

# ELECTRICAL JOB SAFETY PLANNING

## BEST PRACTICES AND REQUIREMENTS

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The critical elements of strategic and comprehensive task planning within electrical workplaces should incorporate recent updates from the NFPA 70E and CSA Z462 2018 editions and best-case practices with emphasis on human performance principles.

This article demonstrates opportunities for improvement from the 2015 to the 2018 editions. A specific listing of all changes in the standards will not be provided here, as there will be a great deal of information available on that moving forward. In fact, the preface in CSA Z462-18 and a portion of the foreword in NFPA 70E-18 document the changes in their 2018 editions. CSA uses a small triangle nomenclature, while the NFPA uses four nomenclatures to note changes throughout their documents. This article focuses on what I consider the major change — the requirement for a job safety plan (JSP) — and why it is critical.

The addition of JSPs to the NFPA 70E and CSA Z462 2018 editions will drastically

change the workplace for those who have simply verbalized their planning in the past. The new standards also give specific guidance on what the documented JSP should contain. There have been major improvements every time either of these standards has been re-issued, and the content in this article is offered in the spirit of continuous improvement.

### **PLAN THE WORK, WORK THE PLAN**

All electrical work must be well planned. The transmission and distribution power line trade has made this a baseline requirement for all tasks executed daily. The expectation is that all work will be planned, documented, and clearly communicated to power line crews before work begins.



In Ontario, the power line trade must comply with the Infrastructure Health and Safety Association (IHSA) *Electrical Utility Safety Rulebook* (EUSR). The EUSR has been in place since 1914. There are currently 49 rules that must be followed by competent and qualified power line tradespeople.

Without question, Rule 107 is one of the most important and critical rules in the EUSR. It states, in part:

- 1) *All work must be properly planned and communicated, considering all workers, the general public, approved work procedures, equipment, and the physical and environmental conditions at the workplace. The purpose of this process is to establish a safe work area by identifying the job steps, hazards and appropriate barriers. The steps to be taken in case of an emergency shall also be documented.*
- 2) *A documented job plan must be completed prior to the performance of all tasks:*
  - a) *on or in proximity to energized electrical equipment;*
  - b) *requiring the establishment of work protection; or*
  - c) *involving critical hazards such as, but not limited to, falling, hoisting, confined space, hazardous substance, etc.*

In the transmission and distribution sectors, it is clear that documented job safety planning

has been a part of the everyday work culture for decades. Safe electrical work needs to be documented. The only way to exercise due diligence within a managed system is to comprehensively plan, document, and clearly communicate all segments of the work to be performed. Unfortunately, this has not been the case in enough electrical workplaces outside of this sector.

In the industrial, commercial, and maintenance electrical sectors, for example, the only stipulation to document safe work was as stated within an individual company's business practices and culture — if done at all. While some companies have comprehensively documented their job safety plans, it was truly just a best practice.

During electrical safety audits, it is not uncommon to find that electrical safe work practices have not been well planned, let alone documented. Even the 2015 editions of CSA Z462 and NFPA 70E did not require documentation for electrical safe work planning. It is evident that there is much to learn from those in the transmission and distribution sector of electrical work.

As Jim White, my good friend and high-end electrical safety expert, likes to say: "If it wasn't documented, it never happened." Failing to document your safe work practices might seem reasonable — until there is a significant

health and safety incident and/or equipment malfunction or failure. Quality electrical maintenance work requires a high level of expertise and execution. Accurate maintenance records, quality assurance, and sticking to a defined scope of work for yourself or a client all require excellent documentation that brings great clarity to the workplace. It is hard to believe that documenting job safety plans and electrical safe work practices has not been clearly mandated in the standards until 2018.

A quick review of the 2015 editions of CSA Z462 and NFPA 70E clearly shows that this critical component was missing. For example, the 2015 editions of the standards mention job briefing, but nothing specifically about job safety planning.

### **Clause 4.1.5.8 Job Briefing (Article 110.H)**

*Before starting each job, the worker in charge shall conduct a job briefing with the workers involved. The briefing shall cover such subjects as the following:*

- a) hazards associated with the job;*
  - b) work procedures involved;*
  - c) special precautions;*
  - d) energy source controls;*
  - e) PPE requirements; and*
  - f) the information on the energized electrical work permit, if a permit is required.*
- Additional job briefings shall be held if significant changes that might affect the safety of workers occur during the course of the work.*

*(Editor's note: For examples of a job briefing and planning checklist, see Informative Annex I in the CSA Z462-18 and NFPA 70E-18 standards.)*

What you won't find in the 2015 editions of the standards is a requirement to document the job briefing after a comprehensive job plan has been completed. In fact, it is quite common and accepted by many in certain segments of the electrical trades to do verbal overviews of the requirements for safe electrical work. Very often, the requirements to complete the

electrical work are discussed but efforts to review safe electrical work are not.

## **COMPREHENSIVE JOB PLANNING**

A new requirement in the 2018 editions of CSA Z462-18 and NFPA 70E-18 has closed the loop on quite possibly one of the biggest gaps regarding best practices for safe electrical work. Without question, comprehensive task planning in the electrical sector needs JSP at the core of every job. In any electrical maintenance task, safety is paramount and mandatory. It is very difficult to keep our workers and contractors safe from electrical hazards — and to finish on time and on budget — if we do not plan and document our work correctly.

Carefully read the new requirements in both 2018 standards regarding JSP as well as the previous requirement for a job briefing, which has now been rewritten to include a requirement to be aligned with documented JSP. In particular, note part (b) and the new 2018 requirement to “be documented” from CSA Z462-18, for example.

In part (c), the required information as described in parts (i) thru (v) clearly maps a workflow that needs to be executed by qualified and competent electricians, technicians, and their supervisors and managers before starting any electrical work. The ability to describe the scope of the job and the individual tasks, identify all the electrical hazards for each task, complete comprehensive shock and arc flash risk assessment procedures, in addition to work procedures, precautions, and energy source controls, must be documented. The detailed requirements truly depend upon the complexity of the work involved.

### **Clause 4.1.6.9.2 Job safety planning (Article 110.1(I)(1) in NFPA 70E-18)**

*The job safety plan shall be in accordance with the following:*

- a) be completed by a qualified person;*
- b) be documented; and*



- c) include the following information:
- (i) a description of the job and the individual tasks;
  - (ii) identification of the electrical hazards associated with each task;
  - (iii) a shock risk assessment in accordance with Clause 4.3.4 for tasks involving a shock hazard;
  - (iv) an arc flash risk assessment in accordance with Clause 4.3.5 for tasks involving an arc flash hazard; and
  - (v) work procedures involved, special precautions, and energy source controls.

Clause 4.1.6.9.3 Job briefing in CSA 462-18 and Article 110.1 (I) (2) Job Briefing in NFPA 70E-18 state: “The job briefing shall cover the job safety plan and the information on the energized electrical work permit (if a permit is required).”

It didn’t make a lot of sense to have a job briefing without a documented JSP for the electrical work. This is now clearly indicated in part (b).

## RISK ASSESSMENT

The managed system in any business needs to provide great clarity for the expected work. Clarity in electrical work within the job planning phase is the ability to clearly articulate the task from start to finish. The requirements for greater clarity have been significantly emphasized in the 2015 editions of CSA Z462 and NFPA 70E with the addition of the risk assessment procedures for shock and arc flash.

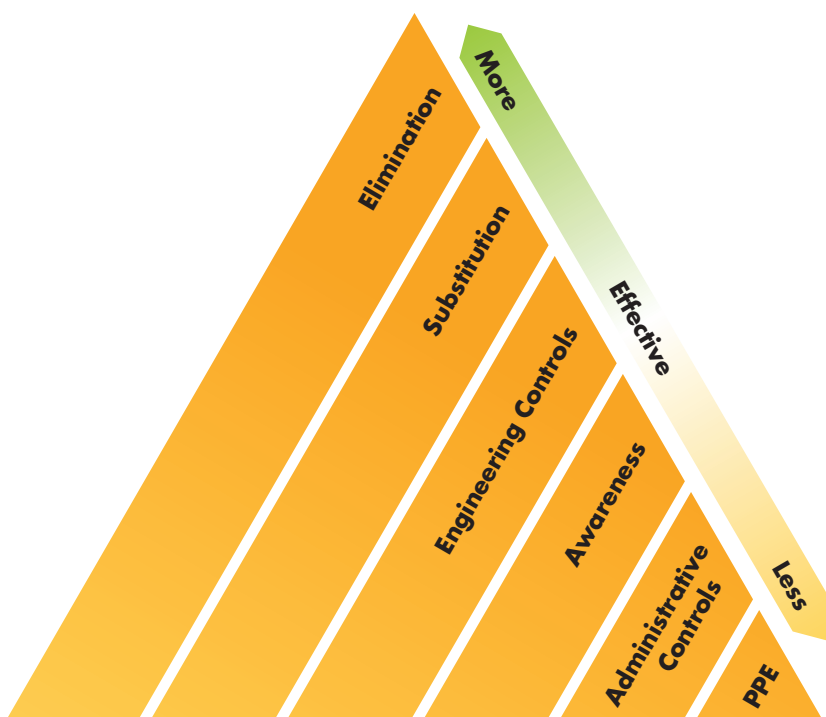
When used, Informative Annex J, Energized Electrical Work Permit, is a document to capture many of the safe electrical work practices that must be assessed in the job planning phases regarding energized work.

In general, the risk assessment procedure is a three-step process:

- 1) Identify the hazards.
- 2) Assess the risks.
- 3) Implement risk control according to a hierarchy of methods.

These three steps are used throughout the shock and the arc flash risk assessment procedures. Tradespeople often did a reasonable job of identifying the electrical hazards but frequently did not document those discussions. The assessment of risks is the portion of a risk assessment procedure that was often not well done in the discussion phase and certainly not well documented. The 2018 editions of the standards emphasize how to accomplish far better risk assessment quantifications for all electrical work within the job planning phases. The likelihood of occurrence of harm as improbable or possible and the severity of harm regarding the level of hazards need to be considered after the electrical hazards have been identified.

The third and final step involves the implementation of a hierarchy of risk control methods as appropriate to the determinations of the first two steps. In order of effectiveness, these include elimination, substitution, engineering controls, awareness, administrative controls, and last but not least, PPE (Figure 1)



**Figure 1:** A Hierarchy of Effectiveness in Risk Control Methods  
(Image courtesy of e-Hazard)

## CLARITY

Execution of a quality JSP will bring great clarity to any electrical workplace task. Clarity is an expectation for all JSPs.

Many of the reasons electrical workers have been injured or killed from interactions with the toxic energy some people call electricity could be described by using an antonym for clarity. During root-cause incident investigations involving electrical work, it is frequently found that some of these antonyms for clarity including vagueness, obscurity, blurriness, and murky could be used to describe the job planning.

Clarity needs to be the foundational value used by electrical managers, supervisors, and workers when executing a task. Managers need to ensure that field supervisors have the qualifications and competency to provide extreme clarity for all JSPs. Without question, supervisors

need extra knowledge and training to provide this clarity. You cannot simply take a good tradesperson from the field and turn them into a high-end supervisor. The management system needs to provide the awareness and skill sets to

their supervisors so that clarity — not vagueness — is the path forward for all electrical work.

As shown in Figure 2, the managed system needs to provide a concise and structured JSP process and procedure. Everyone on the senior management team needs to agree and document

that clarity within their electrical safety programs. Step 2 is for supervisors and workers to obtain clarity for the job steps in electrical safety for the specific task. Step 3, supervisors and workers need to over-communicate that clarity. Step 4, clarity needs to be reinforced.

Many times, you hear a worker ask, “Can’t you just tell me what to do?” Often, instructions have not been clear and concise. JSPs must be

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**Figure 2:** *Job Safety Planning Cycle* (Adapted from “The Advantage: Why Organizational Health Trumps Everything Else in Business,” by Patrick Lencioni)

reviewed in the job briefing with clarity for all concerned. Supervisors are held accountable for ensuring clarity for all work. If 100 percent clarity is not achieved, it is the workers' responsibility to stop and ask. It doesn't take long when this practice is used continually; it's a best practice for electrical tasks and electrical maintenance, and without question, it makes for a far safer workplace.

## HUMAN PERFORMANCE

The CSA Z462 Technical Committee gathered a group of world-class experts preceding their 2015 edition and added one of the technical jewels to the CSA Z462-2015 standard. It was the inclusion of Annex U - *Human performance and workplace electrical safety*. Best practices and knowledge originating from the U.S. airline industry from the 1980s, the medical establishment, and the U.S. Navy nuclear submarine program have been used in North American nuclear power plants very effectively over the last 20 years. The CSA Z462 Annex U Working Group compiled the very best of human performance practices into the 2015 edition of the standard. NFPA 70E will use Annex U from CSA Z462 in Annex Q of their 2018 edition.

Some of the basic principles of human performance are as follows:

- People are fallible, and even the best people make mistakes.
- Error-likely situations and conditions are predictable, manageable, and preventable.
- Individual performance is influenced by organizational processes and values.
- People achieve high levels of performance largely because of the encouragement and reinforcement received from leaders, peers, and subordinates.
- Incidents can be avoided by understanding the reasons mistakes occur and by applying the lessons learned from past incidents.

## CONCLUSION

If you want to plan your work and work your plan, you need to provide extreme clarity. A JSP using documented comprehensive shock and arc flash risk assessments as just one component of the planning will go a long way toward a far safer workplace.

Note: CSA Z462 and NFPA 70E are technically aligned in almost every case. CSA Z462 uses a clause format, while NFPA 70E uses an article format. Any perceived differences between this article and either standard need to be vetted for accuracy by the reader using their own up-to-date and current copy of either standard as appropriate to their workplace. These standards need to be used in their entirety to be effective. Using any one section in isolation often leads to incorrect decisions. Persons who use either standard need to be qualified and competent.

*Editor's note: This article is based on the thoughts of the author, who does not represent either the CSA or NFPA technical committees in this piece.*



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