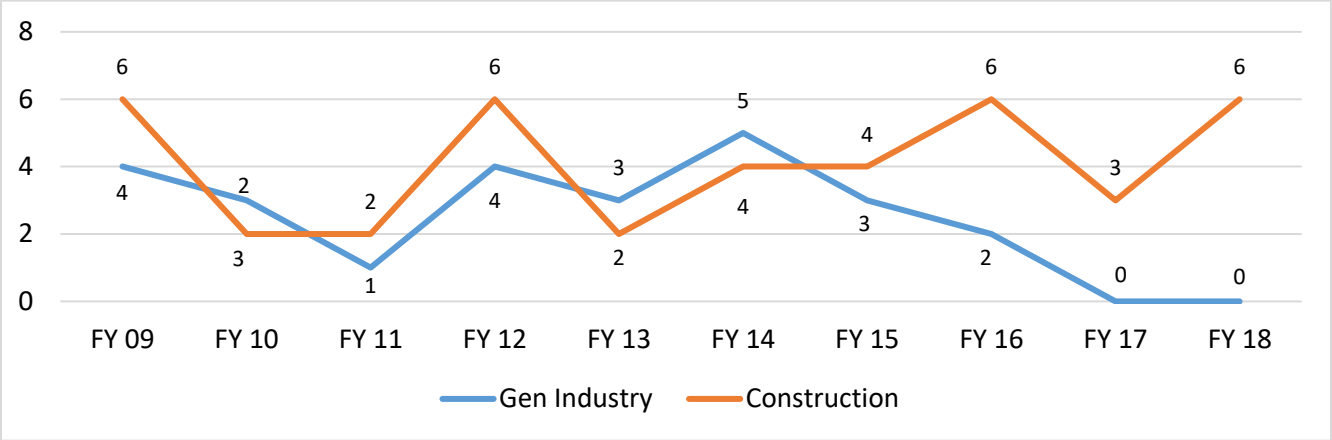
FY 18 Houston Area Electrical Related Fatality Incidents

Working with or around electricity can be very dangerous when proper precautions aren't taken. Electricity comes in varying voltages and is invisible, making testing by a qualified person important prior to working near electrical equipment. In Fiscal Year (FY) 2018 there were six electrical related fatalities in construction compared to 3 incidents in FY 17. Electrical incidents in general industry have been in decline for several years. By implementing and enforcing safe electrical practices we can prevent electrical incidents in the future.

Houston Area Electrical Related Fatalities FY 09 – FY 18



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- Employee was changing out a 480 Volt breaker while hot without arc flash PPE or insulated tools. During the change out he touched the switch gear cabinet with a screwdriver while securing the new breaker to one of the poles causing a short and arc flash. He was taken to the hospital in critical condition and later died. A second worker received burns on his arms attempting to aid him. A third worker was also burned attempting to aid him but was not hospitalized.
- Two employees were in the process of connecting new air conditioning ductwork in the attic of a residential home. One employee kneeled on a metal gas line and then placed his hand on the 110 VAC air handling unit. He called out "the power got me." The second employee exited the attic and informed the owner of the company who disconnected the main breaker. It appears exposed outlets and wiring had made contact with the metal ductwork and/or HVAC unit. He was taken to a local hospital and was pronounced dead a few minutes later.
- Two employees were installing electrical lighting fixtures inside a school being remodeled. One of the employees was working alone in a hall when a subcontractor employee in a nearby room heard a noise and saw the worker in the hall was being electrocuted. He kicked the ladder and the employee fell to the floor. Paramedics responded to the incident but he died from his injuries.
- Employees were installing a new powerline pole near an old pole that was still carrying energized lines. The new pole was being held in the air at an inclined angle by a boom hoist. The worker grabbed the low end of the pole and moved it into an energized line electrocuting him.
- A dump truck driver was found electrocuted outside of the truck with the dump section raised and in contact with overhead power lines.
- A worker was in a dugout hole 2' X 2' X 2.9' repairing the foundation of a house. While in the process of placing the concrete mortars he got shocked possibly from the wiring of the hydraulic machine lifting the house.

In the past 10 years there has been approximately 66 electrical related fatalities/catastrophes in the Houston area. Forty-one of the incidents were in construction and 25 were in general industry. When we look at these past incidents there are a number of general safety rules that could have prevented these deaths:

- **Employees unqualified to work with electricity should remain at least 10 feet (3.05 meters) away from overhead power lines, and keep mechanical equipment at least that distance away too. If the voltage is more than 50,000 volts, the clearance increases by 4 inches (10 centimeters) for each additional 10,000 volts. Clearance distances includes tools and materials such as ladders, scaffolds, and tools.**
    - Employee using an aluminum extension ladder to access the roof of a condominium contacted an overhead power line and was electrocuted.
    - Employee backing up an aerial lift contacted a 19k powerline and was electrocuted.
- **Ensure any electrical circuits and wires in the work area have been identified and deenergized prior to beginning working.**
    - Employee and his supervisor were attempting to identify wire connections that were run from lighting fixtures that had not been removed. The wires were to be taken out of service. The employee uncoiled one of the 277v wires that had been disconnected from the fixture and was electrocuted.
- **Utilize lockout/tagout procedures and verify that power is deenergized prior to work.**
    - EE in process of wiring overhead fluorescent light in plant attic came in contact with stripped energized 277 volt electrical wiring hanging over the fixture
    - Employee was installing a 480 volt compressor motor and was holding three 280 volt wires, stripping the ends with a pair of wire stripping pliers when he contacted the 280 volt wiring.
- **Assume electrical circuits are energized until proven otherwise.**
    - Employee installing drywall where conduit was obstructing the installation. He attempted to remove it by cutting it and was electrocuted.
    - A journeyman electrician and two apprentices were rewiring a 480 volt box and bringing the cable to the box. The box was thought to be dead and they began to work when an arc flash occurred. All three employees were admitted to the hospital.
- **Ensure equipment is installed correctly, including equipment and system grounding, and is maintained in a safe condition.**
    - An employee using a fan to cool off while he repaired a gage on a fuel truck. He had received a shock after contacting the floor fan. The fan would intermittently start and stop. He was discovered by someone checking up on him. Cause of death believed to be electrocution.
    - Employee was installing the rides for fair/festival that was to start and while walking to a restroom he touched a fence from one of the rides and received an electric shock. He died several days later.
- **Ensure cords and plugs are maintained in a safe condition, protected from damage, and GFCIs are used.**
    - Employee was installing PVC plumbing pipe in the ceiling of a newly constructed building. He was found at the foot of the ladder laying on top of an extension cord with tape and exposed wires. The cord was plugged into an energized 120 volt outlet.
    - A 40 year old employee went to his tool box and was electrocuted. A 120 volt extension cord used to power the employees grinder and fan was lying across a welders ground clamp. The ground clamp became hot melting the insulation on the extension cord and the hot conductor came in contact with the grounding clamp energizing the equipment being welded and anything connected to it. The tool box and the equipment were connected by a piece of flat bar.

The majority of the electrical related fatalities occurred from not following or implementing electrical safe work practices. There are OSHA standards for installation and design of electrical systems and components and safe work practices, along with industry standards such as the National Electric Code and NFPA-70 E.

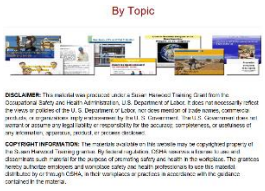
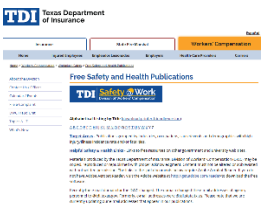
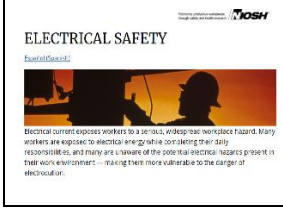
The OSHA Electrical safety-related work practice requirements for general industry are detailed in Subpart S of 29 CFR Part 1910, in Sections 1910.331–1910.335. For construction applications, electrical safety-related work practice requirements are detailed in Subpart K of 29 CFR Part 1926.416 to 1926.417.

In FY 18, Federal OSHA issued 304 citations in construction and 552 in general industry related to violations of the electrical safe work practices requirements. The top five in each industry were:

Standard	Cited	Construction Narrative
1926.416(a)(1)	123	No employer shall permit an employee to work in such proximity to any part of an electric power circuit that the employee could contact the electric power circuit in the course of work, unless the employee is protected against electric shock by deenergizing the circuit and grounding it or by guarding it effectively by insulation or other means.
1926.416(e)(1)	107	Worn or frayed electric cords or cables shall not be used.
1926.416(a)(3)	37	Before work is begun the employer shall ascertain by inquiry or direct observation, or by instruments, whether any part of an energized electric power circuit, exposed or concealed, is so located that the performance of the work may bring any person, tool, or machine into physical or electrical contact with the electric power circuit. The employer shall post and maintain proper warning signs where such a circuit exists. The employer shall advise employees of the location of such lines, the hazards involved, and the protective measures to be taken.
1926.417(b)	18	Equipment or circuits that are deenergized shall be rendered inoperative and shall have tags attached at all points where such equipment or circuits can be energized.
1926.417(a)	9	Controls that are to be deactivated during the course of work on energized or deenergized equipment or circuits shall be tagged.

Standard	Cited	General Industry Narrative
1910.334(a)(2)(i)	79	Portable cord and plug connected equipment and flexible cord sets (extension cords) shall be visually inspected before use on any shift for external defects (such as loose parts, deformed and missing pins, or damage to outer jacket or insulation) and for evidence of possible internal damage (such as pinched or crushed outer jacket). Cord and plug connected equipment and flexible cord sets (extension cords) which remain connected once they are put in place and are not exposed to damage need not be visually inspected until they are relocated.
1910.335(a)(1)(i)	72	Employees working in areas where there are potential electrical hazards shall be provided with, and shall use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed.
1910.332(b)(1)	60	Employees shall be trained in and familiar with the safety-related work practices required by 1910.331 through .335 that pertain to their respective job assignments.
1910.334(a)(2)(ii)	55	If there is a defect or evidence of damage that might expose an employee to injury, the defective or damaged item shall be removed from service, and no employee may use it until repairs and tests necessary to render the equipment safe have been made.
1910.333(a)(1)	38	Live parts to which an employee may be exposed shall be deenergized before the employee works on or near them, unless the employer can demonstrate that deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations. Live parts that operate at less than 50 volts to ground need not be deenergized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.

Resources

	OSHA Electrical Webpage https://www.osha.gov/SLTC/electrical/ https://www.osha.gov/pls/publications/publication.athruz?pType=Industry&pID=73 General electrical safety information and OSHA publications
	OSHA/NOAA Lightning Safety https://www.osha.gov/Publications/OSHA3863.pdf We've had a number of lightning related fatalities in the last ten years
	OSHA Harwood Grants https://www.osha.gov/dte/grant_materials/material_listing_topic.html Harwood Grant electrical safety materials
	TX OSHA Consultation Service https://www.tdi.texas.gov/wc/safety/videoresources/index.html Electrical safety information and tool box talks.
	NIOSH Electrical Safety Page https://www.cdc.gov/niosh/topics/electrical/ Several resource documents and an electrical hazards training manual

This information has been developed by an OSHA Compliance Assistance Specialist and is intended to assist employers, workers, and others as they strive to improve workplace health and safety. While we attempt to thoroughly address specific topics [or hazards], it is not possible to include discussion of everything necessary to ensure a healthy and safe working environment in a presentation of this nature. Thus, this information must be understood as a tool for addressing workplace hazards, rather than an exhaustive statement of an employer's legal obligations, which are defined by statute, regulations, and standards. Likewise, to the extent that this information references practices or procedures that may enhance health or safety, but which are not required by a statute, regulation, or standard, it cannot, and does not, create additional legal obligations. Finally, over time, OSHA may modify rules and interpretations in light of new technology, information, or circumstances; to keep apprised of such developments, or to review information on a wide range of occupational safety and health topics, you can visit OSHA's website at www.osha.gov. For questions contact Jim Shelton at the Houston North Area Office at shelton.james@dol.gov.