



**RESEARCH**

# NON-FATAL ELECTRICAL INJURIES AT WORK

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# NON-FATAL ELECTRICAL INJURIES AT WORK, 2012 – 2016

## FINDINGS

- 9,760 workers in the U.S. were injured through exposure to electricity in the five years between 2012 and 2016, an average of 1,952 injuries per year.
- 16% of the injured were female, substantially higher than their share of fatal electrical injuries (1%).
- Workers aged 25 to 34 years and 35 to 44 years accounted for the largest shares of non-fatal injuries, each with 26% of the total.
- By occupation, workers in installation, maintenance, and repair occupations (29%), construction and extraction occupations (25%), service occupations (19%), and production occupations (12%) accounted for the largest number of deaths.
- 28% of injuries from exposure to electricity resulted in 31 or more days away from work, while 21% of injuries resulted in 6 to 30 days away from work: 8% involved 6 to 10 days away from work, 8% involved 11 to 20 days away from work, and 5% involved 21 to 30 days.

## TRENDS

- Between 2007 and 2016, 21,550 workers in the U.S. experienced some form of non-fatal electrical injury.
- These injuries followed a general downward trend over the ten-year period, but have fluctuated from year to year.
- The high point for injuries came in 2009, with 2,620 reported electrical injuries. The 1,640 injuries in 2016 represented the low point in this period.
- Injury rates per 10,000 workers varied between 0.2 and 0.3 per 10,000 workers and followed a downward trend over 10 years, but showed no improvement between 2012 and 2016.

## KEY TAKEAWAYS

- Despite a downward trend in annual non-fatal electrical injuries since 2007, the trend has levelled off since 2012.
- Many electrical injuries result in considerable lost work time, with 41% of injuries requiring more than two weeks away from work.
- While workers in installation, maintenance, and repair occupations and construction occupations account for the largest number of injuries, a substantial number of injuries involve occupations that may not be familiar with electrical hazards, including service occupations, production occupations, transportation and material moving occupations, and sales and related occupations.



# ..... Background

Electrical hazards pose an injury risk to workers in a variety of occupations and work environments. Many electrical injuries prove fatal, and research indicates that even those that aren't fatal can be particularly debilitating, oftentimes involving complicated recoveries and lasting emotional and physical impact. Information about workplace electrical injuries and how they occur can be vitally important in helping to guide prevention efforts.

In this report, we profile non-fatal occupational injuries in the U.S. caused by exposure to electricity from 2012 – 2016. The report draws on data from the U.S. Bureau of Labor Statistics (BLS) that is collected through its Survey of Occupational Illnesses and Injuries (SOII). Information in SOII is provided by employer reports of injuries and illnesses occurring during a calendar year and includes a number of important details for profiling the electrical injury problem, including demographic and occupation information of injury victims, industry in which victims were employed, details of the injury event, number of days away from work due to injury or illness, and other information.

It's important to note that SOII data do not represent a complete census of occupational injuries and illnesses, but are instead collected from reports submitted by a stratified sample of employers. SOII data does not include federal workplaces, self-employed workers, or establishments with 10 or fewer workers. A number of studies have found that SOII substantially undercounts the true number of occupational injuries and illnesses. Consequently, the number of non-fatal electrical injuries reported here should be considered to represent a conservative estimate of the electrical injury problem.

Due to changes in the OIICS coding system, it is not possible to make detailed comparisons for injuries in the years before changes were introduced. The analysis in this report therefore focuses on the most recent five-year period for which data are available, 2012 – 2016, with the exception of trend and overall summary data for electrical injuries for the years 2007 – 2016. In addition, the analysis in this report is restricted to electrical injuries in private industry and therefore excludes injuries in public sector populations.

BLS also collects information on fatal workplace injuries through a separate data collection system, the Census of Fatal Occupational Injuries (CFOI). Information on fatal work-related electrical injuries is available in a separate NFPA report, [\*Fatal Electrical Injuries at Work\*](#).

## Injury Events

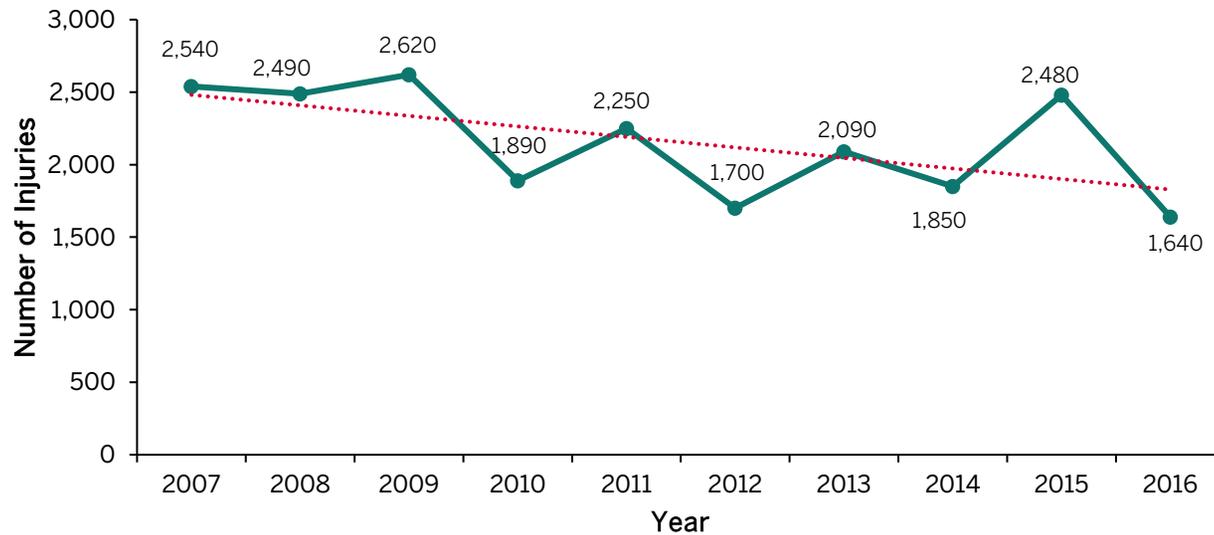
In OIICS 2.01, electrical injuries are identified at the most general level by the injury event code titled “Exposure to electricity,” followed by breakdowns according to “Direct exposure to electricity,” “Indirect exposure to electricity,” and “Exposure to electricity, unspecified.” Direct and indirect exposure to electricity are each further broken down by voltage exposures of 220 volts or less, greater than 220 volts, and unspecified voltage.

It should be understood that “exposure to electricity” is an inclusive code that includes not only the types of incidents typically associated with electrical work, such as contact with electrified machinery or equipment, but also includes lightning strikes, contact with electrical fences, or other electrical events. Injuries resulting from contact with power lines are also included. “Direct exposure to electricity” is defined as direct contact with a power source, such as touching a live electrical wire or coming into contact with an electrical arc. “Indirect exposure to electricity,” in turn, refers to injuries resulting from contact with water, pipes, or some other material that is unintentionally conducting electricity.

## Part 1. Electrical Injury Overview

Between 2007 and 2016, data from the U.S. Bureau of Labor Statistics (BLS) indicate that 21,550 workers in the U.S. experienced some form of non-fatal electrical injury. As Figure 1 shows, these injuries followed a general downward trend over the ten-year period, but annual totals have fluctuated from year to year. The high point for injuries came in 2007 to 2009, with 2,620 reported electrical injuries. The 1,640 injuries in 2016 represented the low point in this period.

**Figure 1. Annual Number of Non-Fatal Electrical Injuries at Work, 2007 – 2016\***

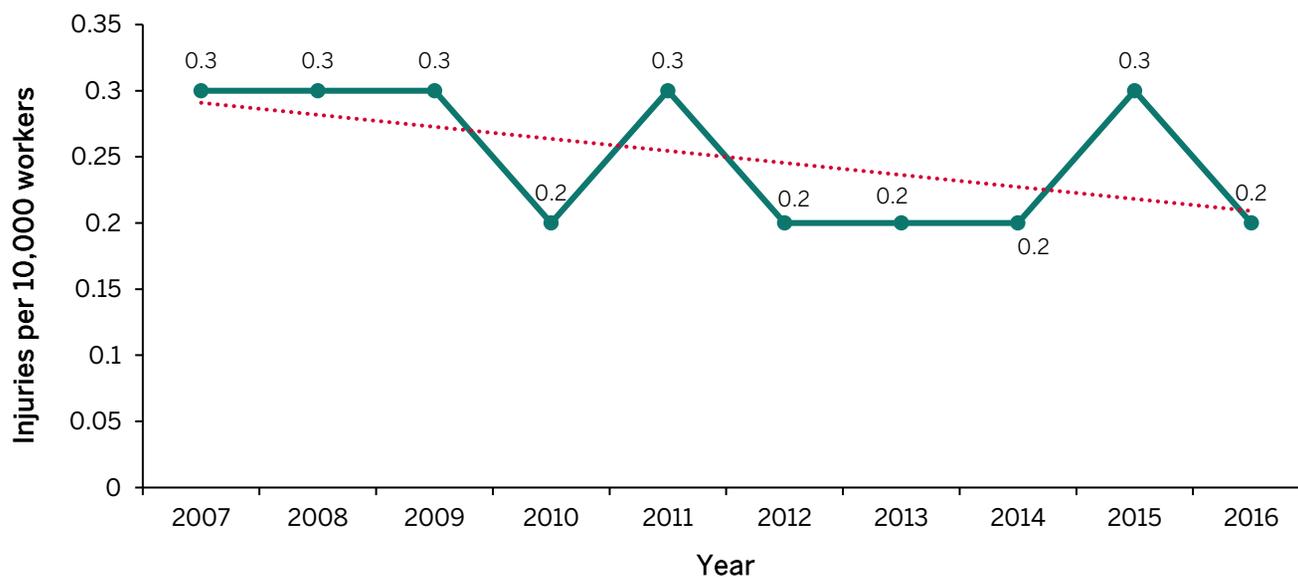


Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

\*Injuries for 2007-2010 represent OIICS injury event code 31XXXX, "Contact with Electric Current," and injuries for 2011-2016 represent OIICS injury event code 51XXXX, "Exposure to Electricity."

Since year-to-year changes in the number of work injuries can simply reflect increases or decreases in the number of workers in the underlying population rather than actual changes in injury experience, it is also useful to consider changes in electrical injuries per 10,000 workers in order to standardize the data and provide an alternative way of evaluating trends. Figure 2 shows non-fatal electrical injuries at work per 10,000 workers in the 2007 – 2016 period. Here again, there is a downward trend in injury rates, with some year-to-year fluctuation. With the exception of 2010, the injury rate stood at 0.3 injuries per 10,000 workers between 2007 and 2011, then fell to 0.2 injuries per 10,000 workers between 2012 and 2016, with the exception for 2015.

**Figure 2. Non-Fatal Electrical Injuries at Work per 10,000 Workers, 2007 – 2016\***



Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.  
\*Injuries for 2007-2010 represent OIICS injury event code 31XXXX, "Contact with Electric Current," and injuries for 2011-2016 represent OIICS injury event code 51XXXX, "Exposure to Electricity."

## Non-Fatal Work Injuries: 2012 – 2016

BLS data indicate that 9,760 workers in the U.S. experienced some form of electrical injury in the five years between 2012 and 2016.

Demographic characteristics of injury victims are shown in Table 1. Most of these injuries were experienced by men (84%), and over half of those injured (52%) were 25 to 44 years of age, while 15% were 24 years or younger and 12% were 55 years of age or older.

**Table 1. Non-Fatal Work Injuries from Exposure to Electricity by Select Worker Characteristics, 2012 – 2016**

Worker Characteristic	Injuries	Percentage
<b>Total injuries</b>	9,760	100%
<b>Gender</b>		
Men	8,160	84%
Women	1,520	16%
<b>Age</b>		
16 to 19	170	2%
20 to 24	1,310	13%
25 to 34	2,550	26%
35 to 44	2,510	26%
45 to 54	1,930	20%
55 to 64	1,040	11%
65 and over	70	1%
Unknown or unreported	250	3%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

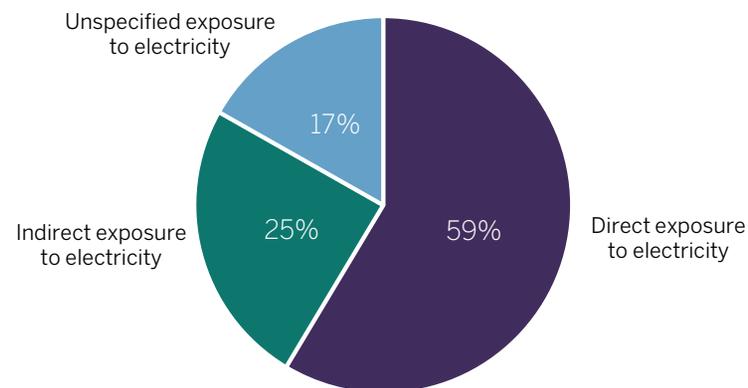
## Type of Exposure

Of the electrical injuries due to exposure to electricity in 2012 – 2016, 5,720 injuries (59%) resulted from direct exposure to electricity, while 2,400 injuries (25%) resulted from indirect exposure to electricity. Exposure was unspecified in 1,640 injuries (17%).

## Occupation

Workers in installation, maintenance, and repair occupations accounted for the largest share of non-fatal injuries (29% of the total), followed by workers in construction and extraction occupations (25%), and workers in service occupations (19%). Workers in production occupations accounted for 12% of the non-fatal injuries, with another 4% of injuries involving workers in transportation and material moving occupations. There were smaller shares of electrical injuries among sales and related occupations (3%), office and administrative support, (2%), healthcare practitioners and technical occupations (2%), management, business, and financial occupations (2%), and computer, engineering, and science occupations (1%). Collectively, workers in these latter occupations -- generally professional, office, or technical occupations -- nonetheless accounted for 10% of non-fatal injuries from exposure to electricity.

**Figure 3. Non-Fatal Electrical Injuries at Work by Type of Exposure, 2012 – 2016**



Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

**Table 2. Non-Fatal Work Injuries from Exposure to Electricity by Occupation, 2012 – 2016**

Occupation	Injuries	Percentage
Installation, maintenance, and repair	2,820	29%
Construction and extraction	2,400	25%
Service	1,890	19%
Production	1,150	12%
Transportation and material moving	360	4%
Sales and related	280	3%
Office and administrative support	210	2%
Healthcare practitioners and technical	190	2%
Management, business, financial	180	2%
Computer, engineering, and science	130	1%
Other occupations	150	2%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## Rates of Non-Fatal Electrical Injury by Occupation

Workers in installation, maintenance, and repair occupations and those in construction and extraction occupations had the highest electrical injury rates per 10,000 workers between 2012 and 2016, as shown in Table 3. Both occupational groups had electrical injury rates that were three or more times higher than other occupations. Workers in production occupations and service occupations had the next highest rates, as did farming, fishing, and forestry in two of the five years.

**Table 3. Non-Fatal Electrical Injuries per 10,000 Workers by Occupation, 2012 – 2016**

Occupation	2012	2013	2014	2015	2016
Installation, maintenance, and repair	1.3	1.9	1.0	1.3	1.0
Construction and extraction	0.9	1.1	1.4	1.2	0.9
Production	0.3	0.2	0.3	0.4	0.3
Service	0.1	0.2	0.2	0.4	0.2
Healthcare practitioners and technical	0.1	0.1	0.0	0.1	0.0
Transportation and material moving	0.1	0.1	0.1	0.0	0.1
Sales and related	0.1	0.0	0.1	0.1	0.1
Farming, fishing, and forestry	–	0.3	–	–	0.3

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.  
Note: Dashes indicate that data do not meet BLS publication guidelines.

## Source of Injury

The source of injury in the OIICS coding system represents the object, substance, equipment, or other factor responsible for the injury or that precipitated the injury event.<sup>1</sup>

Table 4 shows that parts and materials were the source of injury in three out of five injuries (59%) caused by exposure to electricity, followed by machinery (19%), furniture or fixtures (5%), hand tools (5%), and vehicles (1%).

**Table 4. Non-Fatal Electrical Injuries by Source of Injury, 2012 – 2016**

Source of injury	Injuries	Percentage
Parts and materials	5,750	59%
Machinery	1,880	19%
Furniture or fixtures	470	5%
Hand tools	460	5%
Vehicles	70	1%
All other	970	10%
Unknown*	120	1%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.  
\*Includes injuries in which source of injury doesn't meet BLS publication criteria.

<sup>1</sup> Bureau of Labor Statistics, Occupational Injury and Illness Classification Manual Version 2.01, January 2012. Available at: [https://www.bls.gov/iif/oiics\\_manual\\_2010.pdf](https://www.bls.gov/iif/oiics_manual_2010.pdf).

## Number of Days Away From Work

Table 5 shows that more than one-quarter (28%) of occupational injuries resulting from exposure to electricity resulted in 31 or more days away from work. While 22% of injuries involved one lost workday and 14% two lost workdays, another 21% of injuries resulted in 6 to 30 days away from work: 8% involved 6 to 10 days away from work, 8% in 11 to 20 days away from work, and 5% in 21 to 30 days away from work. Fourteen percent of the electrical injuries resulted in three to five days away from work.

**Table 5. Number of Days Away from Work Due to Exposure to Electricity, 2012 – 2016**

Number of days away from work	Injuries	Percentage
Cases involving 1 day	2,140	22%
Cases involving 2 days	1,410	14%
Cases involving 3-5 days	1,390	14%
Cases involving 6-10 days	810	8%
Cases involving 11-20 days	740	8%
Cases involving 21-30 days	480	5%
Cases involving 31 or more days	2,780	28%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## Part 2. Direct Exposure to Electricity

Direct exposure to electricity at work resulted in a total of 5,720 injuries in 2012 – 2016. These injuries are produced by direct contact with a power source, such as contact with live electrical wiring or being struck by an electrical arc.

The demographic characteristics of injury victims are shown in Table 6. Most of these injuries were experienced by men (88%), and half of those injured (50%) were 25 to 44 years of age, while 14% were 24 years or younger and 14% were 55 years of age or older.

**Table 6. Non-Fatal Work Injuries from Direct Exposure to Electricity by Select Worker Characteristics, 2012 – 2016**

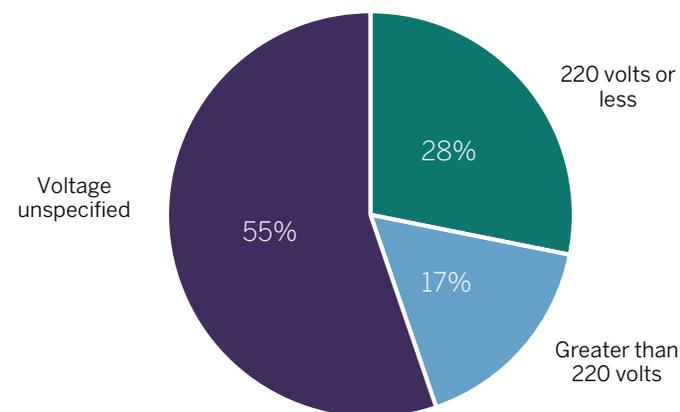
Characteristic	Injuries	Percentage
<b>Gender</b>		
Men	5,060	88%
Women	660	12%
<b>Age</b>		
16 to 19	80	1%
20 to 24	740	13%
25 to 34	1,480	26%
35 to 44	1,380	24%
45 to 54	1,150	20%
55 to 64	730	13%
65 and over	40	1%
<b>Total</b>	<b>5,720</b>	<b>100%</b>

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## Direct Exposure to Electricity by Voltage

As Figure 4 shows, 28% of direct exposure injuries (1,610 injuries) involved voltage of 220 volts or less and 17% (950 injuries) involved voltage of greater than 220 volts. Voltage was unspecified in 55% (3,160 injuries) of injuries due to direct exposure to electricity.

**Figure 4. Non-Fatal Injuries at Work by Direct Exposure to Electricity, 2012 – 2016**



Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## Occupation

Table 7 shows that workers in installation, maintenance, and repair occupations accounted for the largest share of non-fatal injuries (35% of the total) resulting from direct exposure to electricity, followed by workers in service occupations (20%), workers in construction and extraction occupations (19%), and workers in production occupations (13%). Transportation and material moving occupations accounted for 4% of these injuries and sales and related occupations for 3%.

**Table 7. Non-Fatal Work Injuries from Direct Exposure to Electricity by Occupation, 2012 – 2016**

Occupation	Injuries	Percentage
Installation, maintenance, and repair	2,010	35%
Service	1,130	20%
Construction and extraction	1,080	19%
Production	760	13%
Transportation and material moving	250	4%
Sales and related	160	3%
Other occupations*	330	6%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

\*Other occupations include computer, engineering, and science occupations, office and administrative support occupations, education, legal, community service, arts, and media occupations, health care practitioners and technical occupations, farming, forestry, and fishing occupations, and management, business, and financial occupations.

## Rates of Non-Fatal Injury from Direct Exposure to Electricity by Occupation

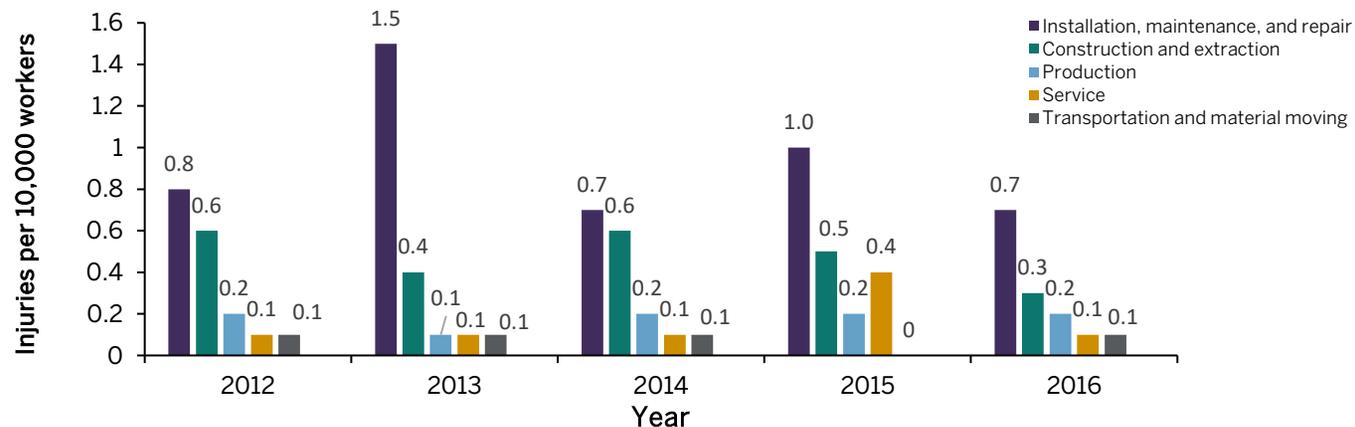
Table 8 shows that workers in installation, maintenance, and repair occupations had the highest rates of electrical injury per 10,000 workers between 2012 and 2016, followed by those in construction and extraction occupations. Both occupational groups had electrical injury rates that were substantially higher than other occupations. Workers in production occupations, service occupations, and transportation and material moving occupations had the next highest rates. The injury rate for service occupations of 0.4 per 10,000 workers in 2015 was notably higher than other years and approached or exceeded the electrical injury rates for construction and extraction occupations during the 2012 – 2016 period. Figure 5 provides a visual illustration of this data.

**Table 8. Non-Fatal Injuries from Direct Exposure to Electricity per 10,000 Workers by Occupation, 2012 – 2016**

Occupation	2012	2013	2014	2015	2016
Installation, maintenance, and repair	0.8	1.5	0.7	1.0	0.7
Construction and extraction	0.6	0.4	0.6	0.5	0.3
Production	0.2	0.1	0.2	0.2	0.2
Service	0.1	0.1	0.1	0.4	0.1
Transportation and material moving	0.1	0.1	0.1	0.0	0.1

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

**Figure 5. Non-Fatal Injuries from Direct Exposure to Electricity per 10,000 Workers by Occupation, 2012 – 2016**



Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## Non-Fatal Injuries from Direct Exposure to Electricity by Source of Injury

Table 9 shows that parts and materials were the source of injury in two out of three injuries (67%) caused by direct exposure to electricity, followed by machinery (15%), furniture or fixtures (4%), and hand tools (1%).

**Table 9. Non-Fatal Injuries from Direct Exposure to Electricity by Source of Injury, 2012 – 2016**

Source of injury	Injuries	Percentage
Parts and materials	3,830	67%
Machinery	830	15%
Furniture or fixtures	250	4%
Hand tools	70	1%
All other	600	10%
Unknown*	140	1%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.  
\*Includes injuries in which source of injury doesn't meet BLS publication criteria.

## Number of Days Away From Work

Table 10 shows that three in 10 (30%) occupational injuries resulting from direct exposure to electricity resulted in 31 or more days away from work. While 21% of injuries involved one lost workday and 13% two lost workdays, another 15% of injuries resulted in 11 to 30 days away from work -- 9% involved 11 to 20 days away from work and 6% in 21 to 30 days away from work. One in ten injuries (10%) resulted in six to 10 days away from work and 13% resulted in three to five days away from work.

**Table 10. Number of Days Away from Work Due to Direct Exposure to Electricity, 2012 – 2016**

Number of days away from work	Injuries	Percentage
Cases involving 1 day	1,180	21%
Cases involving 2 days	760	13%
Cases involving 3-5 days	730	13%
Cases involving 6-10 days	560	10%
Cases involving 11-20 days	490	9%
Cases involving 21-30 days	320	6%
Cases involving 31 or more days	1,690	30%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## ..... Part 3. Indirect Exposure to Electricity

Indirect exposure to electricity at work resulted in a total of 2,400 injuries in 2012 – 2016. These injuries are produced by contact with an object that is unintentionally conducting electricity, such as injuries sustained while standing in water that is conducting electricity or while carrying a ladder that touches a utility line.

The demographic characteristics of injury victims are shown in Table 11. Most of these injuries were experienced by men (78%), but the 22% share of injuries sustained by women is higher than it is for direct exposure electrical injuries. More than half of those injured (54%) were 25 to 44 years of age, while 17% were 24 years or younger and 17% were aged 45 to 54 and 8% were 55 years of age or older.

**Table 11. Non-Fatal Work Injuries from Indirect Exposure to Electricity by Select Worker Characteristics, 2012 – 2016**

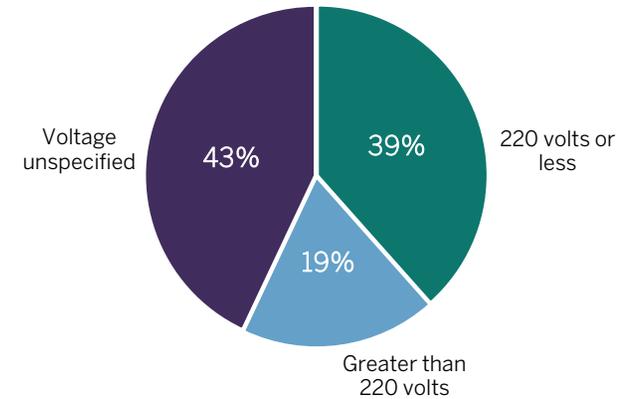
Worker characteristic	Injuries	Percentage
<b>Total injuries</b>	2,400	100%
<b>Sex</b>		
Men	1,870	78%
Women	520	22%
<b>Age</b>		
16 to 19	50	2%
20 to 24	360	15%
25 to 34	760	32%
35 to 44	540	23%
45 to 54	410	17%
55 to 64	190	8%
65 and over	0	0%
Unknown	90	4%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## Indirect Exposure to Electricity by Voltage

As Figure 6 shows, 39% of indirect exposure injuries (930 injuries) involved voltage of 220 volts or less and 19% (450 injuries) involved voltage of greater than 220 volts. Voltage was unspecified in 43% (1,040 injuries) of injuries due to direct exposure to electricity.

**Figure 6. Non-Fatal Injuries at Work by Indirect Exposure to Electricity, 2012 – 2016**



Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## Occupation

Table 12 shows that workers in construction and extraction occupations experienced the largest share of non-fatal injuries (35%) resulting from indirect exposure to electricity, followed by workers in service occupations (22%), and those in installation, maintenance, and repair occupations (16%) and production occupations (10%).

**Table 12. Non-Fatal Work Injuries from Indirect Exposure to Electricity by Occupation, 2012 – 2016**

Occupation	Injuries	Percentage
Construction and extraction	830	35%
Service	530	22%
Installation, maintenance, and repair	380	16%
Production	240	10%
Other occupations*	420	18%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

\*Other occupations include computer, engineering, and science occupations, office and administrative support occupations, education, legal, community service, arts, and media occupations, health care practitioners and technical occupations, farming, fishing, and forestry occupations, and management, business, and financial occupations.

## Rates of Non-Fatal Injury from Indirect Exposure to Electricity by Occupation

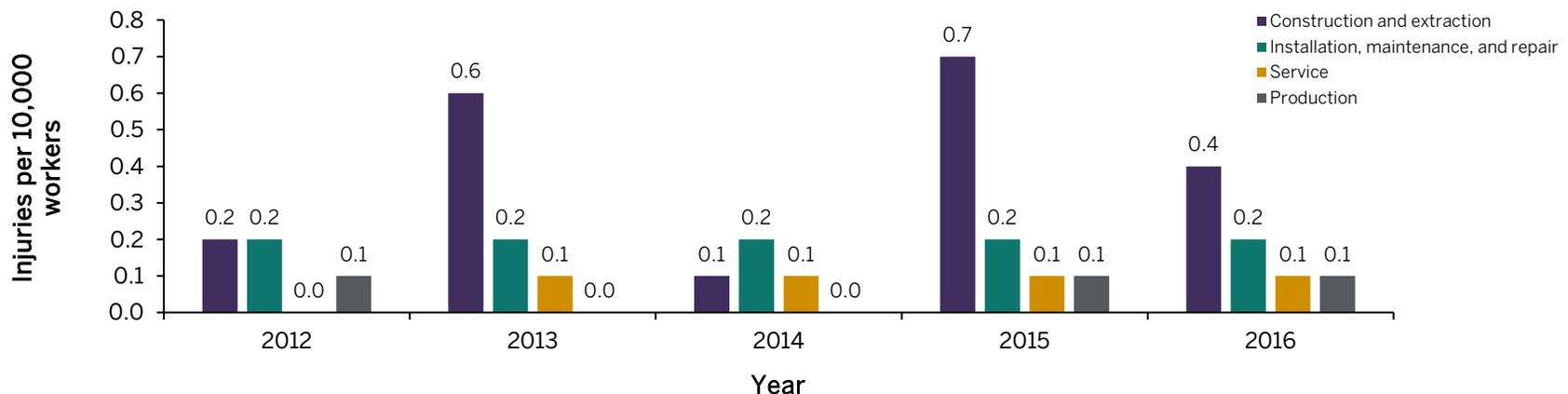
Table 12 shows that workers in construction and extraction occupations generally had the highest rates of injury per 10,000 workers due to indirect exposure to electricity between 2012 and 2016, with the exception of 2014, when workers in installation, maintenance, and repair occupations had the highest rate. Both occupational groups had indirect exposure electrical injury rates that were substantially higher than other occupations. Workers in service occupations and production occupations had the next highest rates. Rate data were not available for other occupations due to BLS restrictions on publication criteria. Figure 7 provides a visual illustration of this data.

**Table 12. Non-Fatal Injuries from Indirect Exposure to Electricity per 10,000 Workers by Occupation, 2012 – 2016**

Occupation	2012	2013	2014	2015	2016
Construction and extraction	0.2	0.6	0.1	0.7	0.4
Installation, maintenance, and repair	0.2	0.2	0.2	0.2	0.2
Service	0.0	0.1	0.1	0.1	0.1
Production	0.1	0.0	0.0	0.1	0.1

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

**Figure 7. Non-Fatal Injuries from Indirect Exposure to Electricity per 10,000 Workers by Occupation, 2012 – 2016**



Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## Non-Fatal Injuries from Indirect Exposure to Electricity by Source of Injury

Table 13 shows that parts and materials were the source of injury in two out of five injuries (41%) caused by indirect exposure to electricity, followed by machinery (29%), hand tools (13%), and furniture or fixtures (5%).

**Table 13. Non-Fatal Injuries from Indirect Exposure to Electricity by Source of Injury, 2012 – 2016**

Source of injury	Injuries	Percentage
Parts and materials	990	41%
Machinery	690	29%
Hand tools	300	13%
Furniture or fixtures	110	5%
All other	170	7%
Unknown*	140	6%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.  
\*Includes injuries in which source of injury doesn't meet BLS publication criteria.

## Number of Days Away From Work

Table 14 shows that three in 10 (30%) occupational injuries resulting from indirect exposure to electricity resulted in 31 or more days away from work. Another 3% of the injuries resulted in 21 to 30 days away from work, and 6% in 11 to 20 days from work. Almost one-fifth injuries (18%) resulted in three to five days away from work and 6% resulted in six to 10 days away from work. Approximately one-third (34%) of the injuries involved one to two days from work.

**Table 14. Number of Days Away from Work Due to Indirect Exposure to Electricity, 2012 – 2016**

Number of days away from work	Injuries	Percentage
Cases involving 1 day	450	19%
Cases involving 2 days	360	15%
Cases involving 3-5 days	440	18%
Cases involving 6-10 days	140	6%
Cases involving 11-20 days	140	6%
Cases involving 21-30 days	80	3%
Cases involving 31 or more days	730	30%

Source: Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses.

## Part 4. Discussion

On average, data from the U.S. Bureau of Labor Statistics indicate that U.S. workers experienced nearly 2,000 non-fatal injuries a year from exposure to electricity in the five years from 2012 to 2016. Although these injuries have followed a general downward trend over the past 10 years, their sheer number nonetheless indicates the ongoing importance of workplace electrical safety efforts, a point that is underscored by that relatively flat rate of electrical injuries per 10,000 workers dating to 2010 that was shown in Figure 2.

The case for injury prevention is also borne out by the serious nature of many electrical injuries. As the data indicate, nearly three in 10 electrical injuries (28%) in 2012 – 2016 involved 31 or more days of lost work time, with another 13% of the injuries requiring 11 to 30 days off from work, 8% requiring six to 10 days off, and 13% requiring 11 to 30 days. Clearly, these injuries are debilitating for victims and costly for employers, strongly suggesting that good safety practice is not just the right thing to do, but also makes for a sound investment.

Many of the injuries are experienced by workers who perform electrical tasks, such as those in installation, maintenance, and repair occupations and construction and extraction occupations. However, electrical injuries were also experienced by occupations not necessarily associated with exposure to electrical hazards, including service occupations, production occupations, even sales and related occupations.

Most electrical injuries (59%) resulted from direct exposure to electricity, with 25% due to indirect exposure and 17% with form of exposure unspecified. A much higher share of injuries from direct exposure to electricity resulted from contact with parts and materials (67%) than was the case for indirect exposure (41%). Indirect exposure injuries, in turn, were more likely to be due to machinery (29%), which accounted for 15% of direct exposure injuries.

Electrical injuries can be reduced or eliminated through the use of proper safety procedures, engineering controls, training programs, personal protective equipment, and other methods. It's important for workers to receive appropriate training for the electrical hazards they may face in their jobs, whether that involves being attentive to overhead powerlines, knowing not to use electrical equipment if wiring is frayed or ground prongs are missing, or ensuring that equipment is locked and tagged out before beginning electrical work. It's also important for employers and supervisors to ensure that workers exposed to electrical hazards receive proper safety training and that work schedules provide adequate time for electrical safety procedures to be followed in full.

## Electrical Safety Practices

- Electrical equipment must be properly grounded to prevent against electrical shock.
- Electrical power tools and equipment should be maintained in good working order.
- Ground-fault circuit interrupters should be used to protect against shock.
- Live parts of electrical equipment that operates at 50 or more volts must be guarded to protect against unintentional contact.
- Job hazards, including electrical hazards, need to be identified and discussed in a pre-job analysis before beginning work.
- Workers need to receive adequate electrical safety training for their job assignments and to be trained by qualified instructors.
- Equipment with arc flash or arc blast hazards should be isolated to ensure that only qualified workers are allowed near.
- Machinery must be de-energized when it needs any kind of maintenance and workers must test to ensure no charge.
- Workers need to be provided with the correct personal protective equipment for their jobs and to be trained in proper use of PPE.
- Electrical hazards must be clearly marked by signage.

## Resources on Electrical Safety

NFPA 70E *Standard for Electrical Safety in the Workplace* sets out requirements for safe work practices to protect workers from exposure to electrical hazards. Information and access to the document is available at [NFPA 70E Standard for Electrical Safety in the Workplace](#).

The National Institute for Occupational Safety and Health (NIOSH) has a variety of information and guidance on electrical safety, as well as links to electrical safety resources, at: [www.cdc.gov/niosh/topics/electrical/](http://www.cdc.gov/niosh/topics/electrical/).

The Occupational Safety and Health Administration (OSHA) has information on electrical safety standards, hazard recognition, training opportunities, and solutions, and other information at: <https://www.osha.gov/SLTC/electrical/>.

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