

APEGS Test: Competency Report

Name APEGS Test
Discipline of Application
Jurisdiction Engineers and Geoscientists BC

EDUCATION

Institution	Degree	Discipline	Location	Date
University of Saskatchewan	Bachelor of Engineering	Electrical	Saskatoon, Canada	Sep 2009 - May 2014

COMPETENCY SUMMARY

Category	Applicant	Required
Technical Competence	3.2	3
Communication	3.0	3
Project and Financial Management	3.0	2
Team Effectiveness	3.5	3
Professional Accountability	3.0	3
Social, Economic, Environmental and Sustainability	3.2	2
Personal Continuing Professional Development	3.0	3

EMPLOYMENT HISTORY

	Employer	Position	Supervisor	Location	Date
1	Employer Three	Senior Engineer-in-Training - Electrical	Supervisor Three	Regina, SK, Canada	Jan 2016 - Apr 2018
2	Employer Two	Engineer-in-Training - Electrical Engineer	Supervisor Two	Saskatoon, SK, Canada	May 2014 - Dec 2015
3	Employer One	Electrical Intern	Supervisor One	Regina, SK, Canada	May 2013 - Dec 2013

Period 1

Employer: Employer Three
Position: Senior Engineer-in-Training - Electrical
Supervisor: Supervisor Three
Location: Regina, SK, Canada
Date Jan 2016 - Apr 2018

Major Responsibilities and Projects:

- Completing technical audits, designs, analysis, implementation and commissioning in building energy management which included lighting and electrical systems.
- Performed feasibility studies and completed detailed engineering design studies.
- Using an in house spreadsheet program and lighting design software I completed electrical designs and analysis.
- Using existing building electrical systems (including distribution, power quality and lighting) I conducted technical reviews and carried out analysis to determine energy savings estimates.
- Report summaries of audit and review findings, system conditions and recommendations which included construction budgets and financial analysis.
- Prepared tender documents and technical specifications
- Project Management Assistant which included scheduling and construction coordination for several projects
- Prepared and distributed fee proposals

Period 2

Employer: Employer Two
Position: Engineer-in-Training - Electrical Engineer
Supervisor: Supervisor Two
Location: Saskatoon, SK, Canada
Date May 2014 - Dec 2015

Major Responsibilities and Projects:

- Responsible for electrical equipment upgrades that included electrical services and power system studies which included short circuit and arc flash.
- Testing and commissioning of high voltage systems
- Completed proposals for detailed industrial electrical engineering services which include power system upgrades, maintenance and two major projects.
- Researched the impact of power quality on distributed generation considerations and the impacts on utilities.
- Project Management Assistant which included scheduling and construction coordination for several projects
- Prepared and distributed fee proposals

Period 3

Employer: Employer One
Position: Electrical Intern
Supervisor: Supervisor One
Location: Regina, SK, Canada
Date May 2013 - Dec 2013

Major Responsibilities and Projects:

- Upgraded lighting for energy savings by installing lighting loggers throughout the building in order to determine the operating hours of each section of the building. I measured hours and calculated the estimated energy usage (kWh) based on the retrofit and upgrade information submitted by the consultants.
- Assisted a certified electrician with the installation of power meters in several buildings.
- Performed feasibility studies and developed design packages for renewable energy projects

COMPETENCY ASSESSMENT

Competency Category 1: Technical Competence

Required Average Level: 3

1.1 Regulations, Codes & Standards: Demonstrate knowledge of regulations, codes, standards, and safety - this includes local engineering procedures and practices as applicable.

Employer	Position	Validator	Date	Canadian Environment?
Employer Three	Sr. Engineer-in-Training - Electrical	Validator Three, PENG	Jan 2017 - Apr 2017	Yes

Situation

This situation demonstrates my understanding of the CEC, CSA and IEEE Standards. I was responsible for determining the substation installation that would be suitable on a temporary construction site and to determine required exterior lighting upgrades on existing buildings.

Action

I was involved in the concept design preparing a report outlining options to improve lighting in the parking lot and walkways. When the final design was approved by my supervisor I was responsible for the design process.

- This included:
- Using a computerized lighting stimulation calculations were used to determine optimal pole locations, heights and light output levels specified by the IESNA.
- Calculating the required size of poles and concrete base to safely withstand wind and snow loading.
- Using CSA 22.1 I determined the size of the conductors and conduit. This was important as during construction I was required to ensure the contractor dug the trenches deep enough to meet CSA 22.1 requirements. Alternatives were used in areas where trenches could not be dug deep were used in site instruction to provide mechanical protection in accordance with the CEC (54-700) this allowed for the depth of underground conductors to be reduced by 300mm.
- I specified and sized circuit breakers and calculated voltage drop.
- I prepared the drawings and specification for the tender documents.
- I was responsible for reviewing the drawings that were provided by our customer and referenced the CEC 2015 requirements for high voltage installations and hydro interconnections standards.

Outcome

I completed studies and determined the substation safe for the site and the public spaces. The ground fault protection settings were set and tested for safety limits as per the Canadian Electrical Code.

The client was satisfied with the lighting upgrades on the existing buildings.

1.1 Competency Level

Applicant: 4

1.2 Project & Design Constraints: Demonstrate knowledge of materials, or operations as appropriate, project and design constraints, design to best fit the purpose or service intended and address inter-disciplinary impacts.

Employer	Position	Validator	Date	Canadian Environment?
Employer Three	Lighting Design Engineer	Validator Three, PENG	Sep 2016 - Nov 2016	Yes

Situation

I managed and designed exterior lighting upgrades and provided a feasibility study for a large scale solar installation for our client.

Action

- I met with the client's project manager and reviewed the scope of the project with them. I completed a detailed review and inventory of existing exterior lighting. A reading of each light source at night was conducted to determine light level in each area, which was presented to the client along with several upgrade suggestions.
- A tender package was prepared that included specifications regarding sizing and material requirements for light standards and concrete basis, accepted lighting and performance requirements, accepted wireless controls systems and commissioning requirements, installation requirements and project management and safety requirements.
- I assisted with a connection impact assessment for generating solar power on a distribution grid connection. I evaluated existing lines and distance to the utility substation, X/R ratio, land classification and construction cost estimates.

Outcome

I contributed to a report to enable to use of existing utility distribution assets and to the multidisciplinary project for the completion of a solar installation which generates green energy.

The upgrades to the existing buildings were complete contributing to the safety of the public. The client was satisfied with the project outcomes.

1.2 Competency Level

Applicant: 3

1.3 Risk Identification & Mitigation: Analyze technical risks and offer solutions to mitigate the risks.

Employer	Position	Validator	Date	Canadian Environment?
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Employer Two

Engineer-in-Training - Electrical
Engineer

Validator Two , PENG

May 2015 - Dec 2015

Yes

Situation

I completed an arc flash report and mitigation study for an existing industrial plant.

Action

Based on information gathered from a site visit and meeting with a technician I modeled the system in ETAP. I determined that the fault current could be controlled by setting and equipment changes. Using CSA Z462 I applied my knowledge of system protected to improve the system selectivity and lower tripping time. Where the fault currents could not be controlled through setting I proposed an upstream circuit breaker with an Arc reduction maintenance switch.

Outcome

A report outlining the arc flash hazard assessment and options to mitigate the arc flash risk.

1.3 Competency Level

Applicant: 3

1.4 Application of Theory: Apply engineering knowledge to design solutions.

Employer	Position	Validator	Date	Canadian Environment?
Employer Three	Sr. Engineer-in-Training /Project Manager	Validator Three, PENG	Jan 2017 - May 2017	Yes

Situation

A client came to us reporting power factor surcharges at several of their terminals. I was responsible for reviewing the existing electrical systems and making recommendations to correct the low power factor issues.

Action

I prepared a report to summarize the findings and provide budget costs for installing the capacitor banks on each of the terminals to raise the overall power factors to levels above 90%.

In order for accurately determine the facility power needs we installed temporary electrical meters for ten business days. After analyzing the data collected I determined that a fixed bank was not suitable due to the fluctuations in power that went up to 60% per day. In order to adjust for these fluctuations I determined an automatic stepped capacitor should be used to prevent over voltage conditions which could harm the motors and equipment.

I analysed the harmonics at the facility to determine if filters would be required or if I had to adjust for resonance. The voltage and current harmonics were below the recommended levels I determined that filters were not required and resonance was not a concern. I prepared the specifications for each site outlining the size and

operating requirements. I was also responsible for

- Reviewing the bids and providing recommendations for award;
- Reviewing the capacitor bank shop drawings for compliance with the specifications;
- Being the point of contact for the contractor;

After all deficiencies were dealt with I prepared the final field review reports, deficiency lists, and certificate of completions.

Outcome

The capacitor banks were installed in accordance with the required specifications and were functional. After three months of completion the ARHs were reviewed and I was satisfied that the overall power factor levels were between the designed 93% and 96%.

1.4 Competency Level

Applicant: 4

1.5 Solution Techniques: Be able to understand solution techniques and independently verify the results.

Employer	Position	Validator	Date	Canadian Environment?
Employer One	Electrical Intern	Validator One, PENG	May 2013 - Jun 2013	Yes

Situation

I assisted my supervisor with the safety grounding and power system study. The study included short circuit coordination and arc flash evaluation for a temporary substation.

Action

Under supervision I modeled the system and provided hand calculations to support my report.

- I reviewed the drawings and requested fault information from SaskPower
- Calculations were used for equipment for maximum fault current and circuit breaker ratings which were based on infinite bus method
- The system model was modeled with ETAP software for short circuit evaluation and confirmed the results with the SaskPower fault data.
- Using IEEE 80 and with limits of CEC Table 52 I selected ground fault settings and provided ground potential rise calculations evaluating step and touch potentials.
- Using NETA standards I provided the field services to verify the ground fall of potential testing, circuit breaker and relay commissioning.

Outcome

This situation gave me understanding on solution techniques and the required codes and standards required to assess that a substation is suitable through

calculations, software simulation and the field results.

1.5 Competency Level

Applicant: 3

1.6 Safety Awareness: Safety awareness: be aware of safety risks inherent in the design; and Demonstrate Safety Awareness - on-site and possible safety authorization/certificate as appropriate.

Employer	Position	Validator	Date	Canadian Environment?
Employer Three	Sr. Engineer-in-Training - Electrical	Kyle Smith, PENG	May 2017 - Apr 2018	Yes

Situation

In each of my high voltage projects it is a requirement that I identify and incorporate or participate in a review of all safety considerations, safety procedures and equipment that apply to each of the system operations and maintenance program.

Action

- I was responsible for leading each safety meeting, ensuring onsite safety measures are taken and applying safety standards to ensure a safe work environment. This included field level risk assessments before and after changes in site conditions.
- Applying CSA Z462 I assessed the arc flash hazards of the electrical equipment and made suggestions to the EOR for mitigation strategies and the PPE requirements
- Keeping CEC CSA 22.1 and the safety of employees and the public I designed the electrical distribution on each project.

Outcome

Projects were completed on budget to the satisfaction of the client and met all safety requirements. I practiced safety by design principles and practiced safe work practices.

1.6 Competency Level

Applicant: 4

1.7 Systems & Their Components: Demonstrate understanding of systems as well as of components of systems.

Employer	Position	Validator	Date	Canadian Environment?
Employer Three	Sr. Engineer-in-Training - Electrical	Validator Three, PENG	May 2017 - Nov 2017	Yes

Situation

The client requested a complete electrical upgrade of an industrial warehouse. I was responsible for working on a re design of the control and distribution system, installing new instruments, cable, cable tray and PLC panels. The mechanical equipment was not updated.

Action

The most challenging part of this project was integrating the new electrical equipment into the older mechanical equipment. It was important that I had a good understanding of the existing system and integration of all components.

After inspecting the machines I reviewed the machine in detail to check the existing instruments, motors and cable trays. The control system had some existing instruments that were not used, not connected or not connected in a series. After discussion with the client I removed some of the instruments in the new design and had all instruments connected directly to the PLC.

Outcome

A report was written and tables were generated with inspection findings and mode of operation of the machine. The report also explained cable sizing and protective device settings.

1.7 Competency Level

Applicant: 3

1.8 Project & Process Lifecycle: Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.

Employer	Position	Validator	Date	Canadian Environment?
Employer Three	Lighting Design Engineer, Engineer-in-Training	Kyle Smith, PENG	Mar 2016 - Jul 2017	Yes

Situation

I managed from construction to completion an upgrade relating to energy savings in the lighting systems for a school district.

Action

I identified and prepared a report on potential upgrades in existing buildings to determine ways to reduce energy consumption without reducing lighting levels in the schools. The report included budget costs for three design concepts.

A tender package was prepared and posted to allow contractors to bid on it.

Throughout the project I was responsible for the following;

- Conducting tours and answering questions with bidders of each building
- Reviewing each RFP and providing recommendations to the school board
- Organizing and meeting with the successful contractor. Acting as a liaison between the contractor and school board
- Reviewing shop drawings
- Preparing contemplated change notices and change orders as required
- Conducting the final field review and issuing a final report outlining the deficiencies found
- Issuing the completion certificate

Outcome

The project was completed to the satisfaction of the client and the calculated energy savings were able to be claimed toward the target for the energy management program.

1.8 Competency Level

Applicant: 3

1.9 Quality Control: Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.

Employer	Position	Validator	Date	Canadian Environment?
Employer Two	Engineer-in-Training - Electrical Engineer	Validator Two , PENG	Jul 2014 - Nov 2014	Yes

Situation

I was responsible for designing and managing the installation of eighteen vehicle charge stations (EVC) at eight multi unit corporate buildings. This included preparing drawings and specifications with pricing from contractors and managed the construction phase from start to completion.

Action

Two site visits included my supervisor, the remaining six sites I reviewed on my own.

During each review I was responsible for

- Reviewing the proposed locations for the EVC to ensure proximity to electrical rooms and panels
- Mapping and routed the wire and conduit runs to the EVA from the electrical room
- Reviewing the electrical panels for service size and voltage
- Calculating voltage drops for service runs
- Calculating added loads to the panel boards to verify electrical systems would not be overloaded

My supervisor provided me with feedback which I then incorporated into my methodology for each site.

Outcome

The project was successfully completed and I gained additional review skills for all stages of the project from design to construction.

1.9 Competency Level

Applicant: 2

1.10 Engineering Documentation: Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.

Employer	Position	Validator	Date	Canadian Environment?
Employer Three	Sr. Engineer-in-Training	Kyle Smith, PENG	Aug 2016 - Sep 2017	Yes

Situation

When working on the lighting upgrades I was responsible for the initial investigation and the concept design phase. I was responsible for following up with the detailed design and the implementation of the approved design.

Action

The lighting upgrades required preparation of layout drawings and specifications for bid documents which required both itemized and unit pricing.

The drawings for the tender package included the following details and information:

- Installation for concrete bases and underground service trenches

- Each location for new lightening to be installed
- Labels for each light type and pole heights for new poles
- Control zones for each type of lighting
- Locations of each electrical service feed

Outcome

The contractor was able to follow the drawings I provided with little direction required to complete the new lighting and control systems.

1.10 Competency Level

Applicant: 3

Competency Category 2: Communication

Required Average Level: 3

2.1 Oral Communication: Oral Communication

Employer	Position	Validator	Date	Canadian Environment?
Employer One	Electrical Intern	Validator One, PENG	May 2013 - Dec 2013	Yes

Situation

The energy study project required that I have multiple in person meetings with the client. During these meetings I was required to explain all aspects of the project to different stakeholders with different levels of understanding of the project.

Action

I was responsible for pitching our idea to the client prior to being awarded the contract, I was required to explain the approach and steps to achieve their objectives. My presentation included the type of software we would be using, examples of similar projects and a budget breakdown.

After we were awarded the contract I provided the client with details on what information I would need to complete the lighting analysis. Along with the client we completed a site review with staff who were familiar with each site. I provided an over view of each site and what information would be required and most applicable for each upgrades.

When the analysis was completed a draft report was completed and I presented the findings and recommendations to the stakeholders. I was also involved in a short training session on how we conducted our analysis.

Outcome

The feedback received from the client was positive. We finalized our report based on feedback and requests from the client. There was also discussion oh how the scope of work could be expanded into the future and develop energy efficient policies.

2.1 Competency Level