STAYING SAFE *with* ANSI 710

5 steps to a safer workplace

The use of electricity has inherent risks, particularly electric shock and arc flash hazard. According to statistics compiled by CapSchell Inc, a Chicago-based research and consulting firm that specializes in preventing workplace injuries and deaths, there are five to ten arc flash explosions that occur in electric equipment every day in the U.S., resulting in medical treatment.

NO END TO INJURIES

Despite Electrical Safety training and the deployment of PPE in industry, there appears to be no lessening of the hazard and this is probably due to not effectively addressing the root cause—the method of system grounding.

The IEEE Standard Organization's standard, 141-1993: "*Recommended Practice for Electric Power Distribution for Industrial Plants*", notes that "the solidly grounded system has the high probability of escalating into a phase-to-phase or three-phase arcing fault, particularly for the 480V [volts] and 600V systems." And yet close to 70 percent of the industrial facilities in North America employ this grounding method.

The American National Standards Institute's ANSI Z10: *"American National Standard for Occupational Health and Safety Management Systems"* provides a concise step-by-step process for improving electrical safety. Here are some of these steps.

STEP #1: Eliminate the hazard by either working de-energized or use a grounding method not susceptible to an arc flash hazard.

STEP #2: Substitute the hazard for a lower or more acceptable level.

STEP #3: Engineering controls—look at design options that automatically reduce risk.

STEP #4: Establish safe work practices by using warning labels, safety training, and the appropriate safety barriers.

STEP #5: Ensure that your workers are wearing the appropriate personal protective equipment (PPE).

ELIMINATE THE HAZARD

In IEEE 141-1993 it states, "There is no arc flash hazard [for low-voltage ground faults], as there is with a solidly grounded system, since the fault current is limited to approximately five amperes." If we change our preferred grounding method from solidly grounded to high-resistance grounded, we probably would eliminate 95 percent of the arc flash incidences since 95 percent of electrical faults start as phase-to-ground faults.

SUBSTITUTE THE HAZARD

An arc is developed in milliseconds and leads to the discharge of enormous amounts of energy. The energy discharged in the arc is directly proportional to the square of the short circuit current and the time the arc takes to develop, that is energy = I2t (thermal energy). The damage resulting from the arc depends on the arcing current and time and of these two factors time is the most easily controlled and managed.

DID YOU KNOW

Technologies such as current-limiting fuses, optical arc detection that reacts at the speed of light and instantaneous maintenance switch all significantly reduce the arc time and, therefore, the arc intensity and impact.

ENGINEERING CONTROL

Arc-resistant switchgear directs the arc away from personnel. Remote racking ensures personnel are not in front of or close to the switchgear and while neither lessens the destructive impact on the equipment, both protect personnel.

We already have the means to significantly reduce the number of arc flash injuries per day; it is simply a matter of changing our grounding methodology and using mitigation technologies that already exist and are proven. There is a role for PPE and electrical safety training, but only after elimination, substitution and engineering control have been implemented.

-- Andrew Cochran, iGard