



# Safety <sup>ELECTRICAL</sup> Measures

**“Elimination is the first priority!**  
Ensure a risk assessment is completed before energized work tasks are completed.”

## How To Avoid Prosecution To OH&S Legislation Related To Arc Flash And Shock Hazards

**By Terry Becker, P.Eng., CESC, IEEE Senior Member**

Due diligence! Two words that are and will be interpreted differently by employers, supervisors, electrical engineers, electrical technologists, electricians and other task qualified workers related to shock and arc flash hazards. Federal, Provincial or Territorial OH&S legislation in Canada outlines the legal requirements for workplace safety. If there is an electrical incident the onus will be on the employer to prove they have met their legal duties under Federal, Provincial or Territorial OH&S legislation, including doing everything “reasonably practicable” to have avoided the incident.

In Alberta the Provincial Government’s OH&S Branch provided the following explanation of due diligence:

*“Due diligence is the ability to demonstrate that a person did what could reasonably be expected under their circum-*

*stances, in order to satisfy a legal requirement. A due diligence defence depends on your ability to demonstrate the actions taken before an incident occurs, not after.*

*Due diligence is providing reasonable efforts to comply with the legislation; not a perfection standard. Even within the best health and safety systems, non-compliance may occur from time-to-time, and those incidents of non-compliance may result in a serious incident.*

*There are many similarities between the concepts of “doing what is reasonably practicable” and “due diligence.” The key difference is “doing what is reasonably practicable” is a legal obligation that you must perform at all times. “Due diligence” is a defense where the person has failed to comply with an OH&S legal requirement, but can prove they did everything reasonable to avoid the non-compliance.”*

An additional element of the due diligence defence would be demonstrating “reasonable care.” In the “reasonable care” defence an employer would demonstrate that they have taken all reasonable actions to foresee and prevent an incident. The employer’s defence should include:

1. Taking the time to review and document what they are doing e.g. constituted an Electrical Safety Committee and meeting minutes documented that OH&S legislation has been reviewed, that the CSA Z462 Workplace electrical safety Standard will be referenced and applied, gap analysis to be completed, etc..
2. Proactively identifying workplace hazards. Inventory existing energized work tasks performed where a worker may be exposed to shock and/or arc flash and identify what worker role is performing the work tasks that are inventoried.
3. Eliminating the hazards if possible. Ensure the employer has an established and audited lockout program. Ensure justification is established when energized electrical work must be performed. Follow the requirements outlined in CSA Z462 Clause 4.2.5 Process for Establishing and Verifying an Electrically Safe Work Condition.
4. Developing, and implementing a management system (e.g. Electrical Safety Program for arc flash and shock hazards) to control, mitigate or manage any hazards that cannot be eliminated.
5. Making sure the management system (e.g. Electrical Safety Program) is working by auditing it.
6. Ensuring that work is not done if it is not possible to eliminate, control or manage the hazards or mitigate their effects to an acceptable risk level.

If an employer has provided arc flash and shock training several years ago, purchased arc flash & shock PPE, paid for

an “arc flash hazard study” and installed the recommended arc flash & equipment labels, isn’t that all they need to do?”

As noted above under Federal, Provincial or Territorial OH&S legislation the regulator expects that appropriate due diligence has been implemented and substantiated. Just providing training once, 3, 4, or 5+ years ago for example would not be appropriate due diligence.

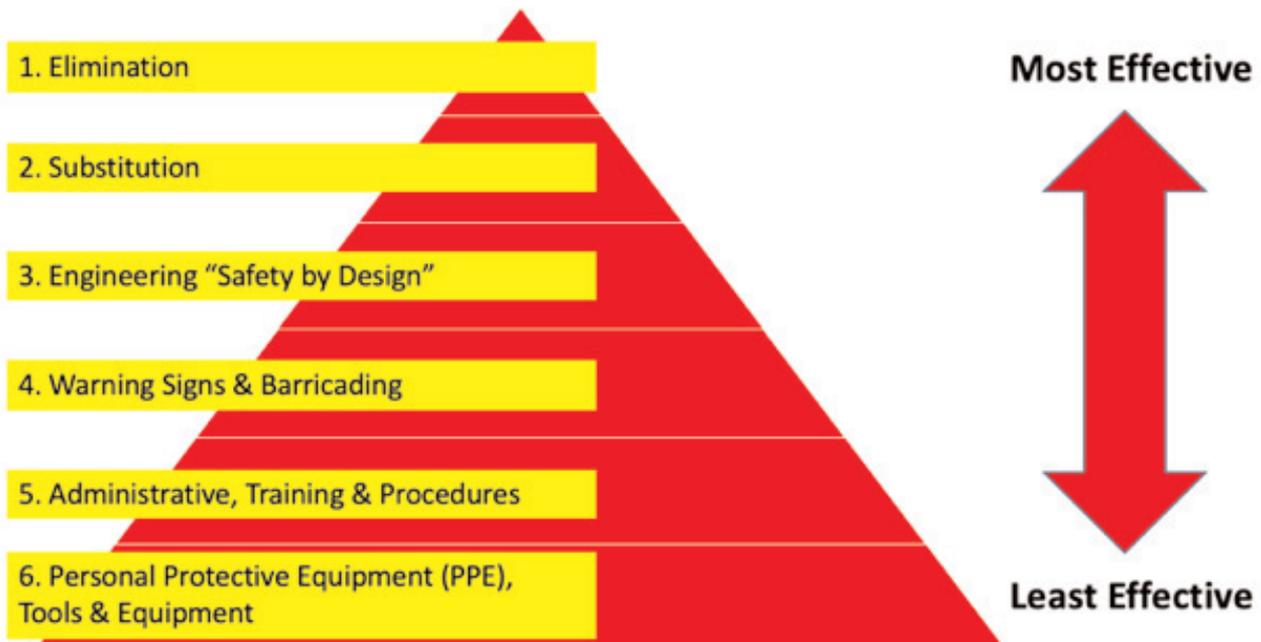
Searching online Wikipedia provides the following additional definition of due diligence:

*“Due diligence is the investigation or exercise of care that a reasonable business or person is expected to take before entering into an agreement or contract with another party, or an act with a certain standard of care.”*

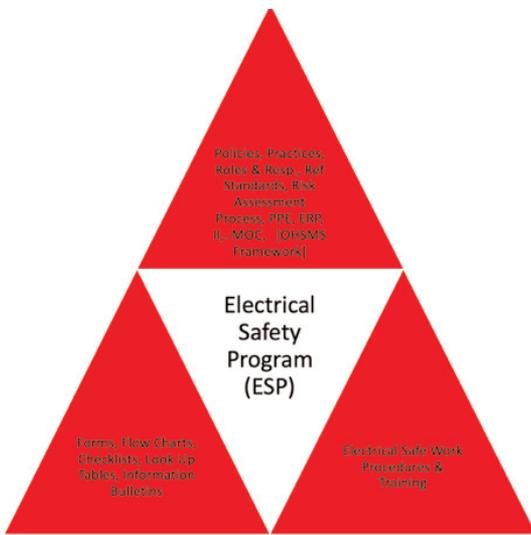
Due diligence is risk based. Greater oversight would be required where there is a greater likelihood of potential injury or damage to health. The employer would most likely also be held accountable to the standard set by other companies in their industry.

In occupational health & safety the following should be demonstrated by the employer, supervisors, electricians and other task qualified workers to demonstrate due diligence:

1. There was foreseeable recognition of potential injury or damage to health to employees or contractors from shock and/or arc flash hazards? Work task based risk assessments for a Job are completed to identify if there is exposure and determine what Hierarchy of Risk Control Methods will be applied to reduce risk. Risk assessments are completed and documented for the discrete individual work tasks that are required to complete the assigned Job. The employer and employee have shared roles & responsibilities, the onus is not just on the employer. Elimination should be the first priority, and if energized electrical work is required it must be documented as justified.



- The employer developed a management system (e.g. Electrical Safety Program) specific for shock and arc flash hazard management to prevent the potential injury or damage to health from occurring. The CSA Z462 Workplace electrical safety Standard provides guidance on what content should be included in an Electrical Safety Program. Occupational health and safety management system Standards (e.g. CSA Z1000 for Canada) can be consulted to determine the framework or table of contents for an Electrical Safety Program. Direction on the content of a safety management system is also provided by some OH&S regulators in Canada (e.g. Certificate of Recognition (COR) framework).



- The employer took reasonable steps to ensure the management system (e.g. Electrical Safety Program) they implemented was working (e.g. the employer had audits or assessments completed internally or by a third party electrical safety SME, following an OH&S audit process). The employer would also ensure that the findings and recommendations of an audit are implemented.
- The employer provided “effective training” ensuring they pre-qualified the company/consultant they hired to ensure the training content was appropriate and compliant. They reviewed the training course overview and ensured it provided content that was compliant to the requirements of CSA Z462. A formal test was provided to the students. Exercises were provided focusing on field based application of the knowledge. Training certificates were provided to the students and the employer has retained copies of the training certificates.
- The employer provided specific direction and instructions to employees and contractors that would be exposed to shock and/or arc flash hazards. The developed, implemented and audited Electrical Safety Program included policies and practices that would be applied to an assigned Job, planned or reactive. The Qualified Electrical Worker would identify for a specific work task(s) related to executing the assigned Job if they were exposed to shock and/or arc flash hazards. A job safety plan was documented by the Qualified Electrical Worker and a job brief-

ing when required was completed and documented before energized electrical work tasks were executed.

- The employer provided information to the Qualified Electrical Worker, specifically the employer provided training on the specific requirements (e.g. policies, practices, procedures, PPE procured, Electrical Incident Reporting requirements, Emergency Response Program requirements, etc.) of the employer’s Electrical Safety Program. Information was posted in the Electrical Shop or Electrical Rooms. Arc flash and shock hazard Warning or Danger equipment labels were installed on electrical equipment.
- The employer should be monitoring the effective application of the management system (e.g. Electrical Safety Program) to ensure it is working, and sustainable. For example, are the expected Hierarchy of Risk Control Methods the employer provided to the Qualified Electrical Worker to reduce risk actually been applied in the field to achieve the expected residual risk level? Occupational health and safety management system (OHSMS) Standards and related practices documented in the employer’s Electrical Safety Program provide the tools the employer can use to monitor: observations by Supervisors, monitoring and following up on near miss reports, reviewing documented job safety planning documentation, testing of employees, inspections of Electrical Rooms (e.g. use a checklist, make it a monthly PM), formal Internal Electrical Safety Audits or bring in a third party Electrical Safety SME to complete an External Electrical Safety Audit. How many Energized Electrical Work Permits (EEWPs) were issued in the last 12 months, and why?

Effective due diligence will only really be measured if your company experiences an electrical incident where there is a significant injury and a Federal, Provincial or Territorial OH&S Officer is onsite completing an investigation. This is obviously not the desired method to “test” your company’s due diligence for shock and arc flash hazards. Been proactive in electrical safety as outlined in the seven steps listed above will provide the basis for effective due diligence and reasonable care. Implement and audit the performance of a developed Electrical Safety Program and follow a continuous improvement model: PLAN, DO, CHECK, ACT!

Please submit any questions or comments you may have to Kevin Buhr and Terry Becker at [kevinb@electricalline.com](mailto:kevinb@electricalline.com) and [terry.becker@twbesc.ca](mailto:terry.becker@twbesc.ca).

**Terry Becker**, P.Eng, CEM, IEEE Senior Member is the first past Vice-Chair of the CSA Z462 Workplace electrical safety Standard Technical Committee and currently a Voting Member and Working Group Leader for Clause 4.1 and the Annexes. Terry is also a Voting Member on the CSA Z463 Maintenance of electrical systems Standard and a Voting Member of the IEEE 1584 Guideline for Arc Flash Hazard Calculations. Terry has presented at Conferences and Workshops on electrical safety in Canada, the USA, India and Australia. Terry is a Professional Engineer in the Provinces of BC, AB, SK, MN and ON. Terry is an Electrical Safety Specialist, Management Consultant, and can be reached at 587.433.3777 or by email [terry.becker@twbesc.ca](mailto:terry.becker@twbesc.ca).