



# Fleet Safety Manual

## 7.B.6 - ELECTRICAL SAFETY WORKING ON ENERGIZED ELECTRICAL CONDUCTORS OR CIRCUIT PARTS

### 1 PURPOSE

- a) To ensure that all persons working on board Canadian Coast Guard (CCG) vessels or stations are protected from accidental exposure to electrical currents and flash burns.
- b) It is important to be aware that working on any energized electrical conductors or circuit parts is not recommended and should not be a routine practice. When necessary, because of operational requirements or for troubleshooting circuits, energized work must be performed by the person in charge or qualified persons under the terms of the [\*Maritime Occupational Health and Safety \(MOHS\) Regulations\*](#)<sup>1</sup>.

### 2 RESPONSIBILITIES

#### 2.1 COMMANDING OFFICER

- a) The Commanding Officer is responsible for ensuring that this procedure is applied onboard the vessel.

#### 2.2 CHIEF ENGINEER, OR DELEGATE

- a) The Chief Engineer, or delegate, shall approve work on any energized electrical conductors or circuit parts. These operations shall be logged in a controlled register.
- b) The Chief Engineer shall be responsible for assigning the work to a person who is qualified to work with energized electrical conductors or circuit parts.
- c) The Chief Engineer shall consult with the Commanding Officer prior to locking out or disabling any energized electrical conductors or circuit parts which affects the operational readiness or navigational safety of the vessel. The Commanding Officer shall also be notified when the circuit is re-energized. Special consideration shall be given prior to disabling any energized system or equipment that affects the operational readiness of the vessel. The Chief Engineer shall produce a list of critical systems / equipment in compliance with section 3.3 (d) of this procedure.
- d) Prior to performing any work on energized electrical conductors or circuit parts, the Chief Engineer is responsible for ensuring that one employee at the worksite has been trained in CPR and is able to fulfill that requirement. The employee shall remain on site for the duration of the work being performed.

#### 2.3 EMPLOYEE

- a) No employee shall commence work on any electrical conductor or circuit part that must remain energized without the prior approval of the Chief Engineer or delegate.

<sup>1</sup> Part 15 – Electrical Safety  
4<sup>th</sup> Edition: 2012-09-01  
Version 4-1: 2016-09-29  
EKME # 2831434

### 3 INSTRUCTION

#### 3.1 GENERAL

- a) When performing energized work, a risk assessment shall be completed in accordance with Section 7.A.1 of this manual.
- b) Energized Electrical Work Permit (EEWP) shall be completed. Energized work shall never be taken lightly. Implementation of best practices, judgment and knowledge of individual systems and use of Personal Protective Equipment (PPE) is necessary to prevent or reduce the potential for injury.

#### 3.2 CATEGORIES OF HAZARDOUS SITUATIONS

- a) Electrification and Electrocutation.
  - These are situations where a worker's body comes into direct contact with or exposed to a live electrical device. These hazards are controlled by wearing PPE and by maintaining a safe distance according to the voltage present.
- b) Arc Flash Burns.
  - An equipment malfunction can create an arc flash with consequences that can cause injury to an employee. The amount of energy released by the arc event is directly related to the voltage of the circuit, the short circuit capacity at the point of malfunction, and the amount of time needed for circuit protection to deploy.
- c) Arc Blast.
  - When copper changes instantly from a solid to a gas, it causes increased pressure, hazardous noise levels, and a shower of hazardous debris. The sound pressure can be as strong as 160 dB, and projectiles can reach a velocity of 1100 km/h.

#### 3.3 APPLICATION

- a) Personal Protective Equipment and Appropriate Measuring Instruments
  - For the Chief Engineers or their delegates, Electrical Officers assigned to the vessels and the Electricians in the Fleet, the PPE should be “arc rated coveralls” minimum 12 calories/cm<sup>2</sup> or better with a face shield and protective gloves, which meet electrical standards.
  - The engine room crew shall be supplied with “flame resistant” coveralls.  
Note 1: Arc rated cloth won't maintain its rate over time if it's not properly treated.  
Note 2: Wearing synthetic fibres or metal accessories is prohibited while performing any work on live circuits, for all classes of vessels.
  - The *CSA (Canadian Standards Association) Standard Z462-15* serves as a best practice standard to accurately determine what PPE is appropriate for a given task. It also defines minimum approach distances and arc rated and flame resistant clothing protection systems.
  - The tools used to perform live electrical work must be fitted with an insulating material. Insulating mats must be inspected regularly to ensure that they are completely intact and have a certificate of conformity with the standard in effect. Electrical equipment solely used in the testing of live circuits shall be tested as per manufacturer's instructions. Where no instructions exist, the equipment shall be tested at a minimum annually.

- b) Vessel / Vessel Class Specific Practices
- Work instructions shall be developed specific to each vessel for energized electrical work. These instructions shall provide employees with guidelines for the categories of tasks to be performed in accordance with the *CSA Standard Z462-15*.
- c) A Risk Assessment attached to the EEWP must be located on site and include a rescue plan which identifies the circuit to be shut down in the event on an emergency.
- An EEWP for energized circuit work is mandatory and shall be completed if the equipment operates at a voltage of **240 V or above** and is powered by a transformer **greater than 125 kVA**, or if prior to the closest upstream protection device, the equipment feeder cables are in a shared enclosure with a voltage present that is above 240V.
  - The Chief Engineer shall maintain a register of EEWPs, which once completed, shall be kept onboard for 2 years.
- d) The Chief Engineer shall produce a list of critical systems or equipment that due to their nature, are required for operational readiness for the vessel and remain in a constant energized state. This list shall remain in the permit register for reference. The EEWP shall be issued when any electrical troubleshooting work is being performed on this equipment.

### 3.4 SYSTEM UNDER TESTING, TROUBLESHOOTING AND RETURN TO SERVICE

- a) If at any time, an unforeseen situation should occur during the troubleshooting situation of energized circuits, for example, the detection of a short circuit, the troubleshooting work shall be stopped immediately and necessary repairs conducted. During the troubleshooting, no unexpected loads shall be introduced into the system.
- b) When the electrical equipment is put back into operational status, it must be proven ready for safe operation.

## 4 DOCUMENTATION

- *CSA(Canadian Standards Association)Standard Z462-15*
- [Maritime Occupational Health and Safety \(MOHS\) Regulations - Parts 13 - Work Permit and 15 - Electrical Safety](#)
- Site Specific Work Instructions
- [Energized Electrical Work Permit \(EEWP\) FP-5197-E](#)
- Register of Energized Electrical Work Permits (EEWPs)
- Log Book Entries

<b>ENERGIZED ELECTRICAL WORK PERMIT (EEWP)</b>	VESSEL: CCGS	
This work permit is required when working on equipment operating at <b>240 volts or more</b> and powered by a transformer of <b>more than 125 kVA</b> .		
Circuit #	Location:	
Period of validity (Date):		
MAINTelligence Work order number:		
Description of Equipment / System:		
Reason for energized work:		
<input type="checkbox"/> Equipment troubleshooting <input type="checkbox"/> System calibration <input type="checkbox"/> Other (specify) _____		
Risk assessment: The following section shall be completed.		
Checklist: <input type="checkbox"/> Safe environment <input type="checkbox"/> Work procedures met <input type="checkbox"/> Inspections during work <input type="checkbox"/> Installation of signage required <input type="checkbox"/> Control room and wheelhouse notified of work <input type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> Insulated material involved (tools, mat, ladder etc.) <input type="checkbox"/> Presence of lockout/tagout if required <input type="checkbox"/> Safety tests required	<input type="checkbox"/> Tags or signs required <input type="checkbox"/> Measuring instruments used appropriate to work <input type="checkbox"/> Metal accessories (jewellery, watch, belt buckle, etc.) removed <input type="checkbox"/> Clear and effective communications among team	<b>RESCUE PLAN</b> <input type="checkbox"/> Emergency power disconnect switch identified and accessible <input type="checkbox"/> Other (Specify) _____
Emergency procedures to be followed:		
Worker: (Print)	Signature:	
Chief Engineer:	Signature:	
Date issued:		
Return to service completed / Functional inspection satisfactory:    Yes    No		
Comments:	Date:	Time: