High Voltage and Arc Flash

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Talking to your workers about electrical hazards is always timely. Electrocution is a leading cause of occupational deaths, according to the U.S. Occupational Safety and Health Administration (OSHA). Electric shock also causes disabling injuries such as burns, respiratory problems, brain, bone and muscle damage and effects on the heart and other internal organs, nervous system changes. Here’s what your workers need to know to safely work with two key electrical hazards: high voltage and arc flash.

The Dangers of High Voltage

Anything over 500 volts is considered high voltage. Contact with power lines or energy sources in this range can lead to death or severe injury. Even coming too close to high energy sources can be harmful, since the electric arc produced by these sources can jump anywhere from a few inches to several feet, depending on the voltage level involved.

Keep in mind that the human body is a great conductor of electricity. You need to impress on your workers the fact that you don’t even have to touch the power source to be affected. As electricity travels through your body, literally seeking ground, it leaves a path of harm and destruction all along the path it takes inside of you.

The injuries caused by high voltage include severe burns, not only on the surface of your skin, but deep in internal organs, as well. Besides burns, one of the biggest hazards associated with electric shock injury is sudden death due to heart attack. Electric shock can cause your muscles to contract irregularly. This includes irregular contraction of the most important muscle in your body, your heart. In addition, electric shock can damage muscles, causing release of kidney damaging proteins into the blood.

Precautions Workers Should Take

Some of the precautions you need to take if you work near high voltage lines include keeping a safe distance away from the lines. This can range from six to 20 feet away, depending on the strength of the line voltage. Equipment, like cranes, also needs to be kept far away from high voltage lines. The distance to keep equipment away ranges from 10 feet to 42 feet, again depending on the strength of electrical source.

Of course, if you are working in the vicinity of a high voltage line, you should make sure that it has been de-energized before you begin your project. You should also avoid working above or over high voltage lines, not only because this increases the possibility of contact, but also because tools or equipment may fall and hit the line and either damage it or lead to arcing.

Other things you can do to protect yourself include wearing rubber-soled shoes and eye protection, and removing all of your jewelry. You should also never work alone with or near high voltage electricity.

The Dangers of Arc Flash

High voltage isn’t the only electrical threat you need to train your workers about. Electricity can travel, or arc, great distances, through air. Arc flash can cause traumatic injuries and death. If workers are working on equipment that can’t be de-energized before performing the work, it’s essential that they have some knowledge about arc flash and how to protect themselves.

Arc flash can be described as a short circuit through air, in which large amounts of light and heat energy are released explosively from electrical equipment. These waves of energy can damage eyesight and hearing, and the superheated ball of gas accompanying the flash can cause burns over your entire body or in your lungs. In addition, pieces of loose or damaged equipment or tools can end up flying through the air.

The amount of heat produced by an arcing event in low and medium energy equipment (480V) can be very large. The amount of heat a

worker is exposed to during an arc flash depends how much energy passes through the system, how long the worker is exposed to the energy and the distance that the worker is from where the arc flash is produced.

Precautions Should Workers Take

Generally, when workers need to perform maintenance or repair work on electrical equipment, that equipment should be de-energized and OSHA's lockout/tagout procedures followed to protect workers from exposure to electrical hazards.

However, there are situations where the electrical equipment must remain energized during work. If that's the case, then NFPA 70E (the National Fire Protection Association Standard for Electrical Safety in the Workplace) specifies the practices that need to be followed to protect workers from the hazards of the electrical energy.

These include:

- Get training so you can recognize energized equipment and how to work safely with it;
- Know that the employer is required to conduct an arc flash analysis before such work is done. The analysis decides what level the electrical hazard is, so a flash protection boundary can be established. It also helps you select proper personal protective clothing and equipment;
- While working on it, keep an "Arc Flash Hazard" label placed on energized equipment.

Conclusion

High voltage is the risk most workers think of when they do electrical work. But arc flash is equally dangerous. The explosions that occur can lead to traumatic injuries, as well as to severe burns that can affect the entire body and the lungs. Death from these injuries is a real possibility.