

OVERHEAD LINES: THE ELECTRICAL DANGER ABOVE

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Do you know what to do around overhead power lines? What if one falls to the ground? What if one falls across your car? Do you know what step potential is? Can you quickly and safely react to a downed power line event?

The goal of this article is to provide you with facts to better understand the hazards of overhead power lines...

INTRODUCTION

Sadly, many people every year, both on and off the job, are seriously injured or killed from contact with overhead lines, and many times the incidents involve overhead lines that have fallen and are lying on the ground or lying on an object that has become energized. Understanding the hazards associated with overhead lines and knowing what to do (or what NOT to do) can literally mean the difference between life and death.



CASE STUDY: A FAMILY TRAGEDY IN CALIFORNIA

On January 14, 2011, three family members were electrocuted in San Bernardino, California—a father (age 44), a mother (age 43), and their son (age 21). Based on information obtained from the *Los Angeles Times*, the details of the tragedy are:

- During high winds, at about 5:45 a.m., they heard a loud “pop” in the backyard.
- A 12,000-volt line had fallen to the ground.
- Several small fires had started in the back and front yards.
- The father and his stepson went to investigate in the backyard.
- The mother went to the front yard and heard a loud explosion.
- Her husband and son were lying on the ground, deceased.
- She reached out to help them and was electrocuted.

Knowing about the dangers of overhead power lines, especially downed power lines, can mean the difference between life and death.

OVERHEAD LINES IN THE WORKPLACE

NFPA 70E

NFPA 70E covers “work within the limited approach boundary of uninsulated overhead lines” in Article 130.5. This is the section of the 70E that deals with many of the hazards associated with work in locations near overhead lines. Everyone should take the time to understand and comply with the requirements and guidance located within Article 130.5.

The second leading cause of worker deaths in construction (after falls) is electrocution, and the primary cause for the electrocutions is contact with overhead lines. Many times the incidents involve a nonelectrical person doing tasks such as operating a mobile crane, moving a metal ladder, unloading supplies, or accessing a roof.

Ladders can be particularly hazardous, as a NIOSH review of the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) data from 1992–2005 identified at least 154 electrocution deaths that resulted from contacting overhead power lines with portable metal ladders (excluding truck-mounted and aerial ladders) [NIOSH 2007a].

OSHA Regulations

Current OSHA regulations require employers to take precautions when cranes and boomed vehicles are operated near overhead power lines. Any overhead power line shall be considered energized unless the owner of the line or the electric utility company indicates that it has been de-energized and it is visibly grounded [29 CFR 1926.550 (a)(15)(vi)]. The OSHA regulations are summarized as follows:

Employers shall ensure that overhead power lines are de-energized or separated from the crane and its load by implementing one or more of the following procedures:



De-energize and visibly ground electrical distribution and transmission lines. 29 CFR 1910.333(c)(3); 29 CFR 1926.550(a)(15)

Use independent insulated barriers to prevent physical contact with the power lines. 29 CFR 1910.333(c)(3); 29 CFR 1926.550(a)(15)

Maintain minimum clearance between energized power lines and the crane and its load. 29 CFR 1910.333(c)(3)(iii); 29 CFR 1926.550(a)(15)(i), (ii), (iii)

Where it is difficult for the crane operator to maintain clearance by visual means, a person shall be designated to observe the clearance between the energized power lines and the crane and its load 29 CFR 1926.550(a)(15)(iv)

The use of cage-type boom guards, insulating links, or proximity warning devices shall not alter the need to follow required precautions.

29 CFR 1926.550 (a)(15)(v)

You should familiarize yourself with all of the OSHA rules concerning overhead line safety.



STEP POTENTIAL: WHAT IS IT?

When power lines fall to the ground you have to be concerned with “step potential.” Think of a rock dropping in a bucket of water and the resulting ripples. The same thing happens with electricity – it flows through the ground like ripples of water. The voltage in the ground near the downed power line will be greatest and will decrease as a person moves away from it. If your feet are apart, one foot will be at a higher voltage than the other. If that difference in voltage (potential) is great enough, it could force current through your body.

That same electricity can enter into your body if you are walking on the ground near the source and the ground becomes energized. Electricity can flow between your feet and through your body and that flow of electricity can lead to ventricular fibrillation (affecting the heart)...and the results can be deadly.

It takes very little current flow through the body to cause problems: muscle contraction, suffocation, heart stoppage - all real possibilities when involved in a downed power line event and step potential becomes a factor.

If you are around a downed power line: **DO THE SHUFFLE!** Shuffle your feet and keep them close together, and after you are clear, keep everyone away and call 911!

But what if you are involved in a vehicle accident and a power line comes down on or around your vehicle – don’t get out of your car!! Only get out if there is a life-threatening situation if you stayed in your car... and if you do have to get out – **JUMP!** as far as you can!

Don’t touch the car and the ground at the same time and keep your feet close together (remember about step potential).

SUMMARY

ALL of the incidents involving injury from overhead power lines can be prevented if a little education and understanding of the hazards of electricity, along with an awareness of your surroundings, are put into place and followed.

Remember – electricity is a very toxic thing – and beware of the overhead line!

PRESENTATION:

If you would like to receive a short PowerPoint presentation entitled *Overhead Lines: The Electrical Danger Above* to use at work, at school, at Boy Scouts, etc... or even at home with the kids – send an email to overheadline@shermco.com and we will send it to you for your use and grant permission to freely distribute the information.

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