Why Are So Many Construction Workers Being Electrocuted?
Michael McCann

Statistics clearly show that exposure to electricity is still a major cause of deaths among construction workers. Among electricians, the most serious concern is working "live" or near live wires, instead of de-energizing and using lockout/tagout procedures. Among non-electricians, failure to avoid live overhead power lines and an apparent lack of basic electrical safety knowledge are the major concerns.

Electrocutions are the fourth leading cause of death among construction workers in the United States. An average of 143 construction workers are killed each year by contact with electricity (based on government data for 12 years, 1992 through 2003). Electrical workers had the most electrocutions per year, followed by construction laborers, carpenters, supervisors of non-electrical workers, and roofers (chart 1). (These numbers do not reflect the risk for each trade, because no corresponding information is available on hours worked for each trade.)

1. Electrocution deaths in construction, by trade, United States, 1992-2003

Trade	*# deaths*	*% of total*
Electrical workers	586	34%
Construction laborers	274	16%
Carpenters	97	6%
Non-electrical supervisors	86	5%
Roofers	72	4%
Other trades	600	35%
Total	1,715	100%

Note: A total of 1,715 deaths in 12 years. Electrical workers includes electricians and their apprentices, electrical helpers, electrical power installers and repairers, and their supervisors. "Other trades" include apprentices and their helpers.

Source: U.S. Bureau of Labor Statistics CFOI Research File

More than half the electrocutions of electrical workers were caused by direct or indirect contact with live electrical equipment and wiring (including light fixtures, circuit breakers, control panels, junction boxes, and transformers) (chart 2).

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2. Major causes of electrocutions, electrical workers and other construction workers, United States, 1992-2003

Cause (Contact with:)	*Total # of deaths (%)* *Electrical workers*	*Other construction workers*
Electrical wiring and equipment	341 (58%)	272 (24%)
Overhead power lines	201 (34%)	630 (56%)
Machinery, appliances	25 (4%)	126 (11%)
Other	19 (3%)	101 (9%)
Total	586 (99%)*	1,129 (100%)

* Does not add to 100% due to rounding

Note: "Other" includes lightning and underground buried power lines

Source: U.S. Bureau of Labor Statistics CFOI Research File

For non-electrical workers, the main cause of electrocution was contact with overhead power lines. These deaths were the result of failure to de-energize or protect the power lines and failure to maintain minimum clearance distances from power lines (*see* chart 3).

3. OSHA minimum clearance distances from overhead power lines

Less than 300 volts	2 feet
300 volts to 50,000 volts	10 feet
More than 50,000 volts	10 feet + 4 inches for every 10,000 volts over 50,000 volts

Another cause of electrocutions, especially among non-electrical workers, was contact with machinery, appliances, power tools, portable lights, and defective power/extension cords.

In many of the electrocutions, electrical workers and other construction workers touched metal objects that had become energized through contact with live electrical equipment and wiring or with overhead power lines. Thus, 42 (12%) of the electrocutions of electrical workers and 88 (32%) of those of other construction workers that involved electrical wiring and equipment involved these contacts. The most common contacts were with metal ladders, metal pipes, metal wires that were deliberately cut or stripped or were accidentally cut by electric drills or other tools, wires that were energized by contact with live wires, and energized trucks and other vehicles.

Electrocutions as a result of metal objects contacting overhead power lines involved 26 electrical

workers and 167 of other construction workers. The most common examples involved metal ladders, cranes, aerial lifts, trucks or heavy equipment (such as water well drillers, backhoes, concrete pumpers and dump trucks), wires, metal poles, and metal scaffolds or scaffold parts.

Working in cramped areas was a contributing factor in 97 electrocutions (6%), about 8 deaths per year. For electricians, working in attics or above drop ceilings was a risk and for other construction workers, working under houses, in basement crawlspaces, or in attics.

Standing in water or having equipment such as trouble lights and extension cords touching water was a contributing factor in at least 51 electrocutions.

Low voltage (600 volts and under) was involved in the electrocutions of at least one-third of electrical workers and one-quarter of non-electrical workers. At least 14% of all electrocutions involved 120/220 volts (household current). (The voltage was not known in more than one-quarter of electrocutions.)

What Can Be Done

Following these procedures would prevent most work-related electrocutions.

Contractors should:

- Comply with OSHA regulations on electrical safety
- Train employees on electrical safety
- Contact utility companies in advance to de-energize or insulate overhead power lines
- If asked to work live, verify with owner/client that de-energizing live electrical circuits/parts is not practical or would create a greater hazard.
- Only allow work on live electrical circuits/parts in accordance with a permit system with specific procedures.

Electrical workers should:

- De-energize and lock out or tag out electrical circuits/parts you will be working on or near
- Work only on live electrical circuits/parts in accordance with a permit system with specific procedures and if you are qualified to do so.
- Wear appropriate personal protective equipment and use proper tools when de-energizing or testing live electrical circuits/parts or otherwise working live.

All other construction workers should:

- Make sure you are trained in electrical safety for the work you will be doing
- Ensure machinery and power tools are properly grounded or double insulated
- Check all extension and power cords for wear and tear before use
- Disconnect the plug on any power tool or machinery before inspecting or repairing
- Keep at least 10 feet from live overhead power lines (*see* chart 3)
- Keep metal objects away from live electrical circuits/parts.