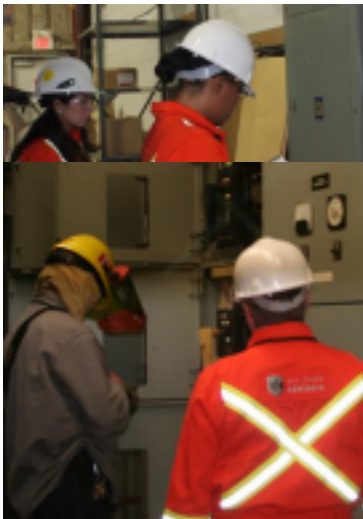


Arc Flash

Introduction and Executive Summary

Petersen Contracting Inc. is pleased to submit a proposal for performing the Arc Flash Assessment as per CSA-Z462. All reports shall be stamped and signed by a Level II Thermographer and by a Professional Engineer.

DATA COLLECTION PHASE AND INSPECTION:



- Our crews will visit the facility to conduct a visual and infrared inspection and collect the data necessary to prepare an arc-flash hazard analysis.
- The data collector may require the following by the facility:
 - Simple floor plan of the facility, drawn to scale. The floor plan will be used to estimate the length of feeder circuits.
 - Identification of all disconnects, circuit breakers, switchboards, motor control centers and transformers.
 - Man-lift and/or ladders, as needed to collect data on electrical equipment such as disconnects, circuit breakers or transformers.
 - If the facility has a qualified electrician or engineer available, Petersen Contracting requests that one accompany and assist in the data gathering, increasing the overall safety and efficiency of the data collection.
 - Availability of existing data sheets and/or drawings that provide information on the existing electrical system.

SHORT CIRCUIT STUDY:

A short circuit study will be performed for the facility to verify that the interrupting rating is greater than the available fault current for fuses, circuit breakers and relays, following the recommendations of the latest standards of IEEE 399 and IEEE 551. The study will provide a list of recommendations for any device that is underrated.

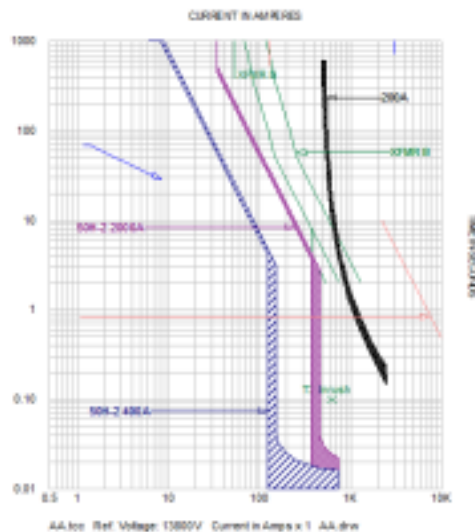
SINGLE LINE DIAGRAM

Petersen Contracting will create an as-built electrical one-line diagram for the facility. This will include all electrical equipment needed to calculate the maximum fault current, the arc flash current and the anticipated maximum energy released in the event of an arc flash for each location as required by CSA Z462.

PROTECTIVE DEVICE COORDINATION STUDY:

A protective device coordination study will be performed for the facility to determine the correct settings and sizes for fuses, circuit breakers and relays, in order to minimize unnecessary service interruptions, blackouts, and nuisance tripping, following the recommendations of the latest standards of IEEE 242 and IEEE 399. For any devices outside acceptable limits the study will include the following:

- Plots of transformer protection curves, motor starting curves, fuse sizes, circuit breaker and relay settings.
- Time-Current characteristic curves plotted on log-log paper demonstrating selective coordination of devices (when achievable). Time current curves will include device characteristics data, equipment protective limits and 3P bolted fault cut-off values at device location.
- List of overcurrent protective devices displaying device or circuit name, device type, manufacturer, function, interrupting rating, ampere frame/sensor/trip/plug, and the recommended protective device settings/frame sizes in order to provide maximum protection, while minimizing service interruption.
- A list of recommendations in order to achieve selectivity (coordination) between protective devices, such that only the nearest protective device trips during over current conditions, leaving the rest of the system unaffected.
- A list of recommendations in order to prevent false overcurrent protective device tripping due to transformer inrushes, transients, motor starting currents, hot and cold load pick up currents.



ARC FLASH HAZARD ANALYSIS:

The Arc Flash study will be performed for the facility to determine the Incidental Energy, Flash Boundary, and PPE Requirements for panel boards, switchboards, industrial control panels, and meter socket enclosures indicated on the one line drawings, and "as-found" in the field. The study will be in accordance with the latest Standard IEEE 1584 recommended calculation method and performed on equipment 208/120 Volts and above. The study will use the latest CSA Z462 Standards for boundary calculations, Hazard Categories, and recommended PPE.

REPORTS:

The final reports will be written to discuss the study findings and recommendations. The report will include the following:

- Introduction.
- Executive Summary and Recommendations.
- Short Circuit Study description, assumptions, and results.
- As-built Arc Flash one line drawing.
- Protective Device Coordination Study description, assumptions, results, and recommendations.
- Visual and Infrared Inspection Report
- Arc Flash Study description, assumptions, results, and recommendations.
- Recommendations for Arc Flash Mitigation at hazard risk category above HRC 2 (8 cal/cm²).

Arc Flash Warning Label Installation

A Petersen Contracting crew will affix the warning labels to the electrical equipment. Warning labels will be affixed to the following electrical equipment, as per CSA-Z462:

WARNING	
Arc Flash and Shock Hazard	
Appropriate PPE Required	
32 inches	Flash Hazard Boundary
3.1 cal/cm ²	Flash Hazard at 18 inches
HRC 1	Arc-rated FR Shirt & Pants
400 VAC	Shock Hazard when cover is removed
00	Glove Class
42 inches	Limited Approach
12 inches	Restricted Approach
1 inches	Prohibited Approach
Location:	400V Distribution

- Switchgears and switchboards
- Panel boards
- Transformers
- Feeder bus ducts
- Variable Frequency Drives
- Control Cabinets
- Industrial Control Panels
- Meter socket enclosures
- Motor Control Centres
- Junction Boxes
- Miscellaneous equipment likely to be serviced, examined, or maintained while energized

Certificate of Compliance

On completion of the study, Petersen Contracting will provide a certificate of compliance which is good for 5 years.