



# Safe Maintenance CHECKLIST

**CSA Z462 is a requirement :  
reduce the risk of arc flash  
hazards with these 5 safety tips**

Proper safety practices and on-going personnel training can minimize the likelihood of electrical injuries and fatalities due to shock, electrocution, arc flash and arc blast. At risk are employees who work on or near exposed energized electrical conductors or circuit parts including electrical maintenance personnel, operators, troubleshooters, electricians, linemen, supervisors, site safety personnel, or anyone exposed to energized equipment of 50 volts or more.

The majority of hospital admissions following electrical accidents are due to arc flash burns, not electrical shock (*per NFPA 70E-2004*), so protect workers with the following tips:

## 1 Identify the hazards through arc-flash hazard studies

Performed by qualified engineers and technicians, Lineman's Testing Laboratories offers CSA Z462-compliant arc flash hazard analyses which determine the potential arc flash incident energies and boundaries, shock hazard boundaries and proper personal protective equipment required for activity within the arc flash boundary. The CSA Z462 states that this analysis should be updated when a major modification or renovation takes place and should be reviewed periodically, at *least* every five years, to account for changes in the electrical distribution system that could affect the results of the analysis.

## 2 Affix proper warning labels to all plant equipment

LTL ensures warning labels identifying potential hazards and required safety equipment are affixed to applicable electrical equipment. The Canadian Electrical Code (CEC) mandates that electrical equipment shall be field-marked to warn persons of potential electrical shock and arc flash hazards.

## 3 Select the proper personal protective equipment (PPE)

The Occupational Health & Safety Act of Ontario states that it is the responsibility of the employer to take every precaution reasonable in the circumstance for the protection of the worker: "The worker shall use rubber gloves, mats, shields and other protective equipment and procedures adequate to ensure protection from electrical shock and burns while performing the work."

### What is an Electrical Shock?

It's the physical effect of an electric current that enters the body, ranging from a minor static-electricity discharge to a power-line accident, lightning strike or industrial apparatus contact. The effects depend on the current (not the voltage), and the worst damage occurs along its path from point of entry to exit. Causes of immediate death are ventricular fibrillation and paralysis of the brain's breathing centre, or of the heart.

### What is an Arc Flash?

It's a dangerous release of energy created by an electrical fault. Such a release will contain thermal energy, acoustical energy, pressure wave and debris. Heat builds to 19,426°C; copper vapor expands by 67,000 times; and there is molten metal, intense light, hot air rapid expansion, pressure waves, sound waves and shrapnel.

### What is an Arc Blast?

It consists of pressure, sound and shrapnel: pressure can easily exceed hundreds or even thousands of pounds per square foot; sounds of 160 decibels occur; and shrapnel can exceed 700 miles per hour.

### What causes an Arc Flash?

Electricity travels the path of least resistance. When the path of electricity is suddenly interrupted, a new pathway is created. The arc can be generated by mechanical failure, current overload, accidental contact, or human error.

Determine the calorie rating for your PPE. A calorie is the energy required to raise one gram of water one degree Celsius at one atmosphere. Approximately one calorie is the heat energy your finger receives if you hold it in a cigarette lighter flame for one second. Applied for one second, 1.2 calorie per centimeter squared can cause a second-degree burn. Once the calorie rating is determined for the amount of energy that could be delivered to a point at a distance from an arc flash, the ATPV rating is calculated and proper PPE can then be selected.

To provide maximum worker safety and protection from burns or electrocution, consult Lineman's Testing Laboratories product specialists to ensure the proper PPE selection process is followed and to provide proper training and ongoing support required for compliance.

## 4 Provide training for proper care and use of PPE

It is imperative that workers understand how and why the required PPE will help them as well as how to properly care for and inspect this equipment to comply with legislation. Insulating rubber gloves, arc flash clothing, face protection, temporary grounding equipment and phasing devices have specific application ratings. Insulating rubber gloves, grounds sets, live line tools and metering/phasing equipment have recertification requirements.

Insulating rubber gloves are to be worn by those working on or near live exposed parts of installations, equipment or conductors. Rubber gloves are the basic protection from electrical shock. Leather protectors must be worn over insulating rubber gloves to provide mechanical protection against cuts, abrasions and punctures as well as protect the rubber gloves from possible physical damage in use. They are specifically designed and are to be used solely for the purpose of protecting the rubber gloves (and must comply with ASTM F696).

To maintain the highest level of insulating protection and ensure long life, it is essential that the rubber gloves are properly cared for, stored, inspected and electrically tested on a regular basis. Recertification of insulating rubber gloves, as per ASTM F496, requires that re-test intervals should not exceed six months.

Lineman's Testing Laboratories is the largest stocking Salisbury by Honeywell distributor in Canada of insulating rubber gloves and related personal protective equipment. As well, LTL is home to Canada's largest NAIL-accredited high voltage testing facilities, conveniently located in Toronto and Edmonton.

## 5 Minimize plant equipment failure through regular maintenance

Early detection of electrical equipment weakness or potential hazard through regular maintenance of high and low voltage electrical and mechanical components and analysis of electrical insulating fluids, helps to reduce production downtime and associated costs, but most importantly, improves safety conditions for system operating personnel. Performed and directed by skilled technicians, Lineman's Testing Laboratories of Canada offers comprehensive maintenance programs tailored to your specific needs. These extensive programs include testing and calibration, inspection, adjustment, cleaning and repair as required of high and low voltage electrical and mechanical components, and analysis of electrical insulating fluids. After service, a detailed data report including summary and recommendations to maintain a reliable service is prepared and delivered.

### SUMMARY: Ensure the following CSA Z462 requirements are met ...

- ✓ A safety program is in place clearly defining responsibilities
- ✓ An Arc Flash Hazard Analysis is conducted and reviewed periodically
- ✓ Warning labels are affixed to all applicable electrical equipment
- ✓ On-going worker training is provided for the care and use of personal protective equipment
- ✓ An electrical work policy is in place for how, where, when, and who
- ✓ All workers are equipped with the proper tools to ensure safe work practices
- ✓ A personal protective equipment re-certification schedule is in place and strictly adhered to