



TOOLBOX TALK

The Dark Side of Electricity: What It Actually Does to You

TOPIC NO.	DURATION	AUDIENCE
TBT 16	10 to 15 min	All Crew

OSHA REFERENCE 29 CFR 1910 Subpart S · 29 CFR 1926 Subpart K · NFPA 70E (Arc Flash)

PROJECT / JOBSITE	DATE	PRESENTED BY

01 THE HOOK

START HERE

Electricity is the most useful force on the jobsite. It runs every tool, every light, every piece of equipment we touch all day. And it's the only one of those forces that can kill you in less than a second without ever making a sound. Most workers respect height, fire, and moving machinery because the consequences are obvious. Electricity is different. It's invisible. There's no warning. By the time you feel it, the damage is already done. Before we start digging into specific electrical hazards over the next several toolbox talks, today we're going to look at what electricity actually does to a human body when something goes wrong.

02 IT DOESN'T TAKE MUCH

People assume it takes a high-voltage line to kill somebody. It doesn't. The amount of **current** (the actual flow of electrons through your body) that's required to disrupt your heart is shockingly small. A standard household drill draws **about 30 times more current than what will kill a person**. The difference between a tingle and a fatality is measured in milliamps:

CURRENT	LEVEL	EFFECT ON THE BODY
1 mA	Tingle	Faint perception. Just enough to feel.
5 to 10 mA	Painful Shock	Strong, painful shock. Most people can still let go.
10 to 20 mA	Can't Let Go	Muscles paralyze. Can't release the conductor. Falls likely.
75 to 100 mA	Heart Fibrillates	Heart rhythm disrupted. Possible cardiac arrest in seconds.
100+ mA	Fatal	Sustained current at this level is almost always fatal.

These are the OSHA-published thresholds. The current that flows through you depends on voltage, on how wet your skin is, on whether you're grounded, and on the path the current takes. Damp skin and a

grounded surface can drop your resistance by an order of magnitude. The same shock that's a nuisance on a dry day can be fatal on a damp one.

03 THE FOUR WAYS ELECTRICITY HURTS YOU

HAZARD 1	HEAT AND BURNS Electricity generates heat as it pushes through tissue. The body can't dissipate it fast enough, so muscle, nerves, and bone get cooked from the inside. Visible burns appear at the entry and exit points (often hand and foot), but the worst damage is internal and invisible. Electrical burns are among the most serious burn injuries and require immediate emergency care.
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HAZARD 2	MUSCLE PARALYSIS ("CAN'T LET GO") Current above 10 milliamps overrides the signals from your nervous system to your muscles. Your hand locks onto the conductor instead of releasing it , which extends the duration of contact and makes the shock worse. Falling off a ladder, scaffold, or roof during muscle paralysis is a major secondary injury, often more serious than the shock itself.
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HAZARD 3	BREATHING AND HEART FAILURE Higher currents disrupt the muscles and nerves that control your lungs and heart. The chest muscles can paralyze, stopping you from breathing. The heart's rhythm can be thrown into ventricular fibrillation (chaotic, ineffective beating) or full cardiac arrest. As little as 100 mA for two seconds is enough to cause death .
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HAZARD 4	ARC FLASH AND ARC BLAST When current jumps through the air during a short circuit, it creates an arc flash. This is a different mechanism from electrocution. You don't need to touch anything. The hazard is the explosion itself: extreme heat, blinding light, supersonic pressure waves, and molten metal . Workers can be burned, blinded, or thrown across a room without ever making contact with a conductor.
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04 THE NUMBERS ON ARC FLASH

ARC FLASH TEMPERATURE 35,000 °F 4X HOTTER THAN THE SUN	WHAT AN ARC FLASH DOES An arc flash happens when current jumps through the air during a short. The plasma reaches nearly four times the temperature of the sun's surface . It melts copper, vaporizes aluminum, and sends molten metal flying. Severe burns can happen 10 feet or more from the source. Per OSHA, most burn injuries actually come from <i>the worker's clothing igniting</i> , not the arc itself.
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DON'T WEAR FUEL

OSHA uses this exact phrase. Synthetic clothing (polyester, nylon, fleece) ignites at low temperatures and melts onto skin. Most arc flash burn injuries come from clothing catching fire, not direct contact with the arc. If you're working on or near energized equipment that could arc, the cotton or arc-rated layers under your hi-vis matter more than you think.

05 WHY IT MATTERS

[JOBSITE]

FOR THE CREW

Understanding what electricity does to a body changes how seriously crews take the basic precautions. The five-second cord inspection, the GFCI test, the look-up for overhead lines: these are not paperwork tasks, they are the things that keep this from happening to one of us.

[INDIVIDUAL]

FOR YOU

You don't need to memorize the milliamp thresholds. You need to remember that the difference between a normal day and a fatal one is sometimes a few thousandths of an amp. That's why the rules exist.

[HOME]

FOR LIFE OFF-SITE

These same physics apply at home. The frayed extension cord on the holiday lights, the kid sticking something in the outlet, the storm-downed line in the yard. Same hazards. Same precautions. Same outcomes if you ignore them.

06 TODAY'S DRILL

TODAY'S DRILL PICK ONE HAZARD

Walk your work area today and pick one of the four hazards we just covered. Spot a place on this site where it could happen if a tool failed or a wire shorted. Heat, paralysis, heart, or arc flash. Then ask yourself what's in place to prevent it: GFCI, intact ground pin, distance from overhead lines, proper PPE. If anything's missing, that's your first conversation with the supervisor.

07 CREW DISCUSSION

Take 2 minutes. Pick one.

1. Has anyone here ever been shocked on a jobsite, even mildly? What were you doing? What did it feel like, and what did you do next?
2. Of the four hazards (heat, can't let go, heart/lungs, arc flash) which one do you think is most likely on this specific site this week, and why?
3. What's under your hi-vis right now? Cotton or synthetic? If an arc flash happened today, would your inner layer help you or hurt you?

