Improving Electrical Safety in the Workplace

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Electricity is a crucial component in commercial and industrial environments because many business processes rely on electric-powered equipment. The prevalence of electrical equipment in the workplace can become an occupational hazard without safety awareness and precautionary practices in place.

Why Electricity Can Be a Workplace Hazard

According to the Electrical Safety Foundation, accidents attributed to electrical hazards injure an average of 4,000 workers and claim 300 lives every year. Injured workers lose an average of 13 workdays for recovery, and the most common types of injuries appeared to be electric shock and electric burns. Given these numbers, electrical accidents are among the top causes of job-related fatalities [1] in the U.S. workplace.

Most electrical accidents, and the resulting worker injuries and property damage, are preventable. Safety-mindedness in the workplace begins with an understanding of the science of electricity.

The human body is an electrical conductor. When the body comes in direct contact with an electrically energized object while simultaneously in contact with a conductive surface of an unequal electrical potential, a circuit is completed. Current will flow through the body, causing pain, injuries and even death. Even a low-voltage flow of 3 milliamps can cause an involuntary muscle reaction that may lead to secondary injuries from falls and flying debris, causing bruises, burns and bone fractures.

Serious burns can result from electrical accidents. There are three basic types of

burns, and in electrical accidents, all three types may happen:

- Electrical burns result from current flowing through human tissues.
- Arc burns result from being in close proximity to an explosion or an accident that triggers very high temperatures.
- A thermal contact burn is the type of surface burn experienced by touching a surface, such as an overheated conduit.

Given the right environment, high-energy electrical arcs, the presence of combustible dust and vapors, and small electrical accidents can lead to fire, explosion, and massive property damage and casualties.

Safety Planning for the Modern Workplace

Workplace policies usually spell out some safety practices to minimize accidents and workplace injuries. However, electrical hazards should be given special attention because the potential for electrical accidents is huge, considering that today's workplace is dependent on electricity to remain functional.

- Have a safety plan in place. Assign a staff member who has the knowledge and experience with electrical matters to oversee the planning and implementation of the company's safety program.
- The plan can be segmented by work areas, employee assignments and execution schedule. It should comply with Occupational Safety and Health Administration (OSHA) regulations, local building codes and other applicable mandates.
- When changes in the process and new equipment are introduced, update the safety plan as appropriate.
- The plan should include a reporting system that will document deficiencies, equipment performance issues and a system of fast-track delivery of these crucial documents to concerned parties.

Monitoring Equipment Problems

Installation problems, operator errors and normal wear-and-tear can lead to loose connections, degraded insulation and defects in the equipment and the electrical connections. Therefore, an inspection schedule by a qualified safety expert should be integral to the company’s calendar.

Issues that should be monitored include:

- Damaged receptacles and connectors that are not suited to the receptacle can pose an electrocution hazard [2].
- Equipment that is not properly grounded can cause electric shock.
- Live wires and live sections without adequate safety barriers can lead to fatal injuries.

- Equipment that is underrated for the tasks it is expected to support can short circuit and cause a power outage.
- Equipment that is rendered obsolete by changes in the process can malfunction, affect other equipment and cause an outage.

Monitoring Environmental Problems

The environment plays an important role in preventing electrical accidents in the workplace. The presence of highly combustible materials, flammable liquids, vapors and gases can turn a small electrical spark into a conflagration.

Electrical equipment and connections exposed to corrosive materials and moisture can deteriorate and malfunction. Wires, cables and receptacles exposed to flooding should be inspected for termination issues and insulation damage. Only qualified personnel should handle testing, resetting and repairs of electrical equipment and accessories after a flood.

Providing Personal Protective Equipment

There is no shortage of safety equipment for every job out there. However, when it comes to personal protective equipment (PPE) suitable for dealing with electrical equipment, OSHA rules are very specific. Eye and face protection should be worn by employees and contractors working in an environment where electric arcs and flashes are possible. Non-conducting gloves and footwear are required when electric shock is a possibility. OSHA-approved PPEs may help prevent electrocution and injuries from an electric shock.

Additionally, any article of clothing that conducts electricity should not be worn, or should be worn insulated, when exposure to energized parts is a possibility. This restriction covers jewelry, headgear with metallic parts and clothes made with conductive material.

Minimizing Operator Errors

OSHA has guidelines for determining which employees should be considered qualified personnel [3] to perform certain tasks in and around electrical equipment, connections and conductive materials.

Safety issues often are created by operator error, yet it is not difficult to mitigate with proper training and implementation of safety measures. These precautions include:

- Only personnel who have been trained in the procedure or in dealing with specific equipment should be allowed in the designated work area.
- The load circuit should be identified and disconnected only by qualified personnel. If the circuit should be turned off, consider how the outage would affect other systems and equipment.
- It is never safe to assume that the system or the equipment has been

completely de-energized. Always perform proper testing procedures because taking shortcuts when dealing with electricity can turn deadly. Qualified personnel should verify de-energization before connecting test instruments.
- Testing instruments should be pretested prior to using on compromised electrical equipment. The test equipment should again be tested after use.
- Lockout-tagout procedures for de-energized systems should be strictly followed.

What to Do When Accidents Happen

No matter how much effort the company puts in preparation, training and monitoring for electrical hazards in the workplace, accidents will happen. When it does, a safety routine should be activated.

When an electrical accident happens, the first reaction should be to shut down the circuit by disconnecting the equipment from the power source or deactivating the system from the electric panel. For this reason, unimpeded access to the panel and the circuit breakers should be maintained at all times [4] to ensure that someone can reach them in case of an emergency.

It is also advisable to refrain from touching the person and equipment involved in the accident unless one is trained in the procedure and only after power has been disconnected. Call for help and clear the area of non-essential employees, according to the safety precautions detailed in the company's safety plan.

Electrical hazards exist because the modern workplace is filled with electricity-reliant equipment and gadgets. However, a sensible safety plan that addresses equipment, environment and operator issues may reduce the hazards and lead to lower electrical accident rates.

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Links:
[1] http://www.esfi.org/index.cfm/page/Electrical-Safety-in-the-Workplace-Fact-Sheet/cdid/10619/pid/3003
[2] http://www.cdc.gov/niosh/docs/87-100/
[3] https://www.osha.gov/dte/grant_materials/fy09/sh-18794-09/electrical_safety_manual.pdf

[4] http://www.ccohs.ca/oshanswers/safety_haz/electrical.html
[5] http://www.harting-usa.com