ELECTRICAL Safety Measures

"All electrical incidents are preventable! Keep employees safe with an up to date Electrical Safety Program and appropriate training."

CSA Z462-2015, Clause 4.3.4.1 Shock Risk Assessment

By Terry Becker, P.Eng.

When does a shock hazard exist for a Qualified Electrical Worker (QEW)? When is a non-electrical worker exposed to the risk of an electric shock that could lead to electrocution? These are two good questions that need to be clarified. In CSA Z462-2015 a Shock Risk Assessment is a component of the overall Risk Assessment Procedure for a work task.

Historically QEWs have been shocked as part of doing their job. This has been and is unacceptable and needs to be stopped! Shock actually needs to be addressed as a higher priority over the arc flash hazard with respect to a QEWs exposure. The risk of exposure is higher to electric shock than to an arcing fault and arc flash for a QEW.

A QEW is exposed to the electric shock hazard when there are exposed conductors and circuit parts with a voltage greater than 50V (as defined in CSA Z462) and there is an inadvertent movement risk with their hands or other body parts. If conductors and circuit parts are adequately insulated, guarded and/or finger safe then there is no risk of exposure to electric shock. This needs to be clearly understood by the QEW.

Non-electrical workers can be exposed to electric shock and electrocution when they are working in proximity of overhead power lines or buried power cables or when they use portable cord-and-plug connected electrical equipment and extension cords that become damaged. A Ground Fault

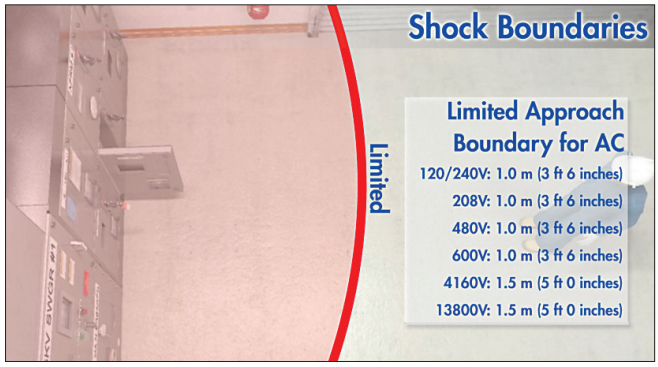
Circuit Interrupter (GFCI) is also required to be used when the portable cord-and-plug connected electrical equipment is used in wet indoor or outdoor locations. Overhead power line proximity or contact by a non-electrical worker is the number one cause of electrocutions in Canada!

The CSA Z462-2015 Standard defines a shock hazard as *"a dangerous condition associated with the possible release of energy caused by contact with or approach to energized electrical conductors or circuit parts."* Voltages as low as 120VAC can cause a fatal electric shock, milli-amperes of electric current through the body can cause a thermal burn injury, pain, muscle contraction, and the heart to fibrillate and lead to an electrocution.

Clause 4.3.4.1 Shock Risk Assessment in the CSA Z462-2015 Standard outlines that:

A shock risk assessment shall determine:
(a) the voltage to which personnel will be exposed;
(b) boundary requirements; and
(c) the PPE necessary to minimize the possibility of electric shock to personnel.

As I mentioned in a previous article we also need to ensure that we clarify what "Working On" energized electrical equipment is. Operating energized electrical equipment that is in a normal operating condition doesn't pose a shock hazard risk and doesn't require shock PPE to be worn. Diagnostics and troubleshooting work tasks can expose a QEW to shock. A justified energized repair and alteration work task can expose a QEW to shock. Isolation related work tasks can expose a QEW to shock (e.g. installation of Temporary Protective Grounds).



The outcome of the Shock Risk Assessment will determine the Limited Approach Boundary and Restricted Approach Boundary distances for the energized electrical equipment. If the body of the QEW encroaches into the Restricted Approach Boundary, the body must be insulated. The most important shock PPE for a QEW is the application of the appropriate Class of rubber insulating gloves and leather protectors. Depending on the work task, insulating or insulated hand tools may be required. The QEW may identify the need for other rubber electrical protective equipment such as rubber insulating blankets.

It is noted that the work task specific Shock Risk Assessment is a component of the overall Risk Assessment Procedure for that work task. The application of shock PPE, tools & equipment is utilized to eliminate exposure or reduce the risk of exposure to the electric shock hazard and reduce the residual Risk Level for the work task to *low* or *medium*. To complete the Shock Risk Assessment, use CSA Z462-2015 Table 1A Approach boundaries for energized electrical conductors or circuit parts for shock protection for AC systems or Table 1B Approach boundaries to energized electrical conductors or circuit parts for shock protection for DC systems to determine the Limited Approach Boundary and Restricted Approach Boundary.

The electric shock hazard may exist in the workplace for both Qualified Electrical Workers and non-electrical workers. Statistically, electric shock leading to electrocution is accountable for 99% of electrical incident fatalities and should be a high priority for proactive management in the workplace.

Please submit any questions or comments you may have to Kevin Buhr and myself at kevinb@electricalline.com and terry.becker@esps.ca.

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