

Human error often causes arc flash accidents

Question: Will you please describe a typical arc flash accident that you would be called on to investigate? If possible, please include the root cause of the accident, the type of equipment involved, the tools used by the employee and the resultant injury.

Responding is Larry W. Hilgeman, president of The Hilgeman Group Inc., Ferdinand, IN.

Answer: Safety professionals across the United States are aware of the importance of implementing an effective electrical safe work program. However, a critical element of a comprehensive program includes provisions for arc flash safety.

Although all arc flash accidents have their own unique details, nearly every case is similar. The names and faces may change, but the causal factors and resulting injuries – both directly to the employee and indirectly to the family – are surprisingly nearly always the same.

A typical arc flash case summary will often be some variation of the following:

“A 45-year-old maintenance employee, with approximately 15 years of electrical experience, was performing a routine adjustment in a 480VAC control panel using an uninsulated screwdriver. While applying additional torque, the screwdriver slipped off the screw head and made phase-to-ground contact inside the electrical enclosure.”



The resulting fault produced an arc flash that ignited the employee's shirt and the upper portion of his pants. The employee suffered third-degree burns to his face, neck, chest, arms and groin, and second-degree burns to his legs. Additionally, the employee was wearing a polyester/cotton blend maintenance uniform, which melted and adhered to portions of the employee's torso. The employee was not wearing insulated electrician's gloves with leather protectors, thus the damage to his hands and fingers was significant. The trauma team at the burn clinic stated that this employee will need to undergo skin debridement and grafting for the next 12 weeks, followed by extensive physical therapy and cosmetic surgery. The patient, his wife and his two young children will all require counseling for depression and to learn adequate coping skills.”

The most common cause of arc flash accidents is human error. Regardless of how much electrical experience the employee may have, phase-to-phase and phase-to-ground contact often happens because an employee is distracted while performing energized work. Another typical cause is failure to use an insulated tool. Other causal factors include dropping conductive items into the enclosure (for example, panel board screws), the accumulation of conductive dust inside the enclosure and simple equipment failure.

The vast majority of our investigations involve 480VAC three-phase enclosures. Control panels, disconnects, buss switches, motor control centers and switchgear are the common locations of these types of accidents.

As mentioned above, the main injury resulting from an arc flash accident is second- and third-degree burns. The burns are similar from patient to patient, but a major factor in the treatment approach to each case is the patient's unique response to treatment.

Today's conscientious safety professionals are actively expanding their electrical safety programs to include arc flash safety. By conducting an arc flash hazard assessment, implementing the necessary personal protective equipment and flame-resistant garments, and conducting electrical and arc flash training, safety professionals are minimizing the risk and severity of a growing hazard in today's industry. S+H

Editor's Note: This article represents the independent views of the author and should not be construed as a National Safety Council endorsement.

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