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# NEW ARC FLASH RISK ASSESSMENT PROCESS

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One of the most significant changes in CSA Z462–2018 is the arc flash risk assessment requirement for energized electrical work task execution as a component of the work task's overall risk assessment procedure. In the 2015 edition, the arc flash risk assessment process was not a complete risk assessment process. The 2018 edition provides the following general and specific arc flash risk assessment requirements:

1. *Appropriate safety-related work practices shall be determined before any person is exposed to the electrical hazards involved in executing an energized electrical work task by using both shock risk assessment and arc flash risk assessment.*
2. *Only qualified electrical workers (QEWs) shall work on electrical conductors or circuit parts that are not in an electrically safe work condition.*
3. *An arc flash risk assessment performed on a specific energized electrical work task includes the following requirements:*
  - *General*
  - *Estimate of Likelihood and Severity*
  - *Additional Protective Measures*
  - *Documentation (the arc flash risk assessment*

*for an energized electrical work task shall be documented)*

- *Arc Flash Boundary*
- *Arc Flash PPE*
- *Equipment Labeling*

There is more to it than you may have been trained on in the past for the 2015 edition. The requirements are not complex to know and perform, but without a documented electrical safety program and compliant electrical safety training, you will have difficulty getting the QEW to apply the electrical safety training they received. You need management system documentation, as well as field-based hazard identification and application of risk control methods documents, for a QEW to use in the field to document that an acceptable residual risk level is achieved.

Let's review the specific requirements of completing a documented arc flash risk assessment process in more detail, with some more specific information on items 3(a) through 3(g) above.

## GENERAL

This is where key changes were made. For a justified energized electrical work task, the QEW must identify whether an arc flash hazard exists. Before executing the energized electrical work task, an estimate of the likelihood of occurrence of injury or damage to health and the potential severity of injury or damage to health must be completed. The QEW must then determine whether additional protective measures are required, including the use of PPE.

## ESTIMATE OF LIKELIHOOD AND SEVERITY

When completing an arc flash risk assessment for a specific energized electrical work task, it is a mandatory requirement with respect to likelihood of occurrence and the potential severity of injury or damage to health that the following items are considered when evaluating the work task's risk level:

- The design of the electrical equipment, including its overcurrent protective device and its operating time
- The electrical equipment operating condition and condition of maintenance

## ADDITIONAL PROTECTIVE MEASURES

If the inherent risk level for the energized electrical work task is not acceptable, additional protective measures will be required. Additional protective measures must be selected and implemented in accordance with the hierarchy of risk control methods. When additional protective measures include the use of PPE, the QEW shall determine them and apply them to the energized electrical work task to reduce risk, including applying appropriate safety-related work practices such as arc flash boundary and the PPE that the QEW will be required to wear when exposed to the arc flash hazard.

A key change not required previously is the assessment of likelihood of occurrence of an arcing fault and arc flash occurring. A new table has been provided (Table 2); it used to be Table 4A. However, the context and use of the new Table 2 is a significant change.

## DOCUMENTATION

The arc flash risk assessment must be documented. Your company must provide a method of documenting a specific work task's arc flash risk assessment as part of the company's electrical safety program. This field-based document would be used by a QEW to identify whether they are exposed to arc flash and/or shock, and to document the hierarchy of risk control methods applied to the work task so that an acceptable residual risk level is achieved.

## ARC FLASH BOUNDARY

When an arcing fault and arc flash are probable, the distance at which incident energy is 1.2 cal/cm<sup>2</sup> is the arc flash boundary. When you stand outside of the arc flash boundary, no arc flash PPE is required to be worn. This distance can be calculated using formulas identified in CSA Z462 Annex D. If calculations have not been performed, then application of the arc flash PPE category method can be used to determine the arc flash boundary.

## ARC FLASH PPE

Two methods can be used to determine arc flash PPE: (1) The incident energy analysis method or (2) the arc flash PPE category method. Either method (but not both) may be used on the same



**Figure 1:** Alternate Equipment Label — Arc Flash Data Provided In Results Table

piece of equipment. When the incident energy analysis method is used, arc flash PPE SHALL NOT be identified with an arc flash PPE category number, but SHALL be determined with an arc thermal performance value (ATPV) for the arc flash PPE being equal to or greater than the calculated incident energy.

CSA Z462–2018 provides a new Table 3 for reference when incident energy analysis is completed. It identifies two choices for arc flash PPE: (1) task wear ATPV 1.2-12 cal/cm<sup>2</sup> or (2) an arc flash suit with ATPV >12 cal/cm<sup>2</sup>. Note that arc flash suits are available up to a 140 cal/cm<sup>2</sup> ATPV.

## EQUIPMENT LABELING

Electrical equipment that will have energized electrical work performed on it shall be labeled with an arc flash and shock warning equipment label (based on ANSI Z535). Specific information must be included on the equipment label (Figure 1). The incident energy analysis must be reviewed for accuracy at intervals not to exceed five years.

By using the CSA Z462–2018 in supervised industrial installations, arc flash data can be documented in a manner readily available to persons likely to perform examination, servicing, maintenance, or operation of the equipment while energized. The arc flash data (Figure 2) could be provided in a results table format directly from the professional engineer's incident energy analysis report.

Bus Name	Device Name	Bus kV	Bus Bolted Fault kA	Device Bolted Fault kA	Arcing Fault kA	Trip Time (s.)	Bkr. Opening (s.)	AF Boundary	Working Distance (in.)	Incident Energy (cal/cm <sup>2</sup> )
SS01-A	52-P210-601-Main-A	0.60	10.26	10.26	7.72	2		16' 3"	2'	26.1
SS01-A (Line Side)	50/51-2501-02A	0.60	43.8	43.8	28.52	1.95		47' 10"	2'	128.4
SS01-B	52-P210-601-Main-B	0.60	10.26	10.26	7.72	2		16' 3"	2'	26.1
SS01-B (Line Side)	50/51-2501-02B	0.60	43.8	43.8	28.52	1.95		47' 10"	2'	128.4
SS02-A	52-P210-602-Main-A	0.60	39.03	39.03	25.71	0.065		4' 5"	2'	3.8
SS02-A (Line Side)	50/51-2501-03A	0.60	39.03	39.03	25.71	1.95		44' 5"	2'	115.0
SS02-B	52-P210-602-Main-B	0.60	39.02	39.02	25.7	0.065		4' 5"	2'	3.8
SS02-B (Line Side)	50/51-2501-03B.	0.60	39.02	39.02	25.7	1.95		44' 5"	2'	114.9
P210-603-A	52-P210-603-Main-A	0.60	10.28	10.28	7.74	2		16' 3"	2'	26.1
P210-603-A (Line Side)	50/51-2501-04A	0.60	47.99	44.08	28.44	1.95		48' 2"	2'	129.8
P210-603-B	52-P210-603-Main-B	0.60	10.28	10.28	7.74	2		16' 3"	2'	26.1
P210-603-B (Line Side)	50/51-2501-04B	0.60	47.99	44.08	28.44	1.95		48' 2"	2'	129.8
SS04-A-E05004	52-P210-604-Main A	0.60	43.89	43.89	28.57	0.4		16' 3"	2'	26.1
SS04-A-E05004 (Line Side)	50/51-2501-05A	0.60	43.9	43.9	28.57	1.95		47' 11"	2'	128.6
SS04-B-E05004	52-P210-604-Main-B	0.60	43.9	43.9	28.57	0.4		16' 3"	2'	26.1
SS04-B-E05004 (Line Side)	50/51-2501-05B	0.60	43.9	43.9	28.57	1.95		47' 11"	2'	128.6
SS05-E05004-A	52-P210-605-Main-A	0.60	17.24	17.24	10.48	2		20' 7"	2'	37.0
SS05-E05004-A (Line Side)	50/51-2501-06A	0.60	44.31	43.38	28.21	1.95		47' 7"	2'	127.3
SS05-E05004-B	52-P210-605-Tie	0.60	17.21	17.21	10.46	2		20' 6"	2'	36.9
SS05-E05004-B (Line Side)	50/51-2501-06B	0.60	44.31	43.38	28.21	1.95		47' 7"	2'	127.3
SS06-A-E05004	52-P210-606-Main-A	0.60	10.28	10.28	7.74	2		16' 3"	2'	26.1
SS06-A-E05004 (Line Side)	50/51-2501-07A	0.60	44.18	44.18	28.74	1.95		48' 1"	2'	129.4
SS06-B-E05004	52-P210-606-Tie	0.60	10.28	10.28	7.74	2		16' 3"	2'	26.1
SS06-B-E05004 (Line Side)	50/51-2501-07B	0.60	44.18	44.18	28.74	1.95		48' 1"	2'	129.4

**Figure 2: Incident Energy Analysis Results Table Example**

## CONCLUSION

As a component of the overall work task's risk assessment procedure, an arc flash risk assessment must be completed. The arc flash risk assessment requirements in CSA Z462–2018 edition are significantly different than the 2015 edition. Please make sure your company documents the specific requirements in its electrical safety program. A qualified electrical worker also must document their

specific work task's arc flash risk assessment before executing the work task.

CSA Z462–2018 was published January 8, 2018. Please purchase a copy for your reference and use at [www.shop.csa.ca/en/canada/c221-canadian-electrical-code/z462-18/invnt/27029372018](http://www.shop.csa.ca/en/canada/c221-canadian-electrical-code/z462-18/invnt/27029372018). Please submit any questions or comments to [tbecker@danatec.com](mailto:tbecker@danatec.com).



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