



Safety Measures ^{ELECTRICAL}

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

CSA Z462-2018: 4th Edition Changes And Impacts You Need To Know!

By Terry Becker, P.Eng.

The 2018, 4th Edition of the CSA Z462 Workplace electrical safety Standard continues to evolve. The majority of the changes and updates are in Clause 3 Definitions and Clause 4 Safety-related work practices. Some minor changes are in Clause 5 Safety-related maintenance requirements and Clause 6 Safety requirements for special equipment. Several Annexes have been modified. It is important that you understand the changes made as they will affect your company's Electrical Safety Program and how you complete energized

electrical work tasks.

Your company should review and update your Electrical Safety Program directly or with electrical safety consulting support following a Management of Change process to ensure its requirements are aligned with the CSA Z462, 2018, 4th Edition.

Ask yourself the following questions as you complete your work tasks: How might these changes impact the existing policies, practices, processes, and procedures used to execute

justified and authorized energized electrical work tasks? What new processes should be added to the company Electrical Safety Program I reference and use with respect to proactive management of arc flash and shock hazards?

In the 4th Edition of CSA Z462 changes and updates have been made to further align the Standard with Occupational Health & Safety Management System Standards and related Risk Assessment Standards. The concept of completing a Risk Assessment Procedure for every energized electrical work task completed is mandatory and is to be documented as a requirement in your company's Electrical Safety Program.

Top 10 Changes & Updates You Need to Know:

1. The 50V low voltage threshold in CSA Z462 has been lowered to 30V to align with the CEC Part 1 Definitions for voltage; 30V is extra low voltage.
2. Existing Clause 4.1.6.8 Risk assessment procedure (RAP) moved the Hierarchy of Control Methods from a non-mandatory Note to Clause 4.1.6.8.4 Hierarchy of risk control methods. These control methods shall be applied to a work task's risk assessment to reduce the Residual Risk Level to as low as reasonably practicable and must be applied in the order listed.
 - (a) De-energize;
 - (b) Substitution;
 - (c) Engineering controls "Safety by Design;"
 - (d) Awareness, warning signs, and barricading;
 - (e) Administrative controls, training and procedures; and
 - (f) Electrical Specific PPE, tools and equipment and its proper care, use and maintenance.
3. Existing Clause 4.1.6.8 Risk assessment procedure (RAP) added a new sub-clause, Clause 4.1.6.8.3 Human Error and the RAP completed for a specific work task shall take human error into consideration and its potential negative impact on people, processes, the work environment, and equipment. Human error will drive up the probability of the arcing fault and arc flash or shock exposure to the worker.
4. Rework and reordering of content in Clause 4.2 Establishing an electrically-safe work condition related to control of hazardous energy, lockout and other methods. LOTO training requirements have been moved to Clause 4.1.7 Training.
5. Clause 4.3.4 Shock Risk Assessment has been updated to align with a risk assessment procedure focus by including a step in the process "to estimate the likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health"; this risk assessment language and process is now also included when completing an Arc Flash Risk Assessment for a work task. A Shock Risk Assessment shall be performed:
 - (a) to identify shock hazards;
 - (b) to estimate the likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health; and

(c) to determine if additional protective measures are required, including the use of PPE.

6. Deletion of the two Notes that implied or were misunderstood related to 40 cal/cm² incident energy being "dangerous and greater emphasis required" and "No PPE available." This statement is false and no substantiation was offered. It is noted that 1.2 cal/cm² of incident exposure to a worker when they are NOT wearing arc-rated PPE is "dangerous" as the clothing would ignite leading to a potentially significant burn injury. Arc flash incident energy doesn't directly correlate to arc blast pressure, it correlates to arcing fault current magnitude.
 - (a) Clause 4.3.7.1 General, Note (2) is deleted
 - (b) Annex D, D.4.1 General, Note (2) is deleted
7. Clause 4.3.5 Arc flash risk assessment has been altered refining the risk assessment procedure focus. Clause 4.3.5.1 General and its Notes are now divided into three sub-clauses:
 - (a) Clause 4.3.5.1 General
 - (b) Clause 4.3.5.2 Estimate of Likelihood and Severity
 - (c) Clause 4.3.5.3 Additional Protective Measures

Clause 4.3.5.1 General now indicates that an Arc Flash Risk Assessment shall be performed:

- (a) to identify arc flash hazards;
- (b) to estimate the likelihood of occurrence of injury or

Control transformers for all your application needs



HPS Imperator®
Encapsulated Machine Tool
Industrial Control Transformer

HPS Spartan®
Industrial Open Core &
Coil Control Transformer

The versatility of HPS control transformers offer a wide range of options for design engineers and meet the diverse needs of panel builders and machinery OEMs.

HPS Imperator® - Designed with low impedance windings for voltage regulation and can accommodate the high inrush current associated with contactors, starters, solenoids, and relays.

HPS Spartan® - Constructed with high quality silicon steel laminations to minimize core losses and increase efficiency. Suited for general purpose, industrial and light duty loads.



Hammond
Power Solutions
1917-2017

power to perform

- damage to health and the potential severity of injury or damage to health; and
- (c) to determine if additional protective measures are required, including the use of PPE.

An entire new Sub-Clause, Clause 4.3.5.2 Estimate of Likelihood and Severity requires that the determination of estimate of likelihood or occurrence of injury or damage to health and the potential severity of injury or damage to health shall take into consideration (the old Notes are included with this Sub-Clause):

1. The design of the electrical equipment, including its overcurrent protective device and its operating time; and
2. The electrical equipment operating condition and condition of maintenance.

Clause 4.3.5.3 Additional Protective Measures includes the three requirements for Arc Flash Risk Assessment in the CSA Z462, 2015, 3rd Edition, but adds in the use of NEW Table 2 Estimate of the likelihood of occurrence of an arc flash incident for ac and dc systems.

Clause 4.3.5.3 Additional Protective Measures

If additional protective measures are required they shall be selected and implemented according to the hierarchy risk control identified in Clause 4.1.6.8.4

- (a) Appropriate safety-related work practices;
- (b) The Arc Flash Boundary; and
- (c) The PPE that personnel within the Arc Flash Boundary shall use.

Table 2 may be used to estimate the likelihood of occurrence of an arc flash event to determine if additional protective measures are required.

This new Table 2 is the old Table 4A, but instead of advising if Arc Flash PPE is required, it now states Likelihood of Occurrence.

8. The new Table 2 Estimate of the likelihood of occurrence of an arc flash incident for AC and DC systems is a standalone table to be used as a primary reference when completing an energized electrical work task's Arc Flash Risk Assessment and is applied first in determining the Likelihood of Occurrence of an arcing fault and arc flash. After using this table to determine that it is likely that an arcing fault and arc flash could occur related to the work task's description and the Condition of Maintenance of the energized electrical equipment the Qualified Electrical Worker would determine "additional protective measures" for arc flash hazard exposure to reduce risk using one of two methods to determine the Arc Flash Boundary and the arc-rated PPE to be worn for the energized work task when standing at a specific Working Distance. Safety-related work practices are still required to be followed.
9. The Arc Flash PPE Category Method of Arc Flash Risk Assessment is updated to only use the existing Table 4B, 4C and 5 renumbered to Table 6A, 6B and 6C. New Notes

have been added to Table 6A Arc-flash PPE categories for alternating current (ac) systems indicating typical fault clearing times of overcurrent protective devices:

- (a) 0.5 cycle fault clearing time is typical for current limiting fuses when the fault current is within the current limiting range.
- (b) 1.5 cycle fault clearing time is typical for molded case circuit breakers rated less than 1000V with an instantaneous integral trip.
- (c) 3.0 cycle fault clearing time is typical for insulated case circuit breakers rated less than 1000V with an instantaneous integral drip or relay operating time.
- (d) 5.0 cycle fault clearing time is typical for relay operated circuit breakers rated 1kV to 35kV when the relay operates in the instantaneous range (i.e. "no intentional time delay").
- (e) 20 cycle fault clearing time is typical for air frame and insulated case circuit breakers with a short time fault clearing delay for motor inrush.
- (f) 30 cycle fault clearing time is typical for air frame and insulated case circuit breakers with a short time fault clearing delay without instantaneous trip.

See IEEE 1584-2002 Table 1 for further information regarding Notes b through d.

10. For "industrial" workplaces with supervision you no longer need to install Warning or Danger Equipment Labels for arc flash and shock, as long as you provide access to the incident energy analysis data or results of using the arc flash PPE category method in "results tables", "spreadsheets", on single line diagrams, or the arc flash hazard information could be included on a Work Order related to specific electrical equipment and the identified protective device, load or line side.

Note: *The changes and updates listed in this Article may not be exactly what is published and you are advised to refer to the published CSA Z462, 4th Edition, 2018 that will be published in January 2018 to confirm exact Clause #s and content.*

Please submit any questions or comments you may have to Kevin Buhr and myself at kevinb@electricalline.com and tbecker@danatec.com.

Terry Becker, P.Eng., CEM, 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. Terry 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 Senior Vice President, Electrical Safety Division (specializing in electrical safety consulting, licensed products and training solutions for arc flash and shock), Danatec Educational Services Ltd., and was previously the Owner, President of ESPS Electrical Safety Program Solutions INC. www.danatec.com / www.esps.ca.