ELECTRICAL Safety Measures

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

What Is Energized Electrical Work?

By Terry Becker, P.Eng.

This article series will review the necessary steps to develop an Electrical Safety Program for your company. The first priority is to understand what energized work is and why you need an Electrical Safety Program for due diligence.

As an Electrical Safety Consultant I often get asked what is "energized electrical work"? The most common examples are a voltage check for diagnostics and testing for the absence of voltage. The best way to answer this question and begin working on your documented Electrical Safety Program is to refer to the CSA Z462-2015 Standard. If you don't already own a copy you'll need to purchase the Standard before any documentation can be created. Next, start with the CSA Z462, Clause 3 Definitions and mark these pages in the Standard because you'll need to return here for clarity when you identify electrical hazards and put into place appropriate preventive and protective controls to reduce risk. To help explain energized work let's begin by reviewing some of the CSA Z462-2015 Standard's Definitions:

Arc Flash Hazard – a dangerous condition associated with the possible release of energy caused by an electric arc.
Notes:
(1) An arc flash hazard can exist when energized electrical conductors or circuit parts are exposed or are within equipment in a guarded or enclosed condition, if a person is interacting with the equipment in a manner that could cause an electrical arc. Under normal operating conditions, enclosed energized equipment that has been properly installed and maintained is not likely to pose an arc flash hazard.
(2) See Table 4A for examples of activities that could pose an arc flash hazard.

Boundary, Arc Flash – when an arc flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second-degree burn if an electrical arc flash were to occur.
Note: A second-degree burn is possible by an exposure of unprotected skin to an electric arc flash above the incident energy level of 5 J/cm^2 (1.2 cal/cm^2).

Boundary, Limited Approach – an approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.

Boundary, Restricted Approach – an approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased likelihood of electric shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part.

Hazard – a source of possible injury or damage to health.

Hazardous – involving exposure to at least one hazard.

Risk – a combination of the likelihood of occurrence of injury or damage to health and the severity of injury or damage to health that results from a hazard.

Risk assessment – an overall process that identifies hazards, estimates the potential severity of injury or damage to health, estimates the likelihood of occurrence of injury or damage to health, and determines if protective measures are required.
Note: As used in this Standard, "arc flash risk assessment" and "shock risk assessment" are types of risk assessments.

Shock Hazard – a dangerous condition associated with the possible release of energy caused by contact with or approach to energized electrical conductors or circuit parts.

Energized Work Tasks

You are completing an energized electrical work task when there are exposed energized electrical conductors or circuit parts that you may approach and/or interact with that

can expose you to an electric shock or create an arcing fault that results in an arc flash. Depending on the voltage level you may only be exposed to electric shock as the voltage may not be high enough to sustain an arcing fault. As a Qualified Electrical Worker it is more likely that you will be exposed to shock than to arc flash if you are not wearing appropriate PPE and using appropriate tools.

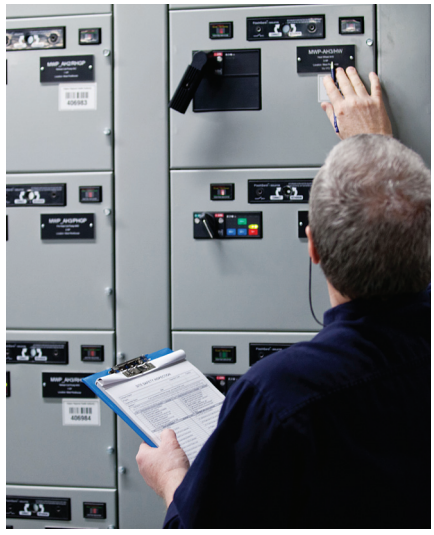
When conductors or circuit parts are insulated, adequately guarded and/or finger safe there is no inadvertent movement electric shock risk, but if you interact with them you may cause an arcing fault that could become an arc flash.

Arc blast pressure is NOT directly related to incident energy (thermal energy from an arc flash measured as cal/cm^2), but is related to arcing fault current. To date there have been no documented fatalities attributed to arc blast pressure. In the U.S. in a 20 year timeframe there were 5800 electrical incident fatalities with 60 attributed to arc flash burns and there were no documented fatalities directly attributed to arc blast pressure.

Field Application Of An Electrical Safety Program

Combining the definitions and interpreting them against a defined work task is applying the CSA Z462-2015 in the field. We use the "tools" in CSA Z462-2015 to mitigate exposure or reduce risk to an acceptable level, but you have to start with a clear understanding of how to identify if your work task exposes you to electrical hazards. This is the first step in the CSA Z462-2015 Risk Assessment Procedure.

As a Qualified Electrical Worker do not doubt what you know, apply it and believe in it. Use CSA Z462-2015 to help you, guide you, and give you tools



to make decisions and when required decide to use Electrical Specific PPE, Tools & Equipment to reduce risk. Document your company's interpretation of CSA Z462-2015 in an Electrical Safety Program and document your Arc Flash & Shock Risk Assessments in the field when standing in front of the energized equipment you will be working on.

The answer is testing for voltage, measuring current or testing for absence of voltage is energized electrical work. Racking in or out power circuit breakers or installing temporary protective grounds is energized electrical work. Operating energized electrical equipment in a normal state is not energized electrical work.

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

Terry Becker, P.Eng., CESCP, IEEE Senior Member is the first past Vice-Chair of the CSA Z462 Workplace electrical safety Standard and currently a Voting Member and Working Group 8 Leader, Annexes. He is also a Voting Member on the IEEE 1584 Technical Committee and an Associate Member of the CSA Z463 Guideline on maintenance of electrical systems. Terry is a Professional Engineer in the Provinces of BC, AB, SK and ON. Terry is the President & Owner of ESPS Electrical Safety Program Solutions INC., www.esps.ca, an electrical engineering consulting firm specializing in electrical safety consulting, licensed products and training solutions.