety pertaining to GFCI to circa 2008 NEC requirements. There was no substantiation provided with TIA regarding unwanted tripping.

Christopher J. Pavese

This exception doesn't provide clarity due to the term, "Dedicated Space." The term needs to be defined for each of the appliances listed.

Alan Manche

The proposed language revision seeks to reduce public safety by removing GFCI protection on receptacles to the microwave oven, range, and oven while millions of circuits serving microwaves are protected by GFCI today. GFCI protection for receptacles serving the countertop in kitchens was put in place in 1987. Millions of microwave ovens are connected to a GFCI protected receptacle, yet this TIA has presented no substantiation that a GFCI trips a microwave. The proposed language does not require an individual branch circuit, therefore the language permits an accessible receptacle on the counter serving the microwave to also serve the countertop and connect other appliances while preparing food, removing the GFCI protecting that has been in place for over 35 years. Removing GFCI protection from the range receptacle puts lives at risk. The range cord is typically installed by an unqualified electrical person which has resulted in placing ranges in an electrically unsafe operating condition. The addition of indoor 240Vac GFCI protection was directly related to electrocution fatalities involving electric ranges and laundry dryers. A significant number of tests have been conducted to further understand the leakage current on ranges. The results of those tests show are alarming. Initial testing demonstrated electric range models leaked current well in excess of the GFCI trip threshold above 10mA up to 17mA. Additional testing demonstrated that 6 units were leaking above 10mA including one unit that was measured to be leaking at the 54mA of current level. If a wiring issue occurs either internal or external to the electric range itself then you would exceed the let go threshold, Muscle Freeze in 50% of the population, and in the 54mA case potentially result in fibrillation. These issues would affect anyone, but especially for our most vulnerable populations, children, and the elderly. Compliance with the most recent revisions to UL 858 must move in a more expeditious time frame to ensure public safety. Removing GFCI protection is not an option and actually testing has demonstrated GFCI protection to be more critical to support public safety.

John McCamish

The technical substantiation point out that appliances have leakage currents above an agreed upon threshold for human safety and include reports of injury. Appliances such as microwaves have been used with GFCI protection for years and a delay is not warranted.

David G. Humphrey

GFCI provides an important safety function. The associated report repeatedly references that appliances provided with GFCI protection "MAY" cause a "nuisance trip" of the GFCI device. The unwanted tripping events that are alleged may likely be a result of current being detected above the 6 milliampere trip threshold which is the maximum level considered safe for human contact. GFCI protected commercial receptacle outlets supplying appliances at 120 volts have been installed in commercial kitchens since the 2002 NEC without apparent incident. Three phase receptacle outlets up to 100 amperes and single phase receptacle outlets up to and including 50 amperes have required GFCI protection since adoption of the 2017 NEC again without apparent incident. Additionally 5 years of delay is in the opinion of this CMP 2 member an excessive amount of time to correct an issue that may exist with a cooking appliance. Any changes to this section should come as a result of the 2026 revision process. There is at the time of this writing ample time to submit a public input where the submitter may seek revision through the NEC revision process.

Nehad El-Sherif

IEEE is not in favor of this TIA for the following reasons: 1. The incompatibility concerns discussed in this TIA are understandable but these concerns do not apply to microwaves that have been protected by GFCIs since 1987 with no reported cases of incompatibility. The TIA provided no substantiation to refute this 2. The substantiation did not address the multiple electrocution deaths reported by CPSC in Attachment A of this TIA 3. There is a concern with the enforcement of this TIA (if passed), because the language "The appliance is located within a dedicated space" is vague and hard to enforce 4. Through a friend, I just became aware of a tragic incident of an 8-year-old boy who was electrocuted in Ft. Myers, FL by touching a 220V electrical outlet behind the stove per comments by police (refer to the links below). This tragedy details why protecting the electric range branch circuit receptacle outlet is needed to improve safety in the kitchen. <https://www.wptv.com/news/national/florida-boy-dies-after-being-shocked-by-electrical-outlet-police-say> <https://www.wfla.com/news/florida/boy-dies-after-touching-electrical-outlet-in-fort-myers-home/>

Brian H. Johnson

After further reading and considering public input comments, the proposed changes would significantly reduce electrical safety.

Abstain

0

QUESTION NO. 2: I AGREE that the subject is of an EMERGENCY NATURE for one or more of the reasons noted in the Instructions box.

Eligible to Vote: 19

Not Returned : 2

Thomas L. Harman,Mathher
Abbassi

Vote Selection

Agree

Votes

Comments

8

Daniel Buuck

A

Greg Woyczynski

A, F

Fred Neubauer

Agree

Jeremy Mark Tidd

A

Charles L. Boynton

F

Frederick P. Reyes

F

David W. Johnson

Agree

Tyler James Doering

C and F

Disagree

9

Steve Campolo

I continue to vote NO on both the proposed changes as well as the emergency nature. Embedded in the TIA's substantiation mention is made regarding the Department of Energy's energy efficiency requirements necessitating the product designs producing the harmonic content causing the unwanted tripping. Several times I questioned if the DOE was ever petitioned for a waiver or extension of the energy efficiency requirements. Additionally, I asked if filtering could reduce unwanted tripping. To date, no requests (and denials) to the DOE have been received.

Thomas A. Domitrovich

The proposed remedy demonstrates no emergency natures that would warrant decreasing safety, as introduced by this TIA.

Christopher J. Pavese

This TIA adds to the code and is not an emergency.

Alan Manche	The emergency nature that microwaves and ranges are tripping GFCIs while not protecting from a hazardous condition has not been substantiated. Further investigation has actually resulted in an understanding that hazardous currents can exists that are being protected by GFCIs.
John McCamish	A compromise in GFCI protection is not warranted when other avenues such as delay in DOE requirements, and pursuing solutions to appliance problems that have known to exist for several years have not been resolved.
Mark Daniel Cook	Substantiate with more data
David G. Humphrey	There was no error, omission, existing hazard or the like with the panels action. Only diligent review and discussion.
Nehad El-Sherif	IEEE disagrees with the emergency nature of this TIA
Brian H. Johnson	After further reading and considering public input comments, I do not believe it is an emergency nature to reduce the safety by removing GFCI requirements.
Abstain	0

- A. The standard contains an error or an omission that was overlooked during the regular revision process.**
- B. The NFPA Standard contains a conflict within the NFPA Standard or with another NFPA Standard.**
- C. The proposed TIA intends to correct a previously unknown existing hazard.**
- D. The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.**
- E. The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.**
- F. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification for the action.**

NFPA 70®-2023 Edition

National Electrical Code®

TIA Log No.: 1749

Reference: 210.8(A) Exception No. 6 (new), and 210.8(D) Exception (new)

Comment Closing Date: September 6, 2023

Submitter: Greg Woyczynski, Association of Home Appliance Manufacturers (AHAM)

www.nfpa.org/70

1. Add a new Exception No. 6 to section 210.8(A) to read as follows:

210.8(A) Dwelling Units.

...

Exception No. 6: GFCI protection shall not be required for a receptacle serving an electric range, wall-mounted oven, counter-mounted cooking unit, or microwave oven if both of the following conditions are met:

(1) The appliance is located within a dedicated space.

(2) In normal use, the appliance is not easily moved or is fastened in place.

This exception shall expire January 1, 2028.

2. Add a new Exception to section 210.8(D) to read as follows:

210.8(D) Specific Appliances.

...

Exception: GFCI protection shall not be required for an outlet supplying an electric range, wall-mounted oven, counter-mounted cooking unit, or microwave oven if both of the following conditions are met:

(1) The appliance is located within a dedicated space.

(2) In normal use, the appliance is not easily moved or is fastened in place.

This exception shall expire January 1, 2028.

Substantiation:

A. Introduction

This TIA is in response to the direction given in Standards Council Decision D#22-10. The Standards Council directed, "...the formation of a Task Group of affected stakeholders...to evaluate the issues raised and consider whether a TIA may be appropriate." The Task Group consists of representatives from home builder organizations, contractors, appliance manufacturers, GFCI manufacturers, electrical inspectors, CPSC, and a testing laboratory. Based upon the information submitted to and reviewed by the Task Group, the proposed TIA adds an exception to GFCI protection requirements.

B. GFCIs trip on safe appliances

There is a technological incompatibility between common loads in the home and GFCIs. The incompatibility is often realized in the form of "nuisance tripping", where a GFCI trips and no electrical hazard is present. This incompatibility is especially pertinent in the context of home appliances, which are subject to continuously updated, mandatory, Department of Energy efficiency requirements. In order for appliances to become meet efficiency standards, home appliance manufacturers incorporate components that operate at frequencies higher than the mains frequency of 60-Hertz. These technologies include switch-mode power supplies, electronically commutated

motors, and LED drivers. More information on technology options to meet efficiency requirements can be found here:

- **Conventional cooking appliances**

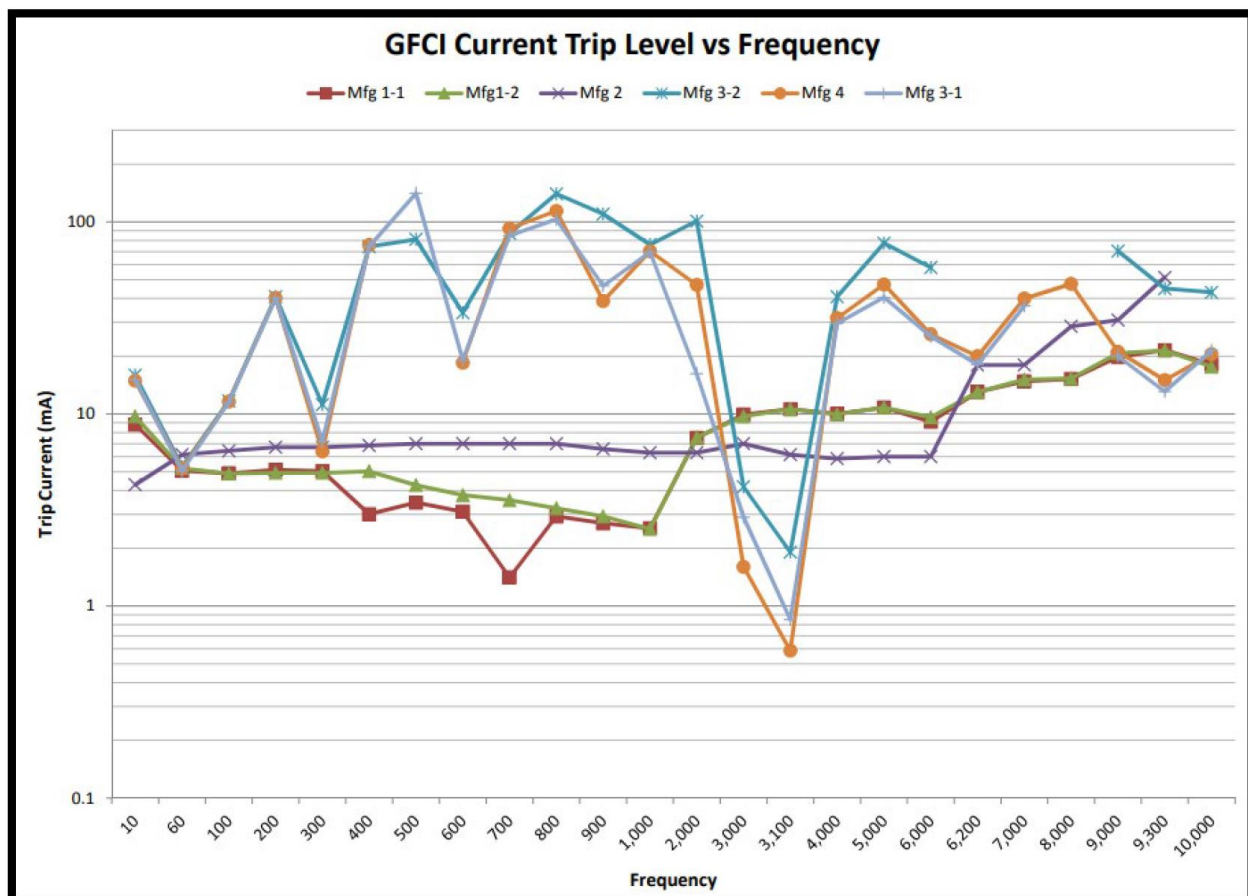
https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=34

- **Microwaves**

https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=33

It should be noted that technologies used to make these appliances more efficient are similar to technologies used to make central air conditioners more efficient.

Presently, there are major inconsistencies in GFCI performance above 60-Hertz. The graph below depicts test data showing this variation amongst 6 different GFCIs:



To study effects of this variation, UL has conducted an independent study testing 3 different types of appliances, from 3 different manufacturers, connecting each of these appliances to 10 different GFCIs. All three appliances contain high frequency components - such components are found in virtually all modern home appliances. A summary of the study is below:

Here is a link to the UL GFCI Study: <https://crc.ul.com/app/library/33905>

There are a few notable items from the UL study:

- 1) GFCI trip thresholds are all over the place. At certain frequencies, GFCI trip thresholds differ by roughly 150%.

- 2) The appliances are safe. When compared to present leakage current requirements and possible future requirements, all appliances pass by a wide margin.
- 3) The three appliance models tested are representative of many more models that are essentially identical as defined by Department of Energy.
- 4) GFCIs trip on all the appliances tested.

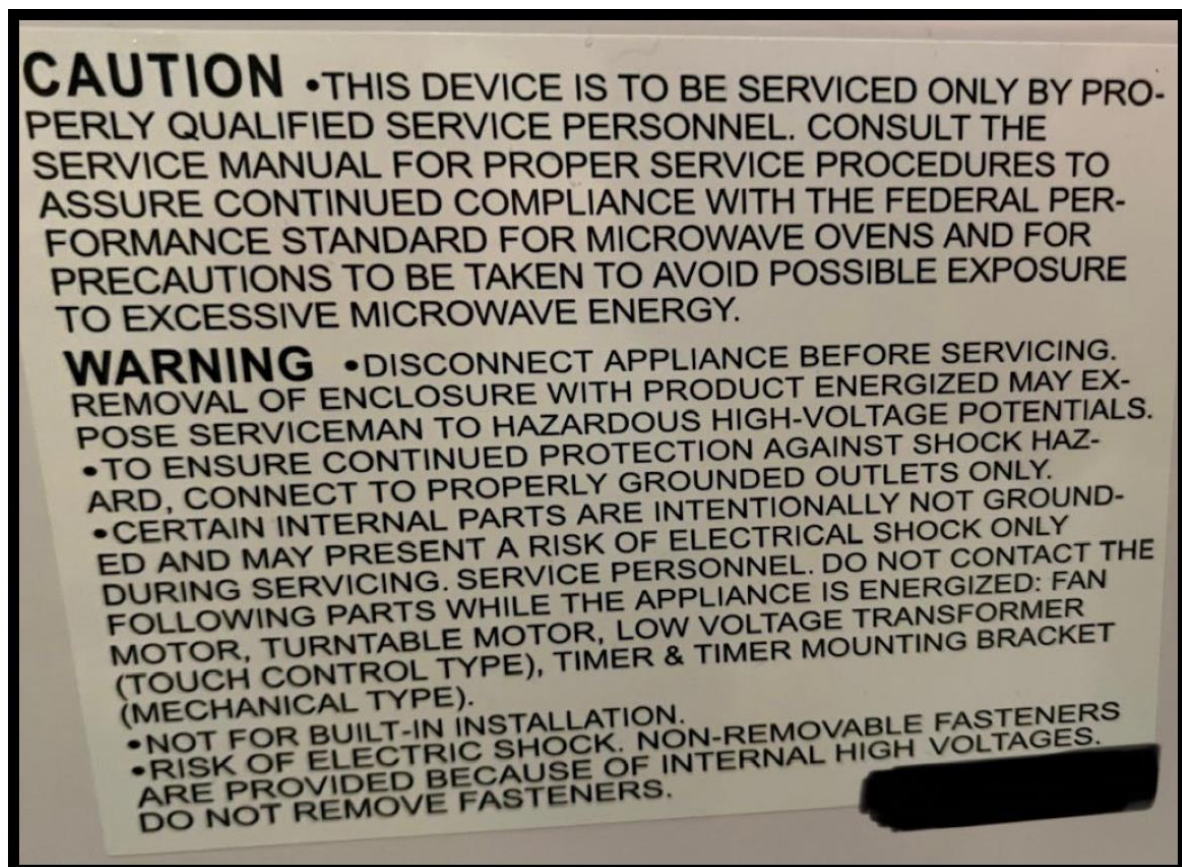
C. The National Electrical Code must consider the safety risks of nuisance tripping

If GFCI protection continues to be required, as laid out in the 2023 NEC, while the incompatibility issue remains, there is a high risk of people being adversely impacted by disabled appliances due to nuisance tripping. This risk may be higher than the risk of people being exposed to a leakage current that could cause harm.

CPSC submitted data to the Task Group showing electrocutions from consumer products in recent years.

ATTACHMENT A, CPSC data - electrocutions

The electrocution data contains 5 mentions of major cooking appliances (e.g. electric stove). It is unclear whether a GFCI would have prevented these deaths. In the case of microwaves, the electrocutions were repair related. It is unknown if these microwaves were plugged into mains or if the shock came from high voltage internal capacitors which can remain charged after unplugging the appliance. Similarly, one of the stove electrocutions involved a generator. It should also be noted that appliances are required to be marked, cautioning users from service while connected to mains:



In contrast, there are numerous reports of nuisance tripping on home appliances. For example, recently, 65 home providers and contractors reported 1700+ housing units experiencing nuisance tripping in Massachusetts. The coalition's public comments can be found below:

ATTACHMENT B, Affordable Housing

The reports cover multiple types of appliances (not just cooking), including products from multiple home appliance manufacturers and multiple GFCI manufacturers.

If a GFCI nuisance trips on a cooking product this affects one's ability to provide for a family, being most impactful to low-income communities that are not well represented in the NEC development process; such households cannot go out to eat. Example calculations with an estimate of people at risk are shown below. It should be noted that additional risks, such as burn risks from cooking large loads on a hot plate, physically impaired persons using a range due to unavailability of a microwave, and a non-trained consumer trying to bypass a GFCI which is nuisance tripping, are not accounted for in the example calculations.

Estimates of cooking units and at-risk populations	Count	Unit	Reference
Number of homes with electric range in the US	65.56	million households approx.	https://www.eia.gov/consumption/residential/data/2020/hc/pdf/HC%203.1.pdf
Percentage of homes with an electric range in the US	46.8286%	approx.	Residential Energy Consumption Survey (eia.gov) 2020 Population and Housing State Data (census.gov)
Number of households facing low food security	8.40	million households approx.	2020 Population and Housing State Data (census.gov) USDA ERS - Key Statistics & Graphics (usda.gov)
Number of homes with an electric range and low food security	3.93	million households approx.	https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/key-statistics-graphics/
Percentage of households experiencing nuisance tripping annually	0.0283%	approx.	$1700 / 2 / 3000000$ 1700 reported cases of nuisance tripping in MA over the course of roughly 2 years
If only 1% of all nuisance trips are on electric ranges	0.0003%		3 million housing units in Massachusetts $0.0283\% * 1\%$
Number of homes with electric range, low food security, experiencing electric range nuisance tripping	11	annual deaths due to nuisance tripping approx.	$3.93 * 0.0003\%$
Deaths from electric ranges	3	from 2014 to 2022	

D. Time is needed to develop updated UL standards

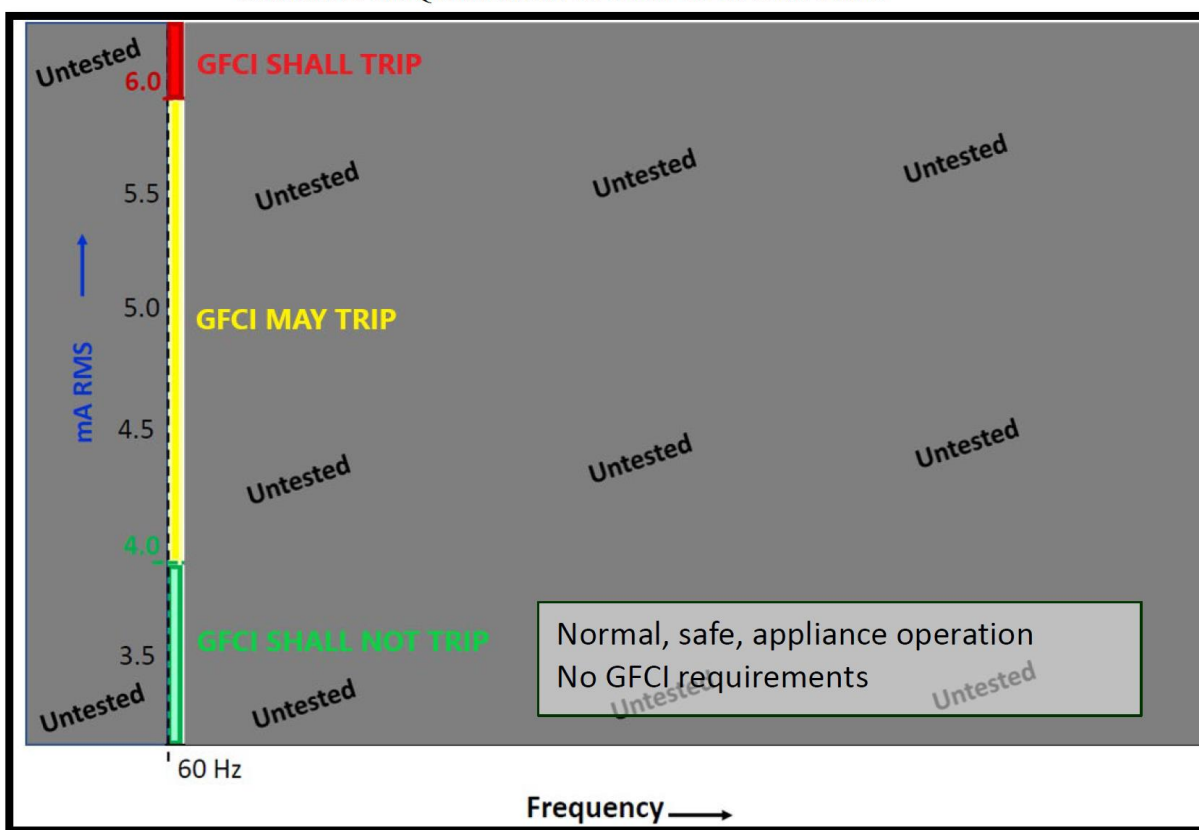
The root cause of incompatibility lies in differences of allowed leakage current in appliance standards and tripping requirements in the GFCI standard.

A summary of present requirements is shown in the table below:

	Frequency of measurements	Consideration of human-body impedance
GFCI standard	60Hz	No
Home appliance standards	15Hz – 1MHz	Yes

UL 943 (*Standard for Ground-Fault Circuit-Interrupters*) requires that Class A ground-fault circuit-interrupters shall trip at a minimum of 6 mA and may trip when measured current exceeds 4 mA. The present UL standard only requires such trip thresholds for 60-Hertz as measured by differential current between line and neutral:

PRESENT REQUIREMENTS FOR GFCI TRIPPING

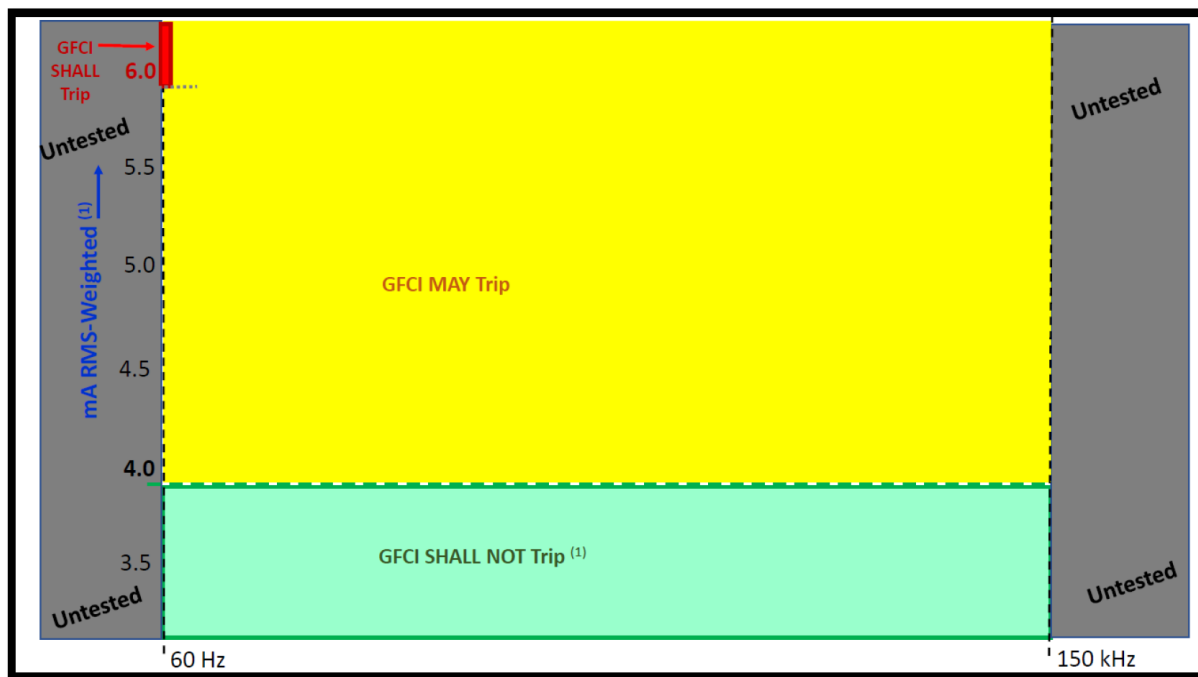


Appliances are operating in the gray space shown, where there are no requirements for when a GFCI shall or shall not trip. It is up to each GFCI manufacturer to set their own high frequency tripping levels which may not be based on safety.

UL 858 (*Safety Standard for Household Electric Ranges*) allows a maximum leakage current of 2.5 mA on 120 volt products. UL 923 (*Safety Standard for Microwave Cooking Appliances*) allows a maximum leakage current value of 0.75 mA. These appliance measurements are conducted over a frequency sweep. Such measurements are meant to determine potential harm to a human body, thus measurements are taken across a 500-ohm resistor.

To fix this incompatibility proven by independent testing (see Section B of this document), UL standards must be updated. For example, the GFCI standard, UL 943 must be updated to ensure that devices only trip when presented with a dangerous differential current. A UL 943 update proposal to accomplish this is being considered in a UL standards Task Group:

PROPOSED REQUIREMENTS FOR GFCI TRIPPING



This proposal will take years to develop and fully ballot, with a reasonable effective date in 2028. In addition, home appliance standards will need to be updated to ensure such products are not emitting currents in the “may trip” zone. A summary of necessary, harmonized, standards **updates** are below:

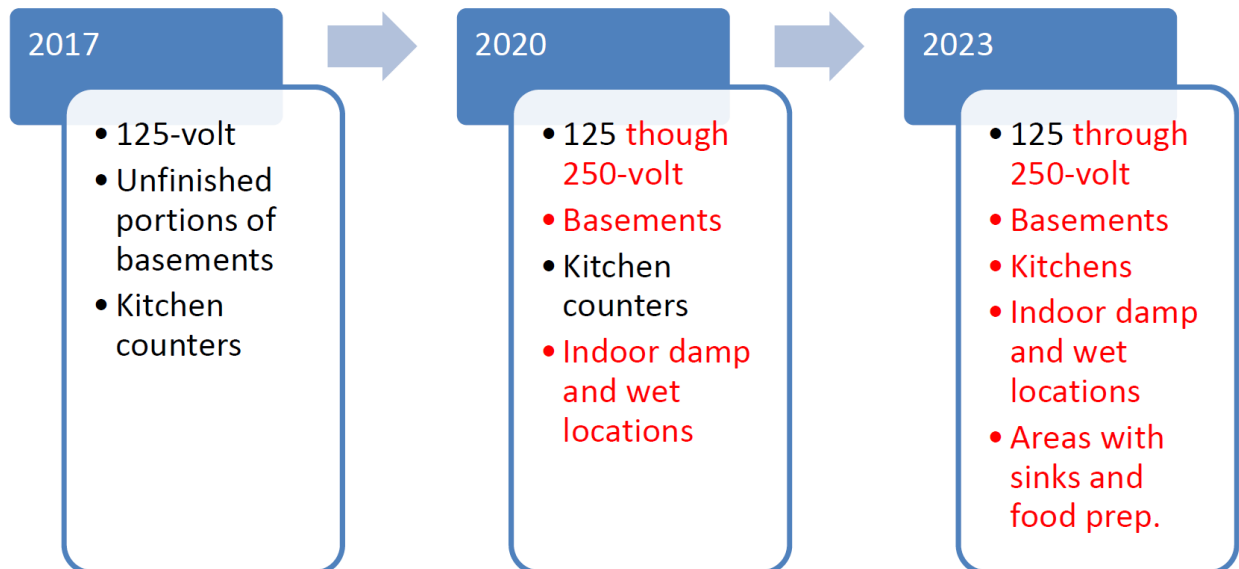
	Frequency of measurements	Consideration of human-body impedance
GFCI standard (new requirement)	60Hz – 150kHz	No
Home appliance standards (existing requirement)	15Hz – 1MHz	Yes
Home appliance standards (new requirement)	15Hz – 1MHz	No

New home appliance requirements have already taken formal steps toward publication with an updated high frequency test achieving consensus in the Technical Committee covering UL 101. It will take time to update all the relevant standards and will take even longer to develop and ship updated product. Until all of these updates have been made, nuisance tripping will continue to occur, and put people in danger, if no action is taken in the National Electrical Code.

Electric ranges rated more than 120 volts, may be operating above the existing 60-hertz GFCI trip thresholds. Home appliance manufacturers have already updated the UL 858 standard to correct this, with updates becoming mandatory in 2025.

E. Conclusion

There has been significant expansion of GFCI requirements in recent NEC code cycles:



These new locations contain appliances which are significantly more complex than appliances in past GFCI locations such as bathrooms and kitchen countertops. While a GFCI may be suitable for protection on circuits powering hair dryers and blenders, they are not suitable for protection on more complex appliances which are subject to efficiency requirements. GFCIs must be modernized before they are required to be connected to more complex loads. While this modernization takes place, GFCI protection must be paused to protect consumers.

In addition to locations specified in 210.8(A), GFCI requirements for cooking appliance are also found in 210.8(D). For a pause in GFCI requirements to be effective, exceptions in both sections are needed.

Emergency Nature: The standard contains an error or an omission that was overlooked during the regular revision process. The proposed TIA intends to correct a circumstance in which the revised NFPA Standard has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process or was without adequate technical (safety) justification of the action.

If GFCI protection is required while the incompatibility issue remains, there may be a higher risk of people being adversely impacted by nuisance tripping than the risk of people being exposed to a leakage current that could cause harm.

Electrocutions - (DTHS and INDP)

1/1/2014 - 4/30/2022*

Based on reports entered into DTHS or INDP no later than 4/30/2022
Only fatalities are included

Disclaimer: CPSC does not guarantee the accuracy, completeness, or adequacy of these data particularly with respect to information submitted by people outside of CPSC. This spreadsheet was prepared by CPSC staff, has not been reviewed or approved by, and may not necessarily reflect the views of the Commission.

#	Document Number(s)	Date	Age/Sex	State	Narrative
1	1412105299	2014-Jul	35 YOM	FL	A 35 YOM decedent was working on pipes in the attic of a home when he came into contact with the power cord to the air-conditioner unit. High voltage electrocution. Autopsy-yes.
2	1448107977	2014-Jul	39 YOM	TX	39 YOM DECEDENT WAS ELECTROCUTED WHILE WORKING ON AIR CONDITIONING UNIT AT FRIENDS RESIDENCE. COD: ELECTROCUTION. AUTOPSY - YES.
3	1528060298	2015-May	51 YOM	MS	A 51 YOM decedent was electrocuted while working air conditioning unit at his home. COD: Complications of Electrocution. Autopsy: No.
4	1548078975	2015-May	4 YOM	TX	4 YOM decedent contacted electrified wires in air conditioning unit; COD: Exposure To Other Specified Electric Current; Autopsy: Yes
5	1512092334	2015-Jun	67 YOM	FL	67 YOM decedent was electrocuted while working on an air conditioning duct; COD: Low voltage electrocution; Autopsy: Yes
6	1548112101	2015-Jul	41 YOM	TX	THE 41-YEARS-OLD MALE DECEDENT - WORKING ON AIR CONDITIONING UNIT. CAUSE OF DEATH: LOW VOLTAGE ELECTROCUTION. AUTOPSY: YES.

ATTACHMENT A - Page 2 of 20

#	Document Number(s)	Date	Age/Sex	State	Narrative
7	1506187715	2015-Sep	54 YOM	CA	54 YOM decedent was exposed to electrical current while working on an air conditioner at home; COD: Exposure To Other Specified Electric Current; Autopsy: Yes
8	1512163157	2015-Oct	28 YOM	FL	28 YOM decedent was exposed to 220 volts in central air conditioning unit; COD: Electrocution; Autopsy: Yes
9	1604030203	2016-Jul	50 YOM	AZ	50-54 YOM WAS ELECTROCUTED WHILE WORKING ON AIR CONDITIONING UNIT. COD: LOW VOLTAGE ELECTROCUTION
10	1637059352	2016-Aug	4 YOM	NC	THE 4-YEARS-OLD MALE DECEDENT - CONTACT WITH EXPOSED WIRE OF AIR CONDITIONING UNIT. CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: NO.
11	1729026481	2017-Aug	50 YOM	MO	THE 50-YEARS-OLD MALE DECEDENT WAS WORKING ON AN AIR CONDITIONER WHEN HE MADE CONTACT WITH A LIVE WIRE, AND WA[...]. CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: NO.
12	1840021731	2018-Jun	67 YOM	OK	THE 67-YEARS-OLD MALE DECEDENT - ELECTROCUTION (AIR CONDITIONER). CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: YES.
13	1837059765	2018-Aug	30 YOF	NC	The air conditioning somehow malfunctioned and started smoking. A 30 YOF decedent tried to open the door and that's when she was electrocuted. It appears that the air conditioning unit caused the surrounding area to become electrified. COD: Electrocution. Autopsy: Yes.
14	1837060145	2018-Aug	8 YOF	NC	An 8 YOF touched electrified surface when air conditioning unit failed, carpet said to be wait. COD: Consequences of electrocution. Autopsy: Yes.

ATTACHMENT A - Page 3 of 20

#	Document Number(s)	Date	Age/Sex	State	Narrative
15	1945032551	2019-Aug	55 YOM	SC	55 YOM He Was Self Employed And He Was Working On An Air Conddition Unit And He Was Electrocuted. COD: Electrocution,Accident With And Air Conditioner. OSC: Electrocution. Addtl ICD Codes: T75. Autopsy? Yes. Manner of Death: Accident.
16	2037101793	2020-Jul	34 YOM	NC	34 YOM decedent was working on outdoor air conditioning unit outside residential home. COD: Low voltage electrocution. Autopsy - no.
17	2031013756	2020-Oct	74 YOM	NE	THE 74-YEARS-OLD MALE DECEDENT BECAME ELECTROCUTED PLUGGING IN AN AIR CONDITIONER COMPRESSOR [AT HIS RESIDENCE]. CAUSE OF DEATH: LOW VOLTAGE ELECTROCUTION. OTHER SIGNIFICANT CONDITIONS: ATHEROSCLEROTIC CARDIOVASCULAR DISEASE. AUTOPSY: YES. MANNER OF DEATH: ACCIDENT.
18	1811002391	2018-May	56 YOM	DC	56 YOM Electrocuted While Working On Hvac. COD: Electrocution. Addtl ICD Codes: Electrocution, -, Exposure, to, unspecified, electric, current. Autopsy? Yes. Manner of Death: Accident.
19	1951041342	2019-Jul	28 YOM	VA	28 YOM Electrocuted By Contact With Energized Metal Exhaust Vent Duct For An Interior Electric Range. COD: Electrocution. Autopsy? Yes. Manner of Death: Accident.
20	1512103384	2015-Jul	30 YOM	FL	30 YOM DECEDENT WAS SHOCKED AT RELATIVES HOME WHEN REACHING BEHIND WASHER FOR FABRIC SOFTENER BOTTLE. COD: PROBABLE ELECTROCUTION. AUTOPSY - YES.
21	1426226376	2014-Jul	43 YOM	MI	43 YOM decedent was electrocuted while working on a dishwasher at home. Electrocution. Autopsy no.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
22	141113CNE0001	2014-Nov	33 YOM	FL	THE 33 YEAR OLD MALE WAS HELPING HIS BROTHER-IN-LAW INSTALL A DISHWASHER. THEY HEARD A NOISE AND THE VICTIM REACHED AROUND THE BACK OF THE DISHWASHER AND APPARENTLY TOUCHED A LIVE WIRE WHEN HE WAS ELECTROCUTED. HE WAS TRANSPORTED TO THE HOSPITAL WHERE HE EXPIRED.
23	1501031729	2015-Aug	72 YOM	AL	A 72 YOM decedent was installing a dishwasher and electrocuted at home. Cause of Death: Accidental electrocution. Autopsy- No.
24	2126059629	2021-Jul	34 YOF	MI	Decedent: 34 YOF. Incident Description: The Decedent Came In Contact With An Exposed Wire Associated With A Dishwasher In Her Home. Incident Location: Home. COD: Electrocution. Addtl ICD Codes: T754. Autopsy? No. Manner of Death: Accident.
25	1406138876	2014-Jul	26 YOF	CA	26 YOF decedent was installing a dryer when she sustained exposure to electrical current; COD: Exposure to other specified electric current; Autopsy: Yes
26	1412170951	2014-Dec	57 YOF	FL	THE 57-YEARS-OLD FEMALE DECEDENT ELECTROCUTED BY [CLOTHES?] DRYER . CAUSE OF DEATH: LOW VOLTAGE ELECTROCUTION. AUTOPSY: YES.
27	1505017935	2015-Jul	29 YOM	AR	29 YOM decedent was electrocuted while installing household dryer; COD: Electrocution; Autopsy: Yes

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#	Document Number(s)	Date	Age/Sex	State	Narrative
28	171024CCC2060 1639070141	2016-Jul	65 YOM	OH	65 YEAR OLD MALE WAS FOUND DEAD AT HIS RESIDENCE AFTER A WELFARE CHECK WAS CONDUCTED. THE DEATH CERTIFICATE STATED ELECTROCUTION AS THE CAUSE OF DEATH BUT NO PRODUCT INFORMATION WAS OBTAINED. THE VICTIMS NEXT OF KIN DIED RECENTLY AND NO ADDITIONAL FAMILY MEMBERS LOCATED.
29	1848068387	2018-Apr	10 YOM	TX	10 YOM Discovered In An Apartment Complex Clothing Dryer. COD: Electrocution. Addtl ICD Codes: T754. Autopsy? Yes.
30	1848109246	2018-Jul	10 YOF	TX	10 YOF Touched Live Wire On Dryer. COD: Electrocution. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: Accident.
31	1905016587	2019-Jun	45 YOM	AR	45 YOM The Deceased Wife Stated The Deceased Wash The Lint Out Of The Dryer The Day Before And Moved The Dryer Back Inside And While Hooking The Dryer Up Was Electrocuted. COD: Heart Failure Due To Electrical Shock, Hypertension. Autopsy? No. Manner of Death: Accident.
32	2012157232	2020-Aug	35 YOM	FL	35 YOM ELECTROCUTED BY FAULTY WIRING OF CLOTHES DRYER. Incident Location: DECEDENT'S HOME. COD: LOW VOLTAGE ELECTROCUTION. OSC: No data. Addtl ICD Codes: T754, T754. Autopsy? YES. Manner of Death: Accident.
33	1747022076	2017-Apr	65 YOF	TN	65 YOF decedent was plugging in pump in furnace assembly. COD: electrocution. Autopsy: no.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
34	210519HCC3008	2021-Jan	37 YOM	TX	A 37-YEAR-OLD MALE DIED FROM ELECTROCUTION AS A RESULT OF A FIRE STARTED AT THE 6' X 10' TRAVEL TRAILER HE SHARED WITH HIS WIFE. THE 42-YEAR-OLD WIFE WAS ADMITTED TO THE ICU OF AN AREA HOSPITAL AND TREATED FOR SMOKE INHALATION. THE FIRE MARSHAL RULED THAT THE FIRE WAS ACCIDENTAL AND THAT IT WAS CAUSED BY A GAS WATER HEATER IGNITING COMBUSTIBLE INSULATION MATERIAL IN A BATHROOM WALL BY MEANS OF CONDUCTION HEATING "DUE TO IMPROPER INSTALLATION." LIVE ELECTRICAL WIRES WERE FOUND IN AND AROUND THE TRAILER, WITH ONE LIVE WIRE NEXT TO THE MAN'S BODY. THE CAUSE OF DEATH WAS DETERMINED TO BE ELECTROCUTION, AND THE MANNER OF DEATH RULED ACCIDENTAL. DAMAGE TO THE TRAILER TOTALED \$5,000, AND CONTENT DAMAGE TOTALED \$500.
35	2126067046	2021-Aug	78 YOM	MI	Decedent: 78 YOM. Incident Description: Holding Live Electric Wire From Generator. Incident Location: Outdoors. COD: Electrocution. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: Accident.
36	1522400256	2015-Oct	37 YOM	LA	THE 37-YEARS-OLD MALE DECEDENT WAS WIRING AN ELECTRIC STOVE AND WAS ELECTROCUTED BECAUSE HE DIDN'T SWITCH THE THE POWER OFF TO THE CIRCUIT. CAUSE OF DEATH: A. CARDIOPULMONARY ARREST B. ELECTRICAL SHOCK. AUTOPSY: NO.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
37	180522HCC1727 1712142369	2017-Sep	69 YOM	FL	IN SEPTEMBER [REDACTED], 2017, A 69 YEAR-OLD MAN WAS ELECTROCUTED WHEN HE UNPLUGGED A GENERATOR EXTENSION CORD FROM A STOVE. OFFICIAL RECORDS DID NOT EXPLAIN HOW THE ELECTROCUTION OCCURRED AND THE INCIDENT WAS NOT WITNESSED.
38	1848190130	2018-Dec	25 YOM	TX	25 YOM Electrocution While Doing Maintenance On A Hot Water Heater. COD: Electrocution. OSC: Recent cocaine and 1, 1-difluoroethane ingestion. Addtl ICD Codes: T405, T598, T754, X44. Autopsy? Yes. Manner of Death: Accident.
39	1636052363	2016-Jun	69 YOM	NY	69 YOM decedent was electrocuted while working on bathroom fan at attic of residence. COD: electrocution. Autopsy - yes.
40	1455005771	2014-Feb	33 YOF	WI	33 YOF decedent touched an improperly grounded ceiling fan in a residence and was electrocuted. Electrocution. Autopsy yes.
41	1917024719	2019-Mar	71 YOM	IL	71 YOM Decedent Working On Ceiling Fan When He Received Electrical Shock.. COD: Electric Shock. Addtl ICD Codes: I499, T754. Autopsy? No. Manner of Death: accident.
42	1412126181	2014-Sep	64 YOM	FL	64 YOM DECEDENT SUFFERED POSSIBLE ELECTROCUTION AT HOME FROM RUNNING FAN . COD: HEMOPERICARDIUM D/T RUPTURED MYOCARDIAL INFARCT D/T CORONARY ATHEROSCLEROSIS; OSC: POSSIBLE ELECTROCUTION. AUTOPSY - YES.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
43	170509CFE0002	2017-Apr	7 YOM	MS	A 7-YEAR-OLD MALE WAS PLAYING OUTSIDE AFTER A RAINSTORM. HE RECEIVED AN ELECTRIC SHOCK WHEN HE TOUCHED A METAL COMPONENT OF A GOLF CART THAT WAS CHARGING IN AN EXTERIOR OUTLET AT HIS HOUSE. ALTHOUGH HIS MOTHER WAS ABLE TO BREAK HIS CONTACT WITH THE GOLF CART AND BEGIN RESUSCITATION EFFORTS, HE DIED LATER THAT DAY AT AN AREA HOSPITAL. THE CAUSE OF DEATH IS CARDIAC ARREST DUE TO ELECTROCUTION. A 5-YEAR-OLD FEMALE WHO WAS PLAYING NEARBY WAS NOT INJURED.
44	1842363889	2018-Nov	62 YOF	PA	62 YOF SUSTAINED BURNS WHEN ELECTRIC LIFT CHAIR CAUGHT FIRE. COD: THERMAL BODY BURNS. OSC: No data. Autopsy? Yes. Manner of Death: Accident.
45	1948142800	2019-Sep	49 YOM	TX	49 YOM Working On Power Supply To Travel Trailer That Was Home In Precipitation Conditions. COD: Electrocution. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: Accident.
46	1836060328	2018-Jul	27 YOM	NY	27 YOM CONTACTED ELECTRIFIED SURFACE. Incident Location: CRAWLSPACE OF EMPTY HOUSE. COD: ELECTROCUTION. OSC: No data. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: Accident.
47	1942389569	2019-Dec	37 YOM	PA	Decedent: 37 YOM. Incident Description: CONTACT WITH HIGH VOLTAGE. Incident Location: Garage. COD: ELECTROCUTION. Addtl ICD Codes: W87. Autopsy? Yes. Manner of Death: Accident.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
48	1822600676	2018-Dec	18 YOM	LA	18 YOM Decedent ELECTROCUTED BY VACUUM CLEANER CORD. COD: ELECTROCUTION. Autopsy: NO
49	211115HCC1353	2021-Jul	67 YOM	NC	A 67 YOM WAS ELECTROCUTED AND DIED WHEN HE GRABBED THE HANDLE OF A WOOD-PELLET FUELED GRILL PLUGGED IN ON AN OUTDOOR PATIO. THE MEDICAL EXAMINER REPORT LISTED THE PROBABLE CAUSE OF DEATH AS LOW-VOLTAGE ELECTROCUTION.
50	1848195771	2018-Dec	24 YOM	TX	24 YOM Electric Shock From Small Appliance. COD: Electrocution. OSC: Wet contact with small appliance in kitchen. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: Accident.
51	1812103182	2018-Jun	8 YOM	FL	08 YOM Low-Voltage Electric Shock From Contact With An Appliance. COD: Complications Of Low Voltage Electric Shock. Autopsy? Yes
52	1413035139	2014-Jul	45 YOM	GA	THE 45-YEAR-OLD MALE DECEDENT DIED AS A RESULT OF ELECTROCUTION WHILE WORKING ON APPLIANCES AT HIS RESIDENCE. HE DIED AT THE SCENE. CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: NO.
53	1936062292	2019-Aug	46 YOM	NY	46 YOM TOUCHED ELECTRIFIED HOME APPLIANCE. Incident Location: RESIDENCE. COD: ELECTROCUTION.. OSC: No data. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: Accident.
54	2017023232	2020-Mar	48 YOM	IL	48 YOM Electrocuted While Working On Household Appliance. Incident Location: Home. COD: No Data. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: accident.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
55	1748097482	2017-Jul	46 YOM	TX	THE 46-YEARS-OLD MALE DECEDENT BECAME EXPOSED TO LIVE WIRES OF A KITCHEN APPLIANCE. CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: YES.
56	1712117238	2017-Jul	43 YOM	FL	43 YOM decedent was electrocuted while installing kitchen appliance while at work. COD: electrocution. Autopsy - yes.
57	1448060821	2014-Apr	40 YOM	TX	40 YOM decedent. The decedent died of an electrocution as a result of an appliance repair . COD: electrocution. Autopsy: Yes
58	2101037731	2021-Aug	60 YOM	AL	60 YOM decedent was electrocuted while charging battery at home. COD: Electric Shock. Autopsy no.
59	190823CCC3627 1848123424	2018-Aug	10 YOF	TX	A 10-YEAR-OLD FEMALE VICTIM WAS ELECTROCUTED WHILE DRYING HER HAIR WITH A HAIR DRYER IN THE MASTER BATHROOM OF THE RESIDENCE. THE VICTIM WAS TAKEN TO THE HOSPITAL WITH ELECTRICAL BURNS ON HER BODY. SHE DIED SHORTLY AFTER ARRIVAL. THE MEDICAL EXAMINER STATED THE CAUSE OF DEATH WAS ELECTROCUTION.
60	1713083564	2017-Dec	43 YOF	GA	A 43 YOF Decedent was electrocuted by Christmas lights at home. COD: Cardiac Arrest; Accidental Electrocution; Enlarged Heart. Autopsy: No.
61	1505018290	2015-Aug	20 YOM	AR	20 YOM was barefoot, sweating, sitting on a metal can. He picked up electric guitar and felt a buzz. He reached over to turn switch off and it electrocuted him and sent him across the yard. COD: Electrocution. Autopsy: No.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
62	1537009454	2015-Jan	66 YOF	NC	THE 66-YEARS-OLD FEMALE DECEDENT WAS SEATED ON DEFECTIVE HEATING PAD. CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: NO.
63	1812108786	2018-Jul	37 YOM	FL	37 YOM Electrocuted By Karaoke Microphone.. Addtl ICD Codes: T754, T754. Autopsy? Yes. Manner of Death: Accident.
64	1448158358	2014-Nov	55 YOM	TX	55 YOM DECEDENT WAS REPLACING LIGHT BULB AT HOME WHEN HE WAS ELECTOCUTED. COD: ELECTROCUTION. AUTOPSY - YES.
65	170711CFE0006 1735009084	2017-Jul	14 YOF	NM	A 14-YEAR-OLD GIRL WAS IN THE BATHTUB USING HER SMARTPHONE WHILE IT WAS CHARGING WITH THE USE OF AN EXTENSION CORD. THE EXTENSION CORD HAD A SECTION OF IT THAT WAS FRAYED AND MISSING INSULATION, RESULTING IN ITS WIRES BEING EXPOSED. THE GIRL MAY HAVE TOUCHED THE DAMAGED PORTION OF THE EXTENSION CORD AND WAS ELECTROCUTED. THE DUPLEX RECEPTACLE THAT THE EXTENSION CORD WAS PLUGGED INTO IN THE BATHROOM DID NOT CONTAIN A GFCI AND WAS NOT GROUNDED. PRIOR TO THE INCIDENT, THE DECEDENT HAD SENT A PHOTOGRAPH IN A TEXT MESSAGE TO A FRIEND THAT SHOWED THE EXTENSION CORD AND PHONE CHARGER PROPPED UP ON A TOWEL. THE INCIDENT RESIDENCE HAD SEVERAL ELECTRICAL RECEPTACLES MISSING WITH ELECTRICAL TAPE COVERING THE WIRES. EXTENSION CORDS WERE BEING USED THROUGHOUT THE HOUSE.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
66	2013001408	2020-Jan	21 YOM	GA	Decedent: 21 YOM. Incident Description: REPAIRING MICROWAVE. Incident Location: Decedents Residence. COD: ELECTROCUTION. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: Accident.
67	2048229655	2020-Dec	68 YOM	TX	Decedent: 68 YOM. Incident Description: Working On A Microwave. Incident Location: Home. COD: Electrocuted, Accident-Post Cardiac Arrest. OSC: Cause of death , electrocution. Addtl ICD Codes: I469, T754. Autopsy? No. Manner of Death: Accident.
68	1937027567	2019-Apr	43 YOM	NC	THE 43-YEARS-OLD MALE DECEDENT - ELECTROCUTED BY ELECTRIC WOOD BURNING DEVICE (HOME USE). CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: YES.
69	1840020662	2018-Jul	31 YOM	OK	THE 31-YEARS-OLD MALE DECEDENT - ELECTRICAL WOOD CARVING DEVICE (NOS). CAUSE OF DEATH: ELECTROCUTION. OTHER SIGNIFICANT CONDITIONS: METHAMPHETAMINE USE. AUTOPSY: YES.
70	1517092491	2015-Nov	80 YOF	IL	AN 80 YOF DECEDENT GOT ELECTROCUTED WHEN HANDLING EXTENSION CORD WITH EXPOSED WIRES AT RESIDENCE. LOW VOLTAGE ELECTROCUTION. AUTOPSY- YES.
71	1947018192	2019-Mar	19 MOF	TN	1 Year 7 Months Old Female Contacted Extension Cord With Exposed Electrical Wires. COD: Low Voltage Electrocution. Autopsy? Yes. Manner of Death: Accident.
72	1948113547	2019-Jul	50 YOM	TX	50 YOM Electrical Shock From Exposed Electrical Wire On An Extension Cord. COD: Electrocution,Na,Na,Na. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: Accident.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
73	1948146801	2019-Sep	14 YOM	TX	14 YOM Decedent Was Attempting To Plug In An Extension Cord Into A Surge Protector. COD: Electrocution. Addtl ICD Codes: T754. Autopsy? Yes. Manner of Death: Accident.
74	2121033112	2021-Jul	28 YOM	KY	28 YOM decedent suffered electrocution by plugging in a light into extension cord. COD: low voltage electrocution. Autopsy - yes.
75	1719026943	2017-Nov	51 YOM	IA	THE 51-YEARS-OLD MALE DECEDENT WAS WORKING IN HIS GARAGE. HE GRABBED AN EXTENSION THAT HAD UNCOVERED WIRES. HE WAS FOUND UNRESPONSIVE AFTERWARDS AND WAS TRANSPORTED TO [REDACTED] EMERGENCY WHERE HE WAS PRONOUNCED. IMMEDIATE CAUSE OF DEATH: CARDIAC ARREST. SEQUENTIALLY LISTED CONDITIONS: ELECTROCUTION - EXPOSURE TO UNCOVERDD LIVE WIRE. AUTOPSY: NO.
76	2022000980	2020-Jul	55 YOM	LA	55 YOM DECEDENT FOUND FACE DOWN IN 18 INCHES OF WATER BESIDE WALKWAY OF BOATHOUSE WHERE HE HAD BEEN WORKING WITH POWER TOOLS HOOKED UP TO ELECTRICITY ON BOATHOUSE WITH EXTENSION CORDS. COD: PROBABLE ELECTRICUTION, PULMONARY EDEMA AND CONGESTION FROM SUBMERSION. AUTOPSY - YES.
77	1548106225	2015-Jul	34 YOM	TX	THE 34-YEARS-OLD MALE DECEDENT - FOR UNKNOWN REASONS, AN ELECTRICAL CURRENT WAS PASSING THE THROUGH GARAGE DOOR WHICH THE VICTIM TOUCHED AND WAS EL. CAUSE OF DEATH: EXPOSURE TO OTHER SPECIFIED ELECTRIC CURRENT. AUTOPSY: YES.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
78	1708022212	2017-Jul	30 YOF	CO	THE 30-YEARS-OLD FEMALE DECEDENT WAS ELECTROCUTED WHEN METAL LAMP FELL ONTO METAL BED FRAME AND EXPOSED BOX SPRINGS. IMMEDIATE CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: YES.
79	171011CCC2032 1605018378	2016-Aug	23 YOM	AR	THE VICTIM, A 23 YOM, WAS REPORTEDLY FOUND BY A FAMILY FRIEND IN AN UNRESPONSIVE STATE UNDERNEATH A PICKUP TRUCK. UPON ARRIVAL OF LAW ENFORCEMENT PERSONNEL, THE VICTIM WAS DETERMINED TO BE DECEASED AND HAD APPARENTLY BEEN DECEASED FOR A COUPLE OF DAYS PRIOR TO BEING FOUND. THE VICTIM REPORTEDLY WAS WORKING ON HIS TRUCK OUTSIDE ON A GRAVEL/DIRT SURFACE AND WHILE WORKING ON THE TRUCK HE USED AN UNIDENTIFIED WORK LIGHT THAT WAS CONNECTED TO AN UNIDENTIFIED EXTENSION CORD THAT WAS PLUGGED INTO AN ELECTRICAL OUTLET INSIDE A NEARBY SHED. WHILE UNDER THE TRUCK THE VICTIM APPARENTLY LAID ON TOP OF THE EXTENSION CORD AND THEN HE EITHER TURNED THE WORK LIGHT ON OR SET IT ON THE GROUND WHERE IT CAME INTO CONTACT WITH WATER RESULTING IN HIS BEING FATALLY ELECTROCUTED.
80	1448083408	2014-Jun	63 YOM	TX	THE 63-YEARS-OLD MALE DECEDENT - ELECTROCUTION FROM LAWN MOWER. CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: YES.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
81	171113HFE0001	2017-Aug	67 YOM	MN	A 67 YOM WAS MOWING HIS LAWN IN A ROAD DITCH AND AT SOME POINT HAD DIFFICULTY GETTING TRACTION AT THE BOTTOM OF THE DITCH AND THE TIPPED OVER. THE VICTIM INEXPLICABLY BECAME TRAPPED UNDERNEATH THE MOWER; WHEN HE WAS FOUND THE MOWER'S BLADES WERE NOT ENGAGED BUT THE MAN WAS DEAD AT THE SCENE. THE WIFE FOUND THE VICTIM AND CALLED 911. THE VICTIM WAS PRONOUNCED AT THE SCENE. THE CAUSE OF DEATH PER THE CORONER'S WAS ELECTROCUTION.
82	2038005524	2020-Aug	49 YOM	ND	49 YOM DECEDENT WAS MESSING WITH ELECTRICAL CORD NEAR THE POOL AT HOME. COD: CARDIAC ARREST D/T ELECTROCUTION. AUTOPSY - NO.
83	2048159595	2020-Aug	15 YOM	TX	Decedent: 15 YOM. Incident Description: Made Contact With Detached Underwater Light While Swimming In Hotel Pool. Incident Location: Hotel Swimming Pool. COD: Electrocution With Drowning. Addtl ICD Codes: T751, T754, W67. Autopsy? Yes. Manner of Death: Accident.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
84	160907HFE0006 1637065365	2016-Sep	17 YOF	NC	A 17 YEAR OLD FEMALE IN THE ROLE OF LIFE GUARD AT A NEIGHBORHOOD SWIMMING POOL WAS FOUND UNRESPONSIVE IN THE SWIMMING POOL. THE LIFE GUARD WHO FOUND THE VICTIM STATED THE SWIMMING POOL WATER WAS ELECTRIFIED AND THEY WERE UNABLE TO REMOVE THE VICTIM FROM THE WATER. PRELIMINARY AUTOPSY RESULTS INDICATE THE VICTIM WAS RENDERED UNCONSCIOUS FROM ELECTROCUTION AND SUBSEQUENTLY DROWNED IN THE POOL. A FAILED ELECTRICAL GROUNDING WIRE CAUSED THE POOL TO BECOME ELECTRIFIED WHEN THE POOL PUMP FAILED.
85	2121130159	2021-Jun	10 YOM	KY	Decedent: 10 YOM. Incident Description: ELECTROCUTED IN POOL WITH FAULTY LIGHTS. Incident Location: FRIEND'S HOME. COD: LOW-VOLTAGE ELECTROCUTION. Autopsy? YES. Manner of Death: ACCIDENT.
86	140528CNE0001 1412054783	2014-Apr	7 YOM	FL	A SEVEN-YEAR-OLD BOY WAS ELECTROCUTED WHEN HE CAME IN CONTACT WITH AN UNDERWATER POOL LIGHT THAT WAS RUSTED AND IMPROPERLY GROUNDED. THE INCIDENT OCCURRED IN HIS FAMILY'S IN-GROUND SWIMMING POOL.
87	1712097931	2017-Jun	50 YOM	FL	50 YOM DECEDENT WAS WORKING ON LIGHT WHILE HE WAS IN WATER AT CONDO FOUNTAIN. COD: LOW VOLTAGE ELECTROCUTION. AUTOPSY - YES.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
88	1912067977	2019-Apr	41 YOM	FL	41 YOM Decedent Was Witnessed To Be Electrocuted While Repairing Underwater Pool Light. COD: Electrocution. Addtl ICD Codes: T754, T754. Autopsy? Yes. Manner of Death: Accident.
89	2036060334	2020-Jun	54 YOM	NY	Decedent: 54 YOM. Incident Description: DROWNING IN POOL WITH FAULTY ELECTRICAL CIRCUIT. Incident Location: SWIMMING POOL AT RESIDENCE. COD: DROWNING.. OSC: Electrocution. Addtl ICD Codes: W69, T751, T754. Autopsy? Yes. Manner of Death: Accident.
90	190702CFE0001 1948101633	2019-Jun	50 YOM	TX	A 50-YEAR-OLD MALE DIED AS A RESULT OF ELECTROCUTION IN AN IN-GROUND POOL OF AN APARTMENT COMPLEX. FOUR OTHER VICTIMS WERE IN THE POOL AND SUSTAINED ELECTRICAL SHOCK, BUT NO PROLONGED INJURIES. AUTHORITIES INDICATED THAT THE CAUSE MAY HAVE BEEN DUE TO AN UNDERWATER LIGHT FIXTURE THAT MAY HAVE MALFUNCTIONED.
91	170523CFE0001 1701019025	2017-May	65 YOM	AL	A 65 YEAR OLD MALE SUFFERD AN ELECTRIC SHOCK WHILE CLEANING HIS RESIDENTIAL POOL. HIS 35 YEAR OLD SON WAS ALSO SHOCKED WHEN HE ATTEMPTED TO RESCUE HIS UNRESPONSIVE FATHER FROM THE POOL. BOTH VICTIMS DIED A FEW DAYS LATER AT THE HOSPITAL FROM THEIR INJURIES. A SUMP PUMP BEING USED TO CLEAN THE POOL WAS DETERMINED TO BE THE SOURCE OF INTERMITTENT ELECTRICAL CURRENT IN THE POOL WATER.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
92	1513063019	2015-Jul	35 YOM	GA	A 35 YOM Decedent submersed in swimming pool at home when others where shocked electrically. COD: Electrocution while in water. Autopsy Yes.
93	1606065611	2016-Mar	43 YOM	CA	A 43 YOM Decedent was electrocuted in a residential swimming pool (at home). Autopsy: Yes.
94	1701023027	2017-May	35 YOM	AL	THE 35-YEARS-OLD MALE DECEDENT - DROWNING DUE TO ELECTROCUTION. CAUSE OF DEATH: A. MULTIPLE ORGAN SYSTEMS FAILURE B. CARDIOPULMONARY RESPIRATORY ARREST C. DROWNING IN SWIMMING POOL D. ELECTROCUTION. AUTOPSY: NO.
95	1521021400	2015-Jun	49 YOM	KY	49 YOM DECEDENT WAS ELECTOCUTED WHEN HE WAS ATTEMTING TO FIX BROKEN SUMP PUMP UNDER FLOOR AT NEIGHBOR'S HOME. COD: ELECTOCUTION. AUTOPSY - NO.
96	2121118244	2021-May	56 YOM	KY	Decedent: 56 YOM. Incident Description: CUT WIRE WHILE CHANGING OUT WATER PUMP UNDER HOUSE. Incident Location: HOME. COD: SUDDEN CARDIAC DEATH DUE TO ELECTROCUTION. COD: W86. Autopsy? NO. Manner of Death: ACCIDENT.
97	1628074415	2016-Sep	42 YOF	MS	A 42 YOF was electrocuted while the shower. COD: Low volt electrocution. Autopsy: Yes.
98	2026002471	2020-Nov	82 YOM	MI	Decedent: 82 YOM. Incident Description: Electrocuted In Bathtub. Incident Location: Home. COD: Probable Electrocution. Addtl ICD Codes: T754, T754. Autopsy? No. Manner of Death: Accident.
99	1618014924	2016-Feb	64 YOF	IN	THE 64-YEARS-OLD FEMALE DECEDENT WAS FOUND UNRESPONSIVE IN BATHTUB WITH FACE UNDER WATER. CAUSE OF DEATH: ASPHYXIA DUE TO DROWNING. AUTOPSY: YES.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
100	1806137923	2018-Jul	79 YOM	CA	79 YOM Television Fell In Hot Tub. Addtl ICD Codes: T754. Autopsy? No. Manner of Death: Accident.
101	1529027176	2015-Sep	70 YOM	MO	THE 70-YEARS-OLD MALE DECEDENT WAS USING A CORDED ELECTRICAL DRILL REMOVING BOARDS FROM A DECK IN [HIS BACKYARD]. CAUSE OF DEATH: CARDIAC ARRHYTHMIA - ELECTROCUTION. AUTOPSY: NO.
102	1512140373	2015-Sep	68 YOM	FL	THE 68-YEARS-OLD MALE DECEDENT WAS ELECTROCUTED WITH OLD DRILL. CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: YES.
103	1453018659	2014-Aug	61 YOM	WA	61 YOM DECEDENT WAS WELDING ON RAINY 2ND FLOOR METAL DECK. WIFE HEARD HIM CRY OUT & FOUND HIM UNRESPONSIVE. SHE WAS SHOCKED WHILE ATTEMPTING TO GET HIS BODY & START RESUSCITATION. COD: PROBABLE CARDIAC ARREST D/T ELECTOCUTION; OCC: STAGE 4 COLON CANCER. AUTOPSY - NO.
104	1548109490	2015-Jul	26 YOM	TX	THE 26-YEARS-OLD MALE DECEDENT - OPERATING ELECTRICAL WELDER AND GRINDER. CAUSE OF DEATH: ELECTROCUTION. AUTOPSY: NO.
105	1642010213	2016-Jan	54 YOM	PA	54 YOM decedent suffered accident while welding at home. COD: cardiac arrhythmia d/t electrocution d/t welding accident.
106	1654008948	2016-Jun	53 YOM	WV	THE 53-YEARS-OLD MALE DECEDENT - WELDING OUTSIDE ON WET GROUND, TRIPPED GARAGE BREAKER. CAUSE OF DEATH: COMPLICATIONS OF ELECTROCUTION. AUTOPSY: NO.
107	1612116814	2016-Jul	71 YOM	FL	A 71 YOM Decedent was electrocuted while welding at his residence. COD: Electrocution. Autopsy No.

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#	Document Number(s)	Date	Age/Sex	State	Narrative
108	1825676246	2018-Jul	33 YOM	MA	33 YOM decedent came into contact with low voltage welding equipment in a basement. Probable cardiac dysrhythmia due to low voltage electrocution. Autopsy yes.
109	1818041935	2018-Aug	19 YOM	IN	19 YOM While Welding. COD: Complications Of Low-Voltage Electrocution. Addtl ICD Codes: T754. Manner of Death: Accident.
110	2039072736	2020-Jul	38 YOM	OH	Decedent: 38 YOM. Incident Description: Found On Floor With Welding Equipment Around. Incident Location: Home. COD: Electrocution. Addtl ICD Codes: T75. Autopsy? Yes. Manner of Death: Accident.
111	2012128514	2020-Jul	28 YOM	FL	28 YOM WITNESSED ELECTROCUTION WHILE HANDLING WELDING MACHINE. Incident Location: BARN. COD: ELECTROCUTION. OSC: No data. Addtl ICD Codes: T754, T754. Autopsy? YES. Manner of Death: Accident.

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December 12, 2022

Massachusetts Electrical Advisory Committee (MEAC) c/o
Paul Vigneau, Director
Division of Fire Safety
Department of Fire Services
P.O. Box 1025
Stow, MA 01775

Dear Mr. Vigneau:

Thank you for the opportunity to provide public comment on the very serious human impact of the 2020 NEC and the 2023 NEC code as drafted. In a word, it is **dreadful**. Of course, we deeply appreciate MEAC's focus on safety and remain strongly committed to a resolution that both protects safety and allows affordable housing residents to have the dignity of cooking in their own homes.

As you know, through our earlier advocacy including the enclosed petition from October, affordable housing providers have found that the GFCI circuit breakers required by the code are not compatible with current stove manufacturers' ability to deliver appliances that work with the breakers. EVERY time a resident attempts to cook, they trip the breakers. This nuisance tripping, happening in all the apartments built or renovated now, effectively means that entire low-income communities are without usable kitchens.

To date, **more than 1,700 units with low-income tenants have been suffering from this problem statewide from Boston to Springfield**. For example, at 2Life Communities, a nonprofit organization doing a comprehensive modernization of the existing Coleman House property in Newton, their low-income senior residents (average age 81) are moving into brand new apartments but due to nuisance tripping they are completely unable to cook. **These are residents who rely upon a median annual income of \$11,595 and for whom the loss of access to use of their kitchen appliances represents a literal threat to their ability to afford to eat**. None could host or even contribute to Thanksgiving dinners—something they found humiliating. This issue is not unique to residents at 2Life, as you will note that over 35 organizations signed the enclosed petition in October asking for a solution.

Since signing the enclosed petition in October, affordable housing providers have met with members of MEAC, representatives from the electrical breaker manufacturers, and the appliance manufacturers to find a solution to the immediate impacts of electric nuisance tripping. The two proposed interim solutions—enlarging the kitchen or hardwiring the stoves—are infeasible. All affordable housing built in MA is funded by the state in a cost-constrained environment which will not allow larger kitchens. Hardwiring the stoves is now allowed by only some local electrical inspectors—for those that do permit it, it is a cost burden of \$250-

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\$300/apartment outside of approved budgets. **Importantly, neither of these solutions are possible under the draft 2023 code—so all new construction or modernization projects which are planned to begin shortly will be faced with building unusable kitchens for very low-income people who have no other options.**

We have learned from the cooking manufacturers that they don't expect to have their manufacturing systems ready to be compatible with the GFCI breakers required in the code until Spring 2025. This 3+ year gap in the supply of cooking appliances that are compatible with GFCI breakers would mean affordable housing developers building thousands of units (at the state's urging) will face the unviable choice of delaying occupancy -- delays in receiving Certificates of Occupancy trigger severe penalties under the IRS code, since affordable housing relies on Low Income Housing Tax Credits -- or moving in families who cannot cook or afford to purchase prepared meals. Supply chain issues are also a serious consideration since there are limited quantities of the less expensive electric stoves and they are only available from a few manufacturers.

As you can see, we feel a sense of both urgency and desperation. **The codes as written pose very real hardship for the most vulnerable members of our communities.** PLEASE reexamine the existing 2020 state electrical code and the forthcoming 2023 NEC electrical code so that the hardship does not fall on low-income households and the federal, state and local resources that are supporting these affordable housing developments.

Sincerely,

2Life Communities

Allston Brighton Community Development Corporation

Beacon Communities

Boston Housing Authority (BHA)

Boston Center for Independent Living

Boston Neighborhood Community Land Trust (BNCLT)

Brookline Housing Authority

B'nai B'rith Housing (BBH)

Cambridge Continuum of Care (CoC)

Cambridge Housing Authority (CHA)

Capstone Communities LLC

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Chelmsford Housing Authority

CHOICE Housing Opportunities

Citizens' Housing and Planning Association (CHAPA)

Coalition for a Better Acre (CBA)

Commonwealth Community Developers, LLC

Community Development Partnership (CDP)

Community Teamwork, Inc. (CTI)

David Koven Consulting

Dellbrook | JKS

Domus Incorporated

Dorchester Bay Economic Development Corporation (DBEDC)

Essex County Community Organization

Fenway Community Development Corporation

Harborlight Homes

Hebrew SeniorLife

Henry Joseph & Associates

Hilltown Community Development

Home City Development, Inc.

Homeowner's Rehab, Inc. (HRI)

Housing Corporation of Arlington (HCA)

Jamaica Plain Neighborhood Development Corporation (JPNDC)

John M. Corcoran & Company

Local Initiatives Support Corporation (LISC) Boston

Maloney Properties

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Massachusetts Association of Community Development Corporations (MACDC)

Massachusetts Housing Investment Corporation (MHIC)

Massachusetts Housing Partnership (MHP)

Metro Housing Boston

Metro West Collaborative Development

Mission Hill Neighborhood Housing Services (MHNHS)

Munkenbeck Consulting

National Housing Law Project

Neighborhood of Affordable Housing, Inc. (NOAH)

NeighborWorks Housing Solutions

New Atlantic Development

New Ecology

North Shore CDC

Oxbow Urban LLC

PCA

Perkins Eastman

Petersen Engineering

Planning Office for Urban Affairs (POUA)

Preservation of Affordable Housing (POAH)

Resonant Energy

SCG Development Partners, LLC

Somerville Community Corporation (SCC)

South Boston NDC

Southwest Boston CDC

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Stravros Center for Independent Living

The Community Builders (TCB)

The Neighborhood Developers (TND)

Traggorth Companies LLC

Utile Architecture & Planning

Valley Community Development

VietAID

CC: Secretary Card, Executive Office of Energy and Environmental Affairs

Secretary Kennealy, Executive Office of Housing and Economic Development

Secretary Reidy, Executive Office of Public Safety and Security

Undersecretary Chang, Energy and Climate Solutions

Undersecretary Maddox, Department of Housing and Community Development (DHCD)

Commissioner Woodcock, Department of Energy Resources (DOER)

Maggie McCarey, Director, Energy Efficiency Division at DOER

Alana Murphy, Director of Policy at DHCD

Catherine Racer, Associate Director at DHCD

JoAnn Bodemer, Assistant Attorney General

Amber Villa, Chief, Neighborhood Renewal Division at Massachusetts Attorney General's Office

Beverly Craig, Senior Program Manager at MassCEC