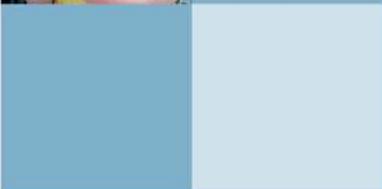
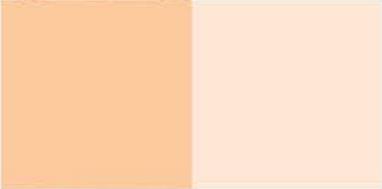
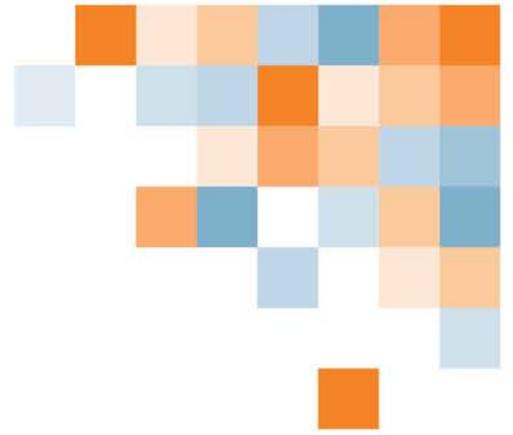


**ita**  
**YOUR TICKET.**



## PROGRAM OUTLINE

### Powerline Technician



The latest version of this document is available in PDF format on the ITA website  
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# **POWERLINE TECHNICIAN HARMONIZED PROGRAM OUTLINE**

**APPROVED BY INDUSTRY  
DECEMBER 2019**

**BASED ON  
RSOS 2019**

**Developed by  
Industry Training Authority  
Province of British Columbia**



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# **Section 1**

# **INTRODUCTION**

# **Powerline Technician**



## Foreword

This revised Powerline Technician Program Outline is intended as a guide for instructors, apprentices, and employers of apprentices as well as for the use of industry organizations, regulatory bodies, and provincial and federal governments. It reflects updated standards based on the new Powerline Technician Red Seal Occupational Standard (2019) and was prepared with the participation, advice and assistance of British Columbia industry and instructor subject matter experts and will form the basis for further updating of the British Columbia Powerline Technician Program.

Practical instruction by demonstration and student participation should be integrated with classroom sessions. Safe working practices, even though not always specified in each operation or topic, are an implied part of the program and should be stressed throughout the apprenticeship.

This Program Outline includes a list of recommended references that are available to support the learning objectives and the minimum shop requirements needed to support instruction.

Competencies are to be evaluated through written exams and practical assessments. A passing grade is achieved by getting an overall mark of 70%. See the Assessment Guidelines for more details. The types of questions used on these exams must reflect the cognitive level indicated by the learning objectives and the learning tasks listed in the related competencies.

Achievement Criteria are included for those competencies that require a practical component. The intent of including Achievement Criteria in the Program Outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner's ability to apply the theory to practice. It is important that these performances be observable and measurable and that they reflect the skills spelled out in the competency as those required of a competent journey person. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the evaluation criteria.

The performance spelled out in the Achievement Criteria is a suggested performance and is not meant to stifle flexibility of delivery. Training providers are welcome to substitute other practical performances that measure similar skills and attainment of the competency. Multiple performances may also be used to replace individual performances where appropriate.

### **SAFETY ADVISORY**

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation the current Standards and Regulation in BC can be obtained on the following website: <http://www.worksafebc.com>. Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.



## Acknowledgements

The Subject Matter Experts (SMEs) retained to review the Program Outline in 2019 include:

- Ben Berkelaar, BC Hydro
- Wesley Nustad, BC Hydro
- Chris Smith, BC Hydro
- Chase Anderson, Allteck Line Contractors
- Dave Fossa, Allteck Line Contractors
- Benton Hadley, Fortis BC
- Pat Hagel, IBEW 258

The industry Subject Matter Experts (SMEs) retained to review the Program Outline in 2013/2014 include:

- Ben Berkelaar, BC Hydro
- Gerry Bramhill, Electrical Industry Training Institute
- Phil Davis, Electrical Industry Training Institute
- Mike Ferguson, BC Hydro
- Dan Giesbrecht, IBEW 258
- Benton Hadley, Fortis BC
- Allan Pineau, BC Hydro
- Jeff Skosnik, Line Contractors Association

The Industry Training Authority would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Powerline Technician occupation.



## How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
<b>Program Credentialing Model</b>	Communicates program length and structure, and all pathways to completion	Illustrates the length and structure of the program	Illustrates the length and structure of the program, and pathway to completion	Illustrates the challenger pathway to Certificate of Qualification
<b>OAC</b>	Communicates the competencies that industry has defined as representing the scope of the occupation	Displays the competencies that an apprentice is expected to demonstrate in order to achieve certification	Displays the competencies apprentices will achieve as a result of program completion	Displays the competencies challengers must demonstrate in order to challenge the program
<b>Training Topics and Suggested Time Allocation</b>	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Shows the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Shows the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Shows the relative weightings of various competencies of the occupation on which assessment is based
<b>Program Content</b>	Defines the objectives, learning tasks, and high level content for each competency, as well as defining observable, measurable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels



Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
<b>Training Provider Standards</b>	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment
<b>Appendix – Glossary of Acronyms</b>			Defines program specific acronyms	



# **Section 2**

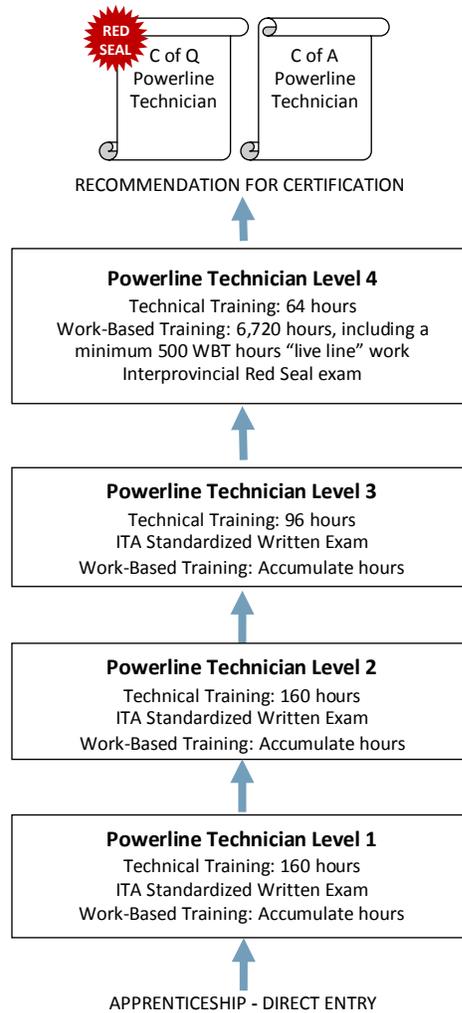
## **PROGRAM OVERVIEW**

### **Powerline Technician**



## Program Credentialing Model

C of Q = Certificate of Qualification  
 C of A = Certificate of Apprenticeship



**CROSS-PROGRAM CREDITS**

*Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program*

- NONE



## Occupational Analysis Chart

### POWERLINE TECHNICIAN

**Occupation Description:** Powerline technicians install, maintain and repair overhead, underground and underwater powerlines and cables, and other associated equipment such as insulators, conductors, lightning arrestors, switches, metering systems, transformers and lighting infrastructure.

<b>SAFETY AND SAFE WORK PRACTICES</b> <b>A</b>	Apply safety regulations	Use trade specific personal protective equipment (PPE)	Apply limits of approach	Apply lock-out and tag-out procedures	Apply grounding and equi-potential bonding principles	Perform rescue
	W A1 1	W A2 1	W A3 1	W A4 1	W A5 1	W A6 1
<b>CLIMBING</b> <b>B</b>	Describe care and use of climbing equipment	Climb structures	Use elevated platforms and ladders	Test for pole (structure) stability		
	W B1 1	W B2 1	W B3 1	W B4 1		
<b>POLICIES AND REGULATIONS</b> <b>C</b>	Identify environmental hazards	Apply industry safety regulations				
	W C1 1	W C2 1				
<b>TOOLS AND INSTRUMENTS</b> <b>D</b>	Use hand tools	Use power tools	Use live line tools	Use test instruments		
	W D1 1	W D2 1	W D3 1	W D4 1 2		
<b>ELECTRICAL THEORY</b> <b>E</b>	Apply electrical fundamentals	Describe operation of motors and generators	Explain transformation and install transformers	Install self-contained metering	Install transformer metering	Describe system operation and protection
	W E1 1 2	W E2 2	W E3 1 2	W E4 1	W E5 3	W E6 4

W = Workplace Skill Acquisition



Perform system switching				
W			E7	
		4		

Operate voltage regulators and capacitors				
W			E8	
		4		

**EQUIPMENT**  
F

Identify mobile line equipment				
			F1	
1				

Use hydraulically-equipped vehicles				
W			F2	
1				

Use stringing equipment				
W			F3	
		3	4	

**RIGGING**  
G

Explain rigging, hoisting and lifting equipment				
W			G1	
1				

Use lifting, rigging and hoisting equipment				
W			G2	
1				

Use rigging tools and equipment in construction and maintenance				
W			G3	
	2			

Apply rigging tools and equipment for live line distribution				
			G4	
	2			

Use rigging tools and equipment in transmission, construction and maintenance				
W			G5	
		3		

Perform live line transmission rigging				
W			G6	
		3		

**OVERHEAD DISTRIBUTION (OD)**  
H

Describe overhead distribution materials				
			H1	
1				

Describe overhead distribution systems				
W			H2	
1				

Construct distribution lines				
W			H3	
1	2			

Demonstrate safe work practices for live line work				
			H4	
1				

Maintain single-phase distribution lines				
W			H5	
1				

Maintain three-phase distribution lines				
W			H6	
	2		4	

Operate overhead distribution (OD) electrical apparatus				
W			H7	
	2	4		

Troubleshoot overhead distribution system components				
W			H8	
		4		

**UNDERGROUND DISTRIBUTION (UD)**  
I

Use underground distribution (UD) equipment and materials				
			I1	
1	2			

Construct underground distribution systems				
W			I2	
	2			

Maintain underground distribution systems				
W			I3	
	2			

Operate underground distribution electrical apparatus				
W			I4	
		3		

Troubleshoot underground distribution system components				
W			I5	
			4	

## Program Overview



<b>TRANSMISSION</b> <span style="float: right;">J</span>	Describe transmission materials	Construct transmission lines	Maintain transmission lines	Operate transmission electrical apparatus	Troubleshoot overhead transmission system components	
	J1	J2	J3	J4	J5	
	1   2   3   4   5	1   2   3   4   5	1   2   3   4   5	1   2   3   4   5	1   2   3   4   5	
<b>COMMUNICATION</b> <span style="float: right;">K</span>	Plan tailboard meetings	Communicate using hand signals	Communicate using electronic devices and systems	Apply communication protocols and requirements	Apply communication techniques	Apply mentoring techniques
	K1	K2	K3	K4	K5	K6
	1   2   3   4   5	1   2   3   4   5	1   2   3   4   5	1   2   3   4   5	1   2   3   4   5	1   2   3   4   5



## Training Topics and Suggested Time Allocation

### POWERLINE TECHNICIAN – LEVEL 1

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line A</b>	<b>SAFETY AND SAFE WORK PRACTICES</b>	<b>15%</b>	<b>60%</b>	<b>40%</b>	<b>100%</b>
A1	Apply safety regulations		✓		
A2	Use trade specific personal protective equipment (PPE)		✓	✓	
A3	Apply limits of approach		✓	✓	
A4	Apply lock-out and tag-out procedures		✓	✓	
A5	Apply grounding and equi-potential bonding principles		✓	✓	
A6	Perform rescue		✓	✓	
<b>Line B</b>	<b>CLIMBING</b>	<b>11%</b>	<b>40%</b>	<b>60%</b>	<b>100%</b>
B1	Describe care and use of climbing equipment		✓		
B2	Climb structures		✓	✓	
B3	Use elevated platforms and ladders		✓	✓	
B4	Test for pole (structure) stability		✓		
<b>Line C</b>	<b>POLICIES AND REGULATIONS</b>	<b>6%</b>	<b>60%</b>	<b>40%</b>	<b>100%</b>
C1	Identify environmental hazards		✓	✓	
C2	Apply industry safety regulations		✓	✓	
<b>Line D</b>	<b>TOOLS AND INSTRUMENTS</b>	<b>9%</b>	<b>45%</b>	<b>55%</b>	<b>100%</b>
D1	Use hand tools		✓	✓	
D2	Use power tools		✓	✓	
D3	Use live line tools		✓	✓	
D4	Use test instruments		✓	✓	
<b>Line E</b>	<b>ELECTRICAL THEORY</b>	<b>14%</b>	<b>66%</b>	<b>34%</b>	<b>100%</b>
E1	Apply electrical fundamentals		✓	✓	
E3	Explain transformation and install transformers		✓	✓	
E4	Install self-contained metering		✓	✓	
<b>Line F</b>	<b>EQUIPMENT</b>	<b>8%</b>	<b>34%</b>	<b>66%</b>	<b>100%</b>
F1	Identify mobile line equipment		✓		
F2	Use hydraulically-equipped vehicles		✓	✓	
<b>Line G</b>	<b>RIGGING</b>	<b>13%</b>	<b>50%</b>	<b>50%</b>	<b>100%</b>
G1	Explain rigging, hoisting and lifting equipment		✓		
G2	Use lifting, rigging and hoisting equipment		✓	✓	
<b>Line H</b>	<b>OVERHEAD DISTRIBUTION (OD)</b>	<b>15%</b>	<b>55%</b>	<b>45%</b>	<b>100%</b>
H1	Describe overhead distribution materials		✓		
H2	Describe overhead distribution systems		✓		
H3	Construct distribution lines		✓	✓	
H4	Demonstrate safe work practices for live line work		✓		
H5	Maintain single-phase distribution lines		✓	✓	



% of Time Allocated to:

		% of Time	Theory	Practical	Total
<b>Line I</b>	<b>UNDERGROUND DISTRIBUTION (UD)</b>	4%	45%	55%	100%
I1	Use Underground distribution (UD) equipment and materials		✓	✓	
<b>Line K</b>	<b>COMMUNICATION</b>	5%	50%	50%	100%
K1	Plan tailboard meetings		✓	✓	
K2	Communicate using hand signals		✓	✓	
K3	Communicate using electronic devices and systems		✓	✓	
K5	Apply communication techniques		✓		
<b>Total Percentage for BC Powerline Technician Level One</b>		<b>100%</b>			



## Training Topics and Suggested Time Allocation

### POWERLINE TECHNICIAN – LEVEL 2

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line D</b>	<b>TOOLS AND INSTRUMENTS</b>	<b>13%</b>	<b>50%</b>	<b>50%</b>	<b>100%</b>
D4	Use test instruments		✓	✓	
<b>Line E</b>	<b>ELECTRICAL THEORY</b>	<b>20%</b>	<b>80%</b>	<b>20%</b>	<b>100%</b>
E1	Apply electrical fundamentals		✓	✓	
E2	Describe operation of motors and generators		✓		
E3	Explain transformation and install transformers		✓	✓	
<b>Line G</b>	<b>RIGGING</b>	<b>19%</b>	<b>50%</b>	<b>50%</b>	<b>100%</b>
G3	Use rigging tools and equipment in construction and maintenance		✓	✓	
G4	Apply rigging tools and equipment for live line distribution		✓		
<b>Line H</b>	<b>OVERHEAD DISTRIBUTION (OD)</b>	<b>24%</b>	<b>40%</b>	<b>60%</b>	<b>100%</b>
H3	Construct distribution lines		✓	✓	
H6	Maintain three-phase distribution lines		✓	✓	
H7	Operate overhead distribution (OD) electrical apparatus		✓	✓	
<b>Line I</b>	<b>UNDERGROUND DISTRIBUTION (UD)</b>	<b>16%</b>	<b>50%</b>	<b>50%</b>	<b>100%</b>
I1	Use underground distribution (UD) equipment and materials		✓		
I2	Construct underground distribution systems		✓	✓	
I3	Maintain underground distribution systems		✓	✓	
<b>Line K</b>	<b>COMMUNICATION</b>	<b>8%</b>	<b>30%</b>	<b>70%</b>	<b>100%</b>
K1	Plan tailboard meetings		✓	✓	
K4	Apply communication protocols and requirements		✓		
<b>Total Percentage for BC Powerline Technician Level Two</b>		<b>100%</b>			



## Training Topics and Suggested Time Allocation

### POWERLINE TECHNICIAN – LEVEL 3

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line E</b>	<b>ELECTRICAL THEORY</b>	15%	70%	30%	100%
E5	Install transformer metering		✓	✓	
<b>Line F</b>	<b>EQUIPMENT</b>	6%	100%	0%	100%
F3	Use stringing equipment		✓		
<b>Line G</b>	<b>RIGGING</b>	20%	50%	50%	100%
G5	Use rigging tools and equipment in transmission, construction and maintenance			✓	
G6	Perform live line transmission rigging		✓	✓	
<b>Line I</b>	<b>UNDERGROUND DISTRIBUTION (UD)</b>	17%	30%	70%	100%
I4	Operate underground distribution electrical apparatus		✓	✓	
<b>Line J</b>	<b>TRANSMISSION</b>	30%	50%	50%	100%
J1	Describe transmission materials		✓		
J2	Construct transmission lines		✓	✓	
J3	Maintain transmission lines		✓	✓	
J4	Operate transmission electrical apparatus		✓	✓	
<b>Line K</b>	<b>COMMUNICATION</b>	12%	30%	70%	100%
K1	Plan tailboard meetings		✓	✓	
<b>Total Percentage for BC Powerline Technician Level Three</b>		<b>100%</b>			



## Training Topics and Suggested Time Allocation

### POWERLINE TECHNICIAN – LEVEL 4

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line E</b>	<b>ELECTRICAL THEORY</b>	<b>24%</b>	<b>60%</b>	<b>40%</b>	<b>100%</b>
E6	Describe system operation and protection		✓		
E7	Perform system switching		✓	✓	
E8	Operate voltage regulators and capacitors		✓	✓	
<b>Line F</b>	<b>EQUIPMENT</b>	<b>4%</b>	<b>100%</b>	<b>0%</b>	<b>100%</b>
F3	Use stringing equipment		✓		
<b>Line H</b>	<b>OVERHEAD DISTRIBUTION (OD)</b>	<b>37%</b>	<b>60%</b>	<b>40%</b>	<b>100%</b>
H6	Maintain three-phase distribution lines		✓	✓	
H7	Operate overhead distribution (OD) electrical apparatus		✓	✓	
H8	Troubleshoot overhead distribution system components		✓	✓	
<b>Line I</b>	<b>UNDERGROUND DISTRIBUTION (UD)</b>	<b>17%</b>	<b>70%</b>	<b>30%</b>	<b>100%</b>
I5	Troubleshoot underground distribution system components			✓	
<b>Line J</b>	<b>TRANSMISSION</b>	<b>10%</b>	<b>100%</b>	<b>0%</b>	<b>100%</b>
J3	Maintain transmission lines		✓		
J5	Troubleshoot overhead transmission system components		✓		
<b>Line K</b>	<b>COMMUNICATION</b>	<b>8%</b>	<b>50%</b>	<b>50%</b>	<b>100%</b>
K6	Apply mentoring techniques		✓	✓	
<b>Total Percentage for BC Powerline Technician Level Four</b>		<b>100%</b>			



# **Section 3**

## **PROGRAM CONTENT**

### **Powerline Technician**



# Level 1

## Powerline Technician



**Line (GAC):**        **A   SAFETY AND SAFE WORK PRACTICES**  
**Competency:**       **A1   Apply safety regulations**

**Objectives**

To be competent in this area, the individual must be able to:

- Apply applicable Occupational Health and Safety (OH&S) Regulations.
- Determine requirements applicable in the workplace.

**LEARNING TASKS**

1. Identify and apply applicable Occupational Health and Safety regulations

**CONTENT**

- WorkSafeBC (OHS) Regulation
- Safety Practice Regulation (SPR)
- WHMIS (MSDS) TDGR
- Controlled substances:
  - Isopropynol
  - Polychlorinated biphenals (PCBs)
  - Gas and oil
  - SF6
  - Mineral oils
  - Cable oil
  - Propane
  - Battery acid
  - Ampact shells
  - Implosive sleeves
  - Oxyacetylene
  - Nitrogen cylinders

**Workplace Achievement Criteria**

Given information on Federal and Provincial Occupational Health and Company Specific Safety policies, the learner must correctly follow these procedures and regulations at all times. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**            **A    SAFETY AND SAFE WORK PRACTICES**  
**Competency:**        **A2    Use trade specific personal protective equipment (PPE)**

**Objectives**

To be competent in this area, the individual must be able to:

- Demonstrate the care and use of Personal Protective Equipment.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <p>1. Identify, describe and use personal protective equipment (PPE)</p> <p>2. Demonstrate the care of personal protective equipment (PPE)</p> | <ul style="list-style-type: none"> <li>• UV protective goggles</li> <li>• Hand protection             <ul style="list-style-type: none"> <li>○ Protective gloves</li> <li>○ Low and high-voltage rubber gloves</li> </ul> </li> <li>• Safety footwear             <ul style="list-style-type: none"> <li>○ OHM sticker footwear</li> <li>○ 9-in. minimum</li> <li>○ Conductive boots (bare hand, live line transmission work)</li> </ul> </li> <li>• Safety headwear             <ul style="list-style-type: none"> <li>○ Class 'E' hardhats</li> <li>○ Chin straps</li> </ul> </li> <li>• Safety clothing             <ul style="list-style-type: none"> <li>○ Fire-retardant clothing</li> <li>○ Arc-rated clothing</li> </ul> </li> <li>• High-visibility day and night clothing</li> <li>• PPE</li> </ul> |
|--|---|

**Achievement Criteria**

**Performance**    The learner will identify, describe and use Personal Protective Equipment.  
**Conditions**     In a lab setting as part of a practical project.  
**Criteria**         Learner will be evaluated on selection and application of PPE.

**Workplace Achievement Criteria**

Given information and regulations with respect to the use of personal protective equipment in the workplace, the learner must correctly follow relevant procedures and regulations at all times. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **A**    **SAFETY AND SAFE WORK PRACTICES**  
**Competency:**     **A3**    **Apply limits of approach**

**Objectives**

To be competent in this area, the individual must be able to:

- Recognize potential risks and identify and apply relevant regulations.
- Apply specific work procedures based on limits of approach.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Describe limits of approach and their importance</li> <li>2. Identify and describe factors that determine limits of approach</li> <li>3. Apply specific work procedures based on limits of approach</li> </ol> | <ul style="list-style-type: none"> <li>• Hazards and risks associated with energized lines and equipment <ul style="list-style-type: none"> <li>• Voltage</li> <li>• Altitude</li> <li>• Humidity</li> <li>• Weather conditions <ul style="list-style-type: none"> <li>○ Rain</li> <li>○ Snow</li> <li>○ Fog</li> <li>○ Electrical storms</li> <li>○ Moisture build-up</li> <li>○ Ice build-up</li> </ul> </li> </ul> </li> <li>• Climbing poles</li> <li>• Hanging transformers</li> <li>• Street lights</li> <li>• Boom truck operations</li> </ul> |
|--|---|

**Achievement Criteria**

**Performance**    The learner will apply limits of approach to energized lines and equipment.  
**Conditions**     In a lab setting as part of a practical project.  
**Criteria**         Learner will be evaluated on limits of approach.

**Workplace Achievement Criteria**

Given information and regulations with respect to the limits of approach to energized lines and equipment in the workplace, the learner must correctly follow relevant procedures and regulations at all times. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **A**    **SAFETY AND SAFE WORK PRACTICES**  
**Competency:**     **A4**    **Apply lock-out and tag-out procedures**

**Objectives**

To be competent in this area, the individual must be able to:

- Recognize potential risks and identify relevant procedures with reference to WorkSafeBC Regulation.
- Apply workplace roles and responsibilities.

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Describe the purpose and function of lock-out procedures</li> <br/> <li>2. Describe the roles and responsibilities of various jobs with respect to lock-out procedures</li> <br/> <li>3. Describe safety protection guarantees</li> <br/> <li>4. Perform various types of lock-out procedures for applicable category of authorization</li> <br/> <li>5. Interpret operating diagrams (one line)</li> </ol> | <ul style="list-style-type: none"> <li>• Risks and hazards in the workplace</li> <li>• Locking procedures</li> <li>• Tagging procedures</li> <li>• Progressive authorization</li> <li>• Live line permits</li> <li>• Operating diagrams (one line)</li> <li>• Field tags</li> <li>• Station tags</li> <li>• Mimic board and tags</li> <li>• Roles <ul style="list-style-type: none"> <li>○ Employer</li> <li>○ Supervisor</li> <li>○ Journeyperson</li> <li>○ Apprentice</li> <li>○ Person in charge (PIC)</li> </ul> </li> <li>• Operating authority</li> <li>• Operating permission</li> <li>• Importance of area specific knowledge and experience</li> <li>• Station entry authorization</li> <li>• Guarantee of isolation</li> <li>• Training and authorization for apprentices</li> <li>• Clearances</li> <li>• Test and work</li> <li>• Self-protection</li> <li>• Use lock-out tags</li> <li>• Follow lock-out procedures</li> <li>• Switching (de-energization-re-energization)</li> <li>• Schematic diagrams</li> <li>• Symbols</li> </ul> |
|---|--|



**LEARNING TASKS**

- 6. Complete testing for applicable category of authorization
- 7. Apply lock-out Procedures

**CONTENT**

- Identify regulatory operating boundaries
- Progressive authorizations
- Locking procedures
- Tagging procedures
- System authorization
- Live line permits
- Operating diagrams (one line)
- Field tags
- Station tags
- Mimic board and tags

**Achievement Criteria**

- Performance The learner will:
- Recognize potential risks.
  - Identify relevant lock-out and tag-out principles.
- Conditions In a lab setting as part of a practical project.
- Criteria Learner will be evaluated on:
- Principles of lock-out/tag-out.

**Workplace Achievement Criteria**

Given information and regulations with respect to lock-out and tagging procedures in the workplace, the learner must correctly follow relevant procedures and WorkSafeBC regulations at all times. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **A**    **SAFETY AND SAFE WORK PRACTICES**  
**Competency:**     **A5**   **Apply grounding and equi-potential bonding principles**

**Objectives**

To be competent in this area, the individual must be able to:

- Recognize potential risks of grounding and equi-potential bonding.
- Demonstrate grounding and bonding principles.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Describe the purpose and function of grounding and equi-potential bonding</li> <li>2. Identify and describe grounding and equi-potential bonding</li> <li>3. Describe grounding, equi-potential bonding, blocking tools and principles</li> <li>4. Perform safety grounding and equi-potential bonding of overhead and underground lines</li> </ol> | <ul style="list-style-type: none"> <li>• Equi-potential zone</li> <li>• Touch potential</li> <li>• Step potential</li> <li>• Induction hazards</li> <li>• Running grounds and ground mats</li> <li>• Ground clamps</li> <li>• Ground wire size selection</li> <li>• Pole bands</li> <li>• Safety grounding plan (SGP)</li> <li>• Use and care of ground sets</li> <li>• Identify grounding switches (hazards)</li> <li>• Grip-all</li> <li>• Approved voltage testing tools</li> <li>• Limits of approach</li> <li>• Safety grounding plan (SGP)</li> <li>• Equi-potential zone</li> <li>• Touch potential</li> <li>• Step potential</li> <li>• Induction hazards</li> <li>• Running grounds and ground mats</li> <li>• Ground clamps</li> <li>• Ground wire size selection</li> <li>• Pole bands</li> <li>• Use and care of ground sets</li> <li>• Identify grounding switches (hazards)</li> <li>• Grip-all</li> <li>• Voltage testing tools</li> </ul> |
|---|---|

**Achievement Criteria**

- Performance The learner will:
- Recognize potential risks.
  - Demonstrate appropriate grounding, bonding and equi-potential zone principles.
- Conditions In a lab setting as part of a practical project.
- Criteria Learner will be evaluated on:
- Establishment of grounding and equi-potential bonding on structures.

**Workplace Achievement Criteria**

Given information and regulations with respect to grounding and bonding zones in the workplace, the learner must correctly follow relevant procedures and regulations at all times. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **A   SAFETY AND SAFE WORK PRACTICES**  
**Competency:**       **A6   Perform rescue**

**Objectives**

To be competent in this area, the individual must be able to:

- Recognize potential risks.
- Perform rescue.

**LEARNING TASKS**

**CONTENT**

<ol style="list-style-type: none"> <li>1. Describe and perform a pole-top and structure rescue</li> <li>2. Describe and perform confined-space rescue</li> <li>3. Describe and perform an aerial-lift rescue</li> <li>4. Describe tower rescue</li> </ol>	<ul style="list-style-type: none"> <li>• Hazard identification</li> <li>• Call for help</li> <li>• Rescue equipment</li> <li>• Pole-top rescue procedures</li> <li>• Hazard identification</li> <li>• Call for help</li> <li>• Rescue equipment</li> <li>• Confined-space rescue procedures</li> <li>• Hazard identification</li> <li>• Call for help</li> <li>• Rescue equipment</li> <li>• Aerial-lift rescue procedures</li> <li>• Hazard identification</li> <li>• Call for help</li> <li>• Rescue equipment</li> <li>• Tower rescue procedures</li> </ul>
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**Achievement Criteria**

Performance   The learner will:

- Recognize potential risks.
- Implement appropriate rescue procedures.

Conditions     In a lab setting as part of a practical project.  
Criteria         Learner will be evaluated on performance of rescue procedures.

**Workplace Achievement Criteria**

Given information and regulations with respect to rescue situations in the workplace, the learner must correctly follow appropriate procedures and regulations at all times. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **B**    **CLIMBING**  
**Competency:**      **B1**   **Describe care and use of climbing equipment**

**Objective**

To be competent in this area, the individual must be able to:

- Describe care and use of climbing equipment.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Describe care and use of climbing equipment</li> <br/> <li>2. Describe basic climbing techniques</li> <br/> <li>3. Describe the use of fall arrest when climbing wood and steel structures</li> <br/> <li>4. Describe equipment safety checks required prior to climbing poles, towers and ladders</li> </ol> | <ul style="list-style-type: none"> <li>• Climbers</li> <li>• Body belt/Harnesses</li> <li>• Fall restrict belt</li> <li>• Second pole strap/worker positioning</li> <li>• Climbing tools and storage</li> <br/> <li>• Techniques for wood and steel</li> <br/> <li>• Fall arrest procedures and equipment for wood and steel structures</li> <br/> <li>• Safety check list</li> <li>• Structure inspection</li> <li>• Procedures for safety checks</li> </ul> |
|---|---|

**Workplace Achievement Criteria**

Given information and regulations with respect to climbing equipment common to the trade, the learner must demonstrate procedures for the care and safe use of such equipment at all times. Employer assessment of performance is required for each task.



**Line (GAC):**        **B**    **CLIMBING**  
**Competency:**     **B2**   **Climb structures**

**Objectives**

To be competent in this area, the individual must be able to:

- Use climbing equipment to climb structures.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Perform safety checks prior to climbing structures</li> <br/> <li>2. Demonstrate basic climbing techniques using safety equipment</li> </ol> | <ul style="list-style-type: none"> <li>• Types <ul style="list-style-type: none"> <li>○ Wood</li> <li>○ Steel lattice</li> </ul> </li> <li>• Tests <ul style="list-style-type: none"> <li>○ Hammer</li> <li>○ Sway</li> <li>○ Drill</li> </ul> </li> <li>• Safety checklist</li> <li>• Climbing hazards</li> <li>• Full fall arrest</li> </ul> |
|--|--|

**Achievement Criteria**

Performance    The learner will use climbing equipment to climb structures.  
Conditions      In a lab setting as part of a practical project.  
Criteria          Learner will be evaluated on:

- Use appropriate equipment
- Incorporate safety inspections
- Perform proper climbing techniques

**Workplace Achievement Criteria**

Given information and regulations with respect to climbing equipment common to the trade, the learner must demonstrate procedures for climbing structures in the workplace. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **B**    **CLIMBING**  
**Competency:**      **B3**   **Use elevated platforms and ladders**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe and apply procedures for working on elevated platforms and ladders.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Describe the installation and use of elevated platforms</li> <br/> <li>2. Describe and use different types of ladders</li> <br/> <li>3. Describe and use procedures for transferring from a structure to a suspended ladder</li> </ol> | <ul style="list-style-type: none"> <li>• Equipment <ul style="list-style-type: none"> <li>○ Elevated platforms</li> <li>○ Hardware</li> <li>○ Fall arrest</li> <li>○ Self Retracting Lanyard (SRL)</li> </ul> </li> <li>• Installation steps</li> <li>• Procedures used to transfer to and from poles and elevated work platforms</li> <li>• Hazards with elevated work platforms</li> <br/> <li>• Ladder types</li> <li>• Safety</li> <br/> <li>• Fall arrest equipment</li> <li>• Hazards with procedure</li> </ul> |
|--|---|

**Achievement Criteria**

**Performance**    The learner will use safe procedures appropriate for working on an elevated platform.  
**Conditions**      In a lab setting as part of a practical project.  
**Criteria**            Learner will be evaluated on:

- Use of fall arrest equipment
- Install baker boards
- Use ladders
- Use baker boards

**Workplace Achievement Criteria**

Given information and regulations with respect to elevated platforms, the learner must identify and describe safe procedures for working on elevated platforms in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):**        **B**    **CLIMBING**  
**Competency:**     **B4**   **Test for pole (structure) stability**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe and apply procedures for testing the structural stability of poles.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Identify causes of pole failure</li> <br/> <li>2. Describe and inspect poles for stability and soundness</li> <br/> <li>3. Describe temporary anchors and support methods</li> <br/> <li>4. Describe methods used to straighten poles</li> </ol> | <ul style="list-style-type: none"> <li>• Cracking</li> <li>• Breakage</li> <li>• Rot</li> <li>• Motor Vehicle Accident (MVA)</li> <li>• Storm damage</li> <br/> <li>• Visual inspection</li> <li>• Test types <ul style="list-style-type: none"> <li>○ Hammer</li> <li>○ Sway</li> <li>○ Drill</li> </ul> </li> <br/> <li>• Pole support techniques <ul style="list-style-type: none"> <li>○ Cross-arm support</li> <li>○ Boom truck</li> </ul> </li> <br/> <li>• Pole straightening techniques <ul style="list-style-type: none"> <li>○ Rope</li> <li>○ Equipment</li> <li>○ Line truck</li> <li>○ Temporary anchor</li> </ul> </li> </ul> |
|--|---|

**Achievement Criteria**

**Performance**    The learner will demonstrate safe procedures for testing the structural stability of poles.

**Conditions**     In a lab setting as part of a practical project.

- Criteria**        The learner will:
- Test structures
  - Support structures

**Workplace Achievement Criteria**

Given information and regulations with respect to testing the structural stability of poles, the learner must identify, describe and use safe work procedures in the workplace. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):** C **POLICIES AND REGULATIONS**  
**Competency:** C1 **Identify environmental hazards**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify environmental hazards and apply regulations common to the trade.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Identify environmental hazards</li> <br/> <li>2. Identify and apply environmental regulations and guidelines</li> <br/> <li>3. Identify and apply environmental precautions</li> </ol> | <ul style="list-style-type: none"> <li>• Hazard types               <ul style="list-style-type: none"> <li>○ Birds</li> <li>○ Spills</li> <li>○ Fire conditions</li> </ul> </li> <li>• Precautions required               <ul style="list-style-type: none"> <li>○ Brush burning</li> <li>○ Chemical spraying</li> <li>○ Transferring hazardous materials</li> <li>○ PPE</li> </ul> </li> <li>• Chemical spill response</li> <li>• Fisheries Act</li> <br/> <li>• Barricades and containment</li> <li>• Absorbents</li> </ul> |
|--|---|

**Workplace Achievement Criteria**

Given information and regulations with respect to environmental hazards and regulations, the learner must identify and describe safe work procedures in the workplace. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):** C **POLICIES AND REGULATIONS**  
**Competency:** C2 **Apply industry safety regulations**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify and apply industry safety regulations common to the trade.

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Identify licensing/certification requirements</li> <br/> <li>2. Describe components of pre-trip/pre-use inspections</li> <br/> <li>3. Describe WorkSafe (OHS) Regulations</li> <br/> <li>4. Describe utility standards and/or Canadian Electrical Code</li> </ol> | <ul style="list-style-type: none"> <li>• Driver licensing               <ul style="list-style-type: none"> <li>○ Class</li> <li>○ Endorsements</li> </ul> </li> <li>• First Aid</li> <li>• Transportation of dangerous goods (TDG)</li> <li>• Requirements</li> <li>• Exemptions</li> <li>• Location of applicable OHS Regulation</li> <li>• WHMIS</li> <li>• Canadian Electrical Code and Canadian Standards Association (CSA)</li> </ul> |
|---|--|

**Workplace Achievement Criteria**

Given information on workplace situations, the learner must identify and describe the regulations that apply in the workplace. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):** D **TOOLS AND INSTRUMENTS**  
**Competency:** D1 **Use hand tools**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe, use and care for hand tools

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Describe and apply good housekeeping as it relates to the care of hand tools</li> <li>2. Use hand tools</li> </ol> | <ul style="list-style-type: none"> <li>• Storage</li> <li>• Cleaning</li> <li>• Sharpen</li> <li>• Lubricate</li> <li>• Pliers</li> <li>• Wrenches</li> <li>• Knives</li> <li>• Hammers</li> <li>• Bolt/wire cutters</li> <li>• Presses</li> <li>• Shovels</li> <li>• Digging bars</li> <li>• Spoons</li> <li>• Tampers</li> <li>• Axes</li> <li>• Peavey/Cant hooks</li> <li>• Semi-con stripper</li> <li>• Insulation remover</li> <li>• Propane torch</li> </ul> |
|--|---|

**Achievement Criteria**

- Performance The learner will use and care for hand tools.  
 Conditions In a lab setting as part of a practical project.  
 Criteria The learner will:
- Select appropriate tools
  - Maintain and store tools

**Workplace Achievement Criteria**

Given information on workplace situations, the learner must identify, describe and use hand tools in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):**        **D**    **TOOLS AND INSTRUMENTS**  
**Competency:**     **D2**   **Use power tools**

**Objectives**

To be competent in this area, the individual must be able to:

- Use and care for power tools.

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Demonstrate use of electric power tools</li> <br/> <li>2. Demonstrate use of hydraulic power tools</li> <br/> <li>3. Demonstrate use of gas power tools</li> <br/> <li>4. Demonstrate use of powder-actuated wedge tools</li> </ol> | <ul style="list-style-type: none"> <li>• Drills</li> <li>• Chain saws</li> <li>• Cable saws</li> <br/> <li>• Drill</li> <li>• Tamper</li> <li>• Cutter</li> <li>• Press</li> <li>• Jacks</li> <br/> <li>• Drill</li> <li>• Chain saw</li> <br/> <li>• Wedge connections</li> </ul> |
|---|--|

**Achievement Criteria**

- Performance    The learner will use and care for power tools
- Conditions     In a lab setting as part of a practical project.
- Criteria         The learner will:
- Select appropriate tooling
  - Maintain and store tools

**Workplace Achievement Criteria**

Given information on workplace situations, the learner must identify, describe and use power tools in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):**            **D**   **TOOLS AND INSTRUMENTS**  
**Competency:**        **D3**   **Use live line tools**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe, use and care for live line tools.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Describe the care and use of cover-up</li> <li>2. Describe the care and use of rubber</li> <li>3. Describe the care and use of fibre-reinforced plastic (FRP)</li> <li>4. Describe the care and handling (transporting) of live line tools</li> <li>5. Describe procedures for field checks of live line tools</li> </ol> | <ul style="list-style-type: none"> <li>• Cover-up equipment <ul style="list-style-type: none"> <li>○ Line guards</li> <li>○ Arm guards</li> <li>○ Pole guards</li> </ul> </li> <li>• Blankets</li> <li>• Hoses</li> <li>• Stick types <ul style="list-style-type: none"> <li>○ Universal</li> <li>○ Strain</li> <li>○ Grip-all (shot-gun)</li> <li>○ Wire tong</li> <li>○ Insulator cradle</li> </ul> </li> <li>• Jibs for line/three-phase lift attachments</li> <li>• Cleaning procedures</li> <li>• Waxing procedures</li> <li>• Insulated booms</li> <li>• Inspections</li> <li>• Stickers</li> </ul> |
|---|---|

**Achievement Criteria**

Performance   The learner will use and care for live line tools.

Conditions     In a lab setting as part of a practical project.

- Criteria        Learner will:
- Select appropriate tools
  - Maintain and store tools

**Workplace Achievement Criteria**

Given information on workplace situations, the learner must identify and describe the use and care of live line tools in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):** D **TOOLS AND INSTRUMENTS**  
**Competency:** D4 **Use test instruments**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe, use and care for test instruments.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <p>1. Describe care and use of various test instruments</p> | <ul style="list-style-type: none"> <li>• Multimeter</li> <li>• Megger test set</li> <li>• Phase sequence indicators</li> <li>• Recording meters</li> <li>• Fault indicator</li> <li>• Cable locators</li> <li>• Cable identifiers</li> <li>• Transformer tester</li> <li>• Potential testers</li> </ul> |
|---|---|

**Achievement Criteria**

Performance The learner will use and care for test instruments.

Conditions In a lab setting as part of a practical project.

- Criteria The learner will:
- Select appropriate instruments
  - Maintain and store instruments

**Workplace Achievement Criteria**

Given information on workplace situations, the learner must identify, describe and use test instruments in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):** E **ELECTRICAL THEORY**  
**Competency:** E1 **Apply electrical fundamentals**

### Objectives

To be competent in this area, the individual must be able to:

- Describe and demonstrate the fundamentals of electrical theory and principles.

### LEARNING TASKS

1. Describe basic principles of electricity

### CONTENT

- Electron theory
- Electromagnetic theory
- Alternating current fundamentals for single-phase
- Direct current fundamentals
- Ohm's law
- Watt's law
- Kirchoff's law
- Circuits
  - Series
  - Parallel
  - Combination
  - Edison 3-wire



**Line (GAC):**        **E**   **ELECTRICAL THEORY**  
**Competency:**     **E3**   **Explain transformation and install transformers**

**Objectives**

To be competent in this area, the individual must be able to:

- Explain single-phase transformers.
- Install single-phase transformers.

**LEARNING TASKS**

**CONTENT**

<ol style="list-style-type: none"> <li>1. Describe the principles of operation of single-phase transformers</li> <li>2. Describe single-phase transformer components and construction</li> <li>3. Perform single-phase transformer calculations</li> <li>4. Describe back-feed</li> <li>5. Describe paralleling procedures</li> <li>6. Describe open neutrals in single-phase transformer secondaries</li> <li>7. Install single-phase transformers</li> </ol>	<ul style="list-style-type: none"> <li>• Principles of operation of single-phase transformers</li> <li>• Single-phase transformer types</li> <li>• Series and parallel</li> <li>• Components of single-phase transformers</li> <li>• Tap changers</li> <li>• Single-phase transformer ratios</li> <li>• Hazards and safety procedures related to back-feed</li> <li>• Paralleling procedures</li> <li>• Matching impedances</li> <li>• Open neutrals</li> <li>• Single-phase transformer secondaries</li> <li>• Hazards and safety procedures</li> <li>• Applicable codes and standards</li> <li>• Transformer configurations</li> <li>• Voltage check</li> <li>• Load checks</li> </ul>
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**Achievement Criteria**

**Performance**    The learner will install single-phase transformer.  
**Conditions**     In a lab setting as part of a practical project.  
**Criteria**        The learner will:

- Install transformer to specifications
- Perform voltage checks
- Use PPE

**Workplace Achievement Criteria**

Given information on workplace situations, the learner must install single-phase transformer in the workplace. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**            **E**    **ELECTRICAL THEORY**  
**Competency:**        **E4**    **Install self-contained metering**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify and describe self-contained metering.
- Install self-contained meters.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Identify and describe components of self-contained metering</li> <li>2. Install single-phase meters</li> <li>3. Identify smart meter infrastructure</li> </ol> | <ul style="list-style-type: none"> <li>• Meter components</li> <li>• Meter socket safety checks</li> <li>• Smart meter components</li> </ul> |
|--|--|

**Achievement Criteria**

- Performance**    The learner will perform meter socket safety checks.
- Conditions**    In a lab setting as part of a practical project.
- Criteria**        The learner will:
- Use PPE transformer to specifications
  - Use voltmeter
  - Install self-contained meter



**Line (GAC):** F **EQUIPMENT**  
**Competency:** F1 **Identify mobile line equipment**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify and describe the operation of various types of mobile equipment.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <p>1. Identify and describe various types of mobile line equipment</p> | <ul style="list-style-type: none"> <li>• Vehicles               <ul style="list-style-type: none"> <li>○ Road</li> <li>○ Rail</li> <li>○ All terrain</li> <li>○ Track machines</li> </ul> </li> <li>• Trailers</li> <li>• Aerial manlift equipment</li> <li>• Boom truck equipment               <ul style="list-style-type: none"> <li>○ Truck cranes</li> <li>○ Pole derricks</li> </ul> </li> <li>• Digging and trenching equipment               <ul style="list-style-type: none"> <li>○ Augers</li> <li>○ Backhoes</li> <li>○ Excavators</li> <li>○ Trenchers</li> </ul> </li> <li>• Boats</li> <li>• Helicopters</li> <li>• Basics of hydraulic systems and components</li> </ul> |
| <p>2. Describe the operation of various mobile line equipment</p>      | <ul style="list-style-type: none"> <li>• Operating principles for hydraulic equipment               <ul style="list-style-type: none"> <li>○ Hiabs</li> <li>○ Truck cranes</li> <li>○ Aerial manlifts</li> <li>○ Winches</li> <li>○ Augers</li> </ul> </li> <li>• Pre-use checks</li> <li>• On-the-job checks</li> <li>• Emergency operation of hydraulic booms and outriggers</li> </ul>  |



**Line (GAC):** F **EQUIPMENT**  
**Competency:** F2 **Use hydraulically-equipped vehicles**

**Objectives**

To be competent in this area, the individual must be able to:

- Use and care for hydraulically-equipped vehicles.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| 1. Operate hydraulically-equipped vehicles | <ul style="list-style-type: none"> <li>• Hazards and safety procedures</li> <li>• Emergency operations</li> <li>• Routine operations</li> <li>• Perform pre-use checks</li> <li>• Perform on-job checks</li> </ul> |
| 2. Operate hydraulic equipment on vehicles | <ul style="list-style-type: none"> <li>• Augers</li> <li>• Winches</li> <li>• Buckets</li> <li>• Booms</li> </ul>  |

**Achievement Criteria**

**Performance** The learner will use hydraulically-operated equipment.

**Conditions** In a lab setting as part of a practical project.

- Criteria** The learner will:
- Set up and operate hydraulic equipment
  - Use fall arrest
  - Follow hand signals
  - Demonstrate emergency operations

**Workplace Achievement Criteria**

Given workplace situations, the learner must operate a hydraulically equipped vehicle. Employer assessment of performance is required for each task.



**Line (GAC):**        **G**    **RIGGING**  
**Competency:**     **G1**   **Explain rigging, hoisting and lifting equipment**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe principles of work, force and mechanical advantage.
- Perform calculations related to rigging.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Identify and describe key principles related to rigging</li> <br/> <li>2. Perform calculations related to rigging</li> </ol> | <ul style="list-style-type: none"> <li>• Force <ul style="list-style-type: none"> <li>○ Four types</li> </ul> </li> <li>• Work</li> <li>• Mechanical advantage <ul style="list-style-type: none"> <li>○ Six basic types</li> </ul> </li> <li>• Friction</li> <li>• Calculations <ul style="list-style-type: none"> <li>○ Force</li> <li>○ Work</li> <li>○ Mechanical advantage</li> <li>○ Friction</li> </ul> </li> </ul> |
|--|---|

**Workplace Achievement Criteria**

Given workplace situations, the learner must identify and describe the application of rigging principles related to work, force and mechanical advantage, and perform related rigging calculations in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):**        **G    RIGGING**  
**Competency:**     **G2   Use lifting, rigging and hoisting equipment**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe, use and care for lifting tools and equipment.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Describe the fundamentals of rigging equipment</li> <br/> <li>2. Identify, describe, and use various types of lifting tools and equipment</li> <br/> <li>3. Describe use and care of lifting tools and equipment</li> <br/> <li>4. Identify, describe and use reference information sources for rigging</li> </ol> | <ul style="list-style-type: none"> <li>• Components</li> <li>• Tools vs equipment</li> <li>• Design factor</li> <br/> <li>• Wire rope</li> <li>• Fibre rope</li> <li>• Chains</li> <li>• Hoists</li> <li>• Blocks <ul style="list-style-type: none"> <li>○ Rope</li> <li>○ Snatch</li> </ul> </li> <li>• Types and sizes of gins <ul style="list-style-type: none"> <li>○ Transformer</li> <li>○ Cross-arm</li> </ul> </li> <li>• Approved hardware <ul style="list-style-type: none"> <li>○ Drop forged shackles</li> <li>○ Hooks</li> <li>○ Working load limit (WLL) and size stamps</li> </ul> </li> <br/> <li>• Wire rope</li> <li>• Fibre rope</li> <li>• Synthetic rope</li> <li>• Hoists</li> <li>• Blocks</li> <li>• Chains</li> <li>• Design/safety factors</li> <li>• Shock loading</li> <li>• Slings</li> <li>• Shackles</li> <br/> <li>• WorkSafeBC Regulation</li> <li>• Rigger’s handbooks/manuals</li> <li>• Manufacturers’ specifications</li> <li>• Engineering specifications</li> </ul> |
|--|--|



### **Achievement Criteria**

**Performance** The learner will use and care for all lifting tools and equipment.

**Conditions** In a lab setting as part of a practical project.

**Criteria** The learner will:

- Apply rigging principles
- Select appropriate components

### **Workplace Achievement Criteria**

Given workplace situations, the learner must use and care for lifting tools and equipment. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **H**    **OVERHEAD DISTRIBUTION (OD)**  
**Competency:**    **H1**   **Describe overhead distribution materials**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe materials used in overhead distribution systems.

**LEARNING TASKS**

**CONTENT**

1. Identify and describe materials used in overhead distribution

- Poles
  - Height
  - Class
  - Type
- Cross-arms and timbers
- Bolts
  - Types
  - Sizes
- Hardware to support conductors
  - Sky pin
  - Arm pin
  - Clevis
- Insulators
- Hardware to support electrical apparatus
- Street light materials
- Guying materials
- Anchoring materials
- Conductors/cables
  - Types
  - Sizes
- Dead-ending conductor materials
- Tying-in/clipping materials
- Connectors
  - Types
- Cellular infrastructure



**Line (GAC):** H **OVERHEAD DISTRIBUTION (OD)**  
**Competency:** H2 **Describe overhead distribution systems**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe overhead distribution systems.

**LEARNING TASKS**

1. Identify and describe overhead distribution systems

**CONTENT**

- Under-construction or in-service
- Energized or de-energized
- Systems
  - Wye
  - Delta
  - Looped
  - Radial
- Line voltage
- Line source and destination
- Circuit identifier
- Conductor type and size
- Basic structural type
- Pole mounted apparatus
- Use of circuit diagrams

**Workplace Achievement Criteria**

Given workplace situations, the learner must describe the overhead distribution systems. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **H**    **OVERHEAD DISTRIBUTION (OD)**  
**Competency:**     **H3**   **Construct distribution lines**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe and construct overhead distribution lines.

**LEARNING TASKS**

1. Describe basic construction of overhead distribution lines

**CONTENT**

- Pole selection
  - Class
- Job planning
  - Work orders
- Public safety awareness
- Delivery of poles and materials
- Digging pole holes
- Pole framing for different structure types
- Installation of pole hardware
- Setting poles with line trucks
- Installation of various types of anchors
- Installation of guy wires
- Stringing and splicing conductors
- Installation of secondary services
- Securing conductors
- Installation and connecting system grounds

**Achievement Criteria**

**Performance**    The learner will utilize methods of construction for overhead distribution lines.

**Conditions**     In a lab setting as part of a practical project.

- Criteria**         The learner will:
- Select materials
  - Follow specifications/standards

**Workplace Achievement Criteria**

Given workplace situations, the learner must describe and utilize methods of construction for overhead distribution lines. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **H    OVERHEAD DISTRIBUTION (OD)**  
**Competency:**     **H4   Demonstrate safe work practices for live line work**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe safe work procedures for live lines.
- Describe the difference between a regulated utilities system and unregulated system.

**LEARNING TASKS**

**CONTENT**

1. Identify safe work practices

- Hazards
- Safe work practices
- Various types of structures
- Hazards
- Safe work practices
- Jurisdictional authority
  - Federal Mines Act
  - WorkSafeBC
  - BC Hydro
  - FortisBC
- Various work methods



**Line (GAC):**        **H**    **OVERHEAD DISTRIBUTION (OD)**  
**Competency:**     **H5**   **Maintain single-phase distribution lines**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe and use live line maintenance procedures.
- Maintain single-phase overhead distribution lines.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Describe and use single-phase live line procedures</li> <li>2. Calculate weights and forces on tools and equipment</li> </ol> | <ul style="list-style-type: none"> <li>• General maintenance procedures for live line work</li> <li>• Tools and rigging</li> <li>• Conductor weights</li> </ul> |
|---|---|

**Achievement Criteria**

**Performance**    The learner will use and care for all lifting tools and equipment.

**Conditions**     In a lab setting as part of a practical project.

- Criteria**        The learner will be evaluated on:
- Application of rigging principles
  - Component selection

**Workplace Achievement Criteria**

Given workplace situations, the learner must perform Live Line maintenance work on overhead single-phase distribution lines in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):** I **UNDERGROUND DISTRIBUTION (UD)**  
**Competency:** I1 **Use underground distribution (UD) equipment and materials**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify and describe equipment and materials used in underground distribution systems.

**LEARNING TASKS**

**CONTENT**

1. Identify and describe equipment and materials used in underground distribution

- Hardware
- Conductors
  - Sizes and types
  - Primary and secondary
- Connectors and covers
  - Primary and secondary
- Cable termination methods
  - Primary and secondary
- Tapes
- Approved solvents, cleaners and lubricants
- Parking cables and by-pass apparatus
  - Feed-through module
- Secondary boxes
- Manholes
- Junction boxes
- Kiosks
- Switches

2. Describe underground distribution power systems

- Under-construction or in-service
- Energized or de-energized
- Distribution or transmission
- Single or three-phase
- Line voltage
- Line source and destination
- Line/circuit number
- Cable tags
- Phasing marks and colours
- Cable types
- Direct buried or in duct
- Cable protection
- Identify cable on one line diagrams
- Radial and loop feeds



**Line (GAC):**        **K**    **COMMUNICATION**  
**Competency:**     **K1**   **Plan tailboard meetings**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the purpose of tailboard meetings.
- Participate in tailboard meetings.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Identify and describe the function of tailboard meeting</li> <br/> <li>2. Participate in tailboard meetings</li> </ol> | <ul style="list-style-type: none"> <li>• Crew duties</li> <li>• Crew qualifications and experience</li> <li>• Sequence and schedule of work</li> <li>• Hazards and safety procedures</li> <br/> <li>• Assessment and communication of potential hazards</li> <li>• Monitoring progress of job</li> <li>• Clear task assignments</li> </ul> |
|--|--|

**Achievement Criteria**

- Performance    The learner will:
- Complete and present tailboard forms
  - Engage crew in discussion
- Conditions     In a lab setting as part of a practical project.
- Criteria        The learner will be evaluated on:
- Job specifications
  - Hazard identification and mitigation
  - Written and oral communication

**Workplace Achievement Criteria**

Given workplace situations, the learner must identify the purpose and necessity of tailboard meetings in the workplace. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **K**    **COMMUNICATION**  
**Competency:**     **K2**   **Communicate using hand signals**

**Objectives**

To be competent in this area, the individual must be able to:

- Use hand signals to communicate.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <p>1. Use hand signals relevant to the workplace</p> | <ul style="list-style-type: none"> <li>• Types and meanings of hand signals               <ul style="list-style-type: none"> <li>○ Stringing</li> <li>○ Equipment lifts</li> </ul> </li> </ul> |
|--|--|

**Achievement Criteria**

**Performance**    The learner will use hand signals.  
**Conditions**     In a lab setting as part of a practical project.  
**Criteria**         The learner will be evaluated on:

- Comprehension
- Communication

**Workplace Achievement Criteria**

Given workplace situations, the learner must effectively communicate using hand signals in the workplace. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **K**    **COMMUNICATION**  
**Competency:**     **K3**   **Communicate using electronic devices and systems**

**Objectives**

To be competent in this area, the individual must be able to:

- Communicate using electronic devices and systems.

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <p>1. Demonstrate the use of electronic communication systems</p> | <ul style="list-style-type: none"> <li>• Cellular telephones</li> <li>• Two-way radios</li> <li>• Email</li> <li>• Computers</li> <li>• Communications protocols               <ul style="list-style-type: none"> <li>○ Repeat back protocols</li> </ul> </li> </ul> |
|---|--|

**Achievement Criteria**

Performance    The learner will use electronic communication devices.  
 Conditions     In a lab setting as part of a practical project.  
 Criteria         The learner will be evaluated on switching communication for authorization purposes.

**Workplace Achievement Criteria**

Given workplace situations, the learner must effectively communicate using electronic tools and systems in the workplace. Employer assessment of performance is required for each task.





# Level 2

## Powerline Technician



**Line (GAC):**        **D    TOOLS AND INSTRUMENTS**  
**Competency:**     **D4   Use test instruments**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe, use and care for advanced test instruments.

**LEARNING TASKS**

**CONTENT**

1. Identify and use advanced test instruments

- Phasing sticks
- DC Hi-Pot adapters
- Rubber glove voltage leakage tester
- Gas detectors
- Safety ground tester (Megger)

**Achievement Criteria**

Performance    The learner will:

- Use test instruments
- Maintain and care for test instruments
- Use specialized PPE

Conditions     In a lab setting as part of a practical project

Criteria         The learner will be evaluated on:

- Accuracy
- Safety

**Workplace Achievement Criteria**

Given tasks and situations at work, the learner must demonstrate the use and care of advanced test instruments in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):**        **E**   **ELECTRICAL THEORY**  
**Competency:**     **E1**   **Apply electrical fundamentals**

**Objectives**

To be competent in this area, the individual must be able to:

- Apply advanced electrical theory.

**LEARNING TASKS**

**CONTENT**

1. Apply advanced principles of electricity

- Alternating current fundamentals for three phase
- Characteristics of Wye-connected systems
- Characteristics of Delta-connected systems
- Interconnections between Delta and Wye systems



**Line (GAC):**        **E    ELECTRICAL THEORY**  
**Competency:**      **E2   Describe operation of motors and generators**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the operation of three-phase motors and generators.

**LEARNING TASKS**

**CONTENT**

1. Describe the operating characteristics of single and three-phase motors	<ul style="list-style-type: none"> <li>• Types of single and three-phase alternating current (A/C) motors               <ul style="list-style-type: none"> <li>○ Phase rotation</li> </ul> </li> </ul>
2. Describe the effects of an open phase on a three-phase motor under starting and under running conditions	<ul style="list-style-type: none"> <li>• Voltage conditions</li> </ul>
3. Describe the effects of over and under voltage on motors	<ul style="list-style-type: none"> <li>• Voltage conditions</li> </ul>
4. Describe the effects on a utility system of full voltage starting large motors	<ul style="list-style-type: none"> <li>• Demand on-system conditions</li> </ul>
5. Describe the effects of voltage imbalance on three-phase motors	<ul style="list-style-type: none"> <li>• Motor performance</li> </ul>



**Line (GAC):**        **E**    **ELECTRICAL THEORY**  
**Competency:**     **E3**   **Explain transformation and install transformers**

**Objectives**

To be competent in this area, the individual must be able to:

- Apply three-phase transformation principles.
- Install three-phase transformer banks.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Apply principles and characteristics of three-phase transformer banks</li> <li>2. Apply three-phase transformer bank connections</li> <li>3. Describe back-feed on three-phase transformer banks</li> <li>4. Apply procedures and precautions for three-phase transformer banks</li> <li>5. Install three-phase transformer banks</li> </ol> | <ul style="list-style-type: none"> <li>• Wye transformation systems</li> <li>• Delta transformation systems</li> <li>• Ferroresonance</li> <li>• Calculating load checks</li> <li>• Vectoring principles</li> <li>• Phasor diagrams</li> <li>• Circuits that create back-feed</li> <li>• Hazards and safety procedures related to back-feed</li> <li>• Phasing</li> <li>• Paralleling <ul style="list-style-type: none"> <li>○ Angular displacement</li> </ul> </li> <li>• Energizing/De-energizing</li> <li>• Sequence (rotation)</li> <li>• Troubleshooting</li> <li>• Hazards and procedures</li> <li>• Codes and standards</li> <li>• Transformer connections <ul style="list-style-type: none"> <li>○ Wye system</li> <li>○ Delta system</li> </ul> </li> <li>• Voltage checks</li> <li>• Load checks</li> <li>• Paralleling three-phase transformers</li> <li>• Winding circuits <ul style="list-style-type: none"> <li>○ Series/parallel</li> <li>○ Taps/multi-voltage</li> </ul> </li> </ul> |
|--|--|

**Achievement Criteria**

Performance The learner will:

- Install three-phase transformers
- Parallel three-phase transformers
- Use test instruments

Conditions In a lab setting as part of a practical project

Criteria The learner will be evaluated on:

- Safety
- Application of advanced electrical theory
- Use of test instruments

**Workplace Achievement Criteria**

Given workplace situations, the learner must install three-phase transformers/three-phase transformer banks in the workplace. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):**        **G    RIGGING**  
**Competency:**     **G3   Use rigging tools and equipment in construction and maintenance**

**Objectives**

To be competent in this area, the individual must be able to:

- Apply rigging principles for construction and maintenance.

**LEARNING TASKS**

**CONTENT**

1. Apply rigging principles for construction and maintenance

- Weights and forces
- Tool and equipment requirements
- Procedures
- Manufacturers' and engineering specifications
  - ASTM
  - ASME
  - ANSI
- Connecting devices
- Design factors
  - Working load limit (WLL) and size stamps
  - Manufacturers' ultimate tensile strength (UTS)
- WorkSafeBC Regulation
- Rigging manuals

**Achievement Criteria**

Performance    The learner will:

- Apply rigging theory
- Select appropriate rigging

Conditions     In a lab setting as part of a practical project.

Criteria        The learner will be evaluated on:

- Care and maintenance of equipment
- Use of rigging
- Accuracy of applied theory

**Workplace Achievement Criteria**

Given workplace situations, the learner must demonstrate the use of rigging tools and equipment for distribution construction and maintenance in the workplace. Employer assessment of performance and logbook entry is required for each task.







**Line (GAC): H OVERHEAD DISTRIBUTION (OD)**

**Competency: H6 Maintain three-phase distribution lines**

**Objectives**

To be competent in this area, the individual must be able to:

- Apply live line maintenance procedures.
- Maintain three-phase overhead distribution lines.

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Apply three-phase live line procedures while performing maintenance work</li> <li>2. Calculate weights and forces on tools and equipment</li> <li>3. Apply live line procedures for using powder-actuated wedge-type connections</li> </ol> | <ul style="list-style-type: none"> <li>• Distribution Live Line Maintenance work procedures</li> <li>• General maintenance procedures for Live Line work</li> <li>• Tools and rigging</li> <li>• Conductor weights and forces</li> <li>• Installation of powder-actuated wedge-type connections</li> </ul> |
|---|--|

**Achievement Criteria**

- Performance The learner will:
- Use live line tools
  - Calculate weights and forces
  - Maintain limits of approach
  - Perform live line work procedures
- Conditions In a lab setting as part of a practical project
- Criteria The learner will be evaluated on:
- Safety
  - Accuracy of calculations
  - Safe work practices
  - Care and use of tools
  - Tool selection

**Workplace Achievement Criteria**

Given workplace situations, the learner must perform Live Line maintenance work on three phase overhead distribution lines in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):** H **OVERHEAD DISTRIBUTION (OD)**  
**Competency:** H7 **Operate overhead distribution (OD) electrical apparatus**

**Objectives**

To be competent in this area, the individual must be able to:

- Operate overhead distribution electrical apparatus.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <p>1. Operate overhead distribution electrical apparatus</p> | <ul style="list-style-type: none"> <li>• Single disconnect switches               <ul style="list-style-type: none"> <li>○ Fused</li> <li>○ Solid</li> </ul> </li> <li>• Lightning arrestors               <ul style="list-style-type: none"> <li>○ Function</li> </ul> </li> <li>• Street lighting apparatus</li> <li>• Air brake switches</li> </ul> |
|--|--|

**Achievement Criteria**

- Performance The learner will:
- Operate overhead apparatus
  - Use specialized PPE/tools
- Conditions In a lab setting as part of a practical project.
- Criteria The learner will be evaluated on:
- Safety
  - Sequence
  - Use of PPE/tools

**Workplace Achievement Criteria**

Given workplace situations, the learner install and operate overhead distribution electrical apparatus in the workplace. Employer assessment of performance is required for each task.





**Line (GAC):**        **I**     **UNDERGROUND DISTRIBUTION (UD)**  
**Competency:**       **I2**    **Construct underground distribution systems**

**Objectives**

To be competent in this area, the individual must be able to:

- Construct underground distribution systems.
- Access underground distribution systems.

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Describe basic underground distribution (UD) system components</li> <br/> <li>2. Describe procedures for entering underground (UG) confined spaces</li> <br/> <li>3. Apply grounding and equi-potential bonding principles</li> <br/> <li>4. Install primary and secondary cables</li> <br/> <li>5. Identify phases and cable</li> <br/> <li>6. Participate in job planning</li> <br/> <li>7. Install apparatus</li> <br/> <li>8. Perform cable terminations</li> </ol> | <ul style="list-style-type: none"> <li>• Electrical and civil drawings</li> <li>• System grounding/neutral connections</li> <li>• Terminal poles</li> <li>• Junction boxes</li> <li>• Vaults and pull boxes</li> <li>• Switching kiosks</li> <li>• Secondary boxes</li> <br/> <li>• Testing</li> <li>• Ventilation</li> <li>• Monitoring</li> <li>• Rescue plans</li> <li>• Grounding mat</li> <li>• Feed-throughs</li> <li>• Grounding elbows</li> <br/> <li>• Single and three-phase</li> <li>• Socks</li> <li>• Capstans</li> <li>• Single and three-phase underground distribution (UD) services</li> <li>• Cable identifier</li> <li>• Tug test</li> <li>• Work orders</li> <li>• Drawing and schematics review</li> <li>• Plans and procedures</li> <li>• Terminal pole</li> <li>• Vista</li> <li>• Standards</li> <li>• Junction box</li> <li>• Elbows</li> <li>• Terminators</li> <li>• Splices</li> </ul> |
|---|--|

**Achievement Criteria**

Performance The learner will:

- Access workspace
- Apply grounding and equi-potential bonding
- Install underground apparatus
- Use underground tools and test instruments

Conditions In a lab setting as part of a practical project.

Criteria The learner will be evaluated on:

- Safety
- Installation of apparatus
- Selection and use of tools and equipment
- Written and verbal communication

**Workplace Achievement Criteria**

Given workplace situations, the learner must demonstrate methods and procedures for constructing underground distribution systems in the workplace. Employer assessment of performance is required for each task.



**Line (GAC):** I **UNDERGROUND DISTRIBUTION (UD)**  
**Competency:** I3 **Maintain underground distribution systems**

**Objectives**

To be competent in this area, the individual must be able to:

- Maintain underground distribution systems.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Identify grounding and equi-potential bonding requirements for underground distribution (UD) systems</li> <li>2. Apply grounding and equi-potential bonding</li> </ol> | <ul style="list-style-type: none"> <li>• Grounding procedures</li> <li>• Tagging procedures</li> <li>• Grounding kits</li> <li>• Hazard identification</li> <li>• Underground distribution (UD) standards</li> <li>• Test for potential</li> <li>• Tag-out/lock-out procedures</li> <li>• Tools and equipment</li> </ul> |
|--|--|

**Achievement Criteria**

- Performance** The learner will:
- Access workspace
  - Apply grounding and equi-potential bonding
  - Install underground apparatus
  - Use underground tools and test instruments
- Conditions** In a lab setting as part of a practical project.
- Criteria** The learner will be evaluated on:
- Safety
  - Installation of apparatus
  - Selection and use of tools and equipment
  - Written and verbal communication

**Workplace Achievement Criteria**

Given workplace situations, the learner must select, identify and apply procedures for underground distribution systems in the workplace. Employer assessment of performance is required for each task.





**Line (GAC):**        **K    COMMUNICATION**  
**Competency:**      **K4   Apply communication protocols and requirements**

**Objectives**

To be competent in this area, the individual must be able to:

- Apply communication protocols and requirements.

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <p>1. Identify protocols and requirements</p> <p>2. Apply protocols</p> | <ul style="list-style-type: none"> <li>• Authorities <ul style="list-style-type: none"> <li>○ Provincial regulatory</li> <li>○ Power system</li> <li>○ Emergency services</li> </ul> </li> <li>• Workplace accident</li> <li>• Incidents</li> <li>• Reporting requirements</li> <li>• Job-related terminology</li> <li>• Scene lockdown</li> </ul> |
|---|--|

**Workplace Achievement Criteria**

Given workplace situations, the learner must demonstrate methods and skills for communicating with jurisdictional authorities, power system authorities, emergency services, co-workers and other disciplines in the workplace. Employer assessment of performance is required for each task.



# Level 3

## Powerline Technician



**Line (GAC):** E **ELECTRICAL THEORY**  
**Competency:** E5 **Install transformer metering**

**Objectives**

To be competent in this area, the individual must be able to:

- Select and install three-phase meters.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Explain the use of and precautions required for potential and current three-phase transformers in primary and secondary metering</li> <li>2. Install and perform meter socket safety checks</li> <li>3. Select meters for various installations</li> <li>4. Select CTs and PTs</li> <li>5. Install meters</li> <li>6. Describe power factor</li> </ol> | <ul style="list-style-type: none"> <li>• Potential and current in three phase transformers</li> <li>• Primary and secondary metering</li> <li>• Primary and secondary metering</li> <li>• Three-phase meter operation</li> <li>• Self-contained</li> <li>• Transformer</li> <li>• Current transformers</li> <li>• Potential transformers</li> <li>• 400 A single-phase</li> <li>• Canadian Electrical Code (CEC)</li> <li>• Effects of power factor on electric circuits</li> <li>• Power factor correction</li> <li>• Power factor calculation</li> <li>• Power factor formula and power triangle</li> </ul> |
|--|---|

**Achievement Criteria**

- Performance** The learner will:
- Apply metering theory
  - Install transformer metering
  - Use tools and tests instruments
- Conditions** In a lab setting as part of a practical project.
- Criteria** The learner will be evaluated on:
- Accuracy of calculations
  - Meter selection
  - Properties of tools and test instruments
  - Safety

**Workplace Achievement Criteria**

Given workplace situations, the learner must select, install and accurately read three phase meters in the workplace. Employer assessment of performance is required for each task.





**Line (GAC):**           **G    RIGGING**  
**Competency:**       **G5   Use rigging tools and equipment in transmission, construction and maintenance**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify and describe lifting equipment, resources and components for transmission lines.
- Use lifting components involved in transmission.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Identify hardware, equipment, tackle and slings used in standard rigging practices for transmission</li> <li>2. Identify slinging methods for transmission lines</li> <li>3. Calculate weights and forces</li> </ol> | <ul style="list-style-type: none"> <li>• Shackles and hooks</li> <li>• WLL and size stamps</li> <li>• Chains and slings</li> <li>• Rigging equipment</li> <li>• Rigging calculations</li> <li>• Rigger's handbook</li> <li>• Manufacturers' and engineering specifications</li> <li>• Load weights of transmission conductors</li> <li>• Manufacturers' UTS</li> </ul> |
|--|--|

**Achievement Criteria**

- Performance**    The learner will:
- Apply rigging theory
  - Select appropriate rigging
- Conditions**    In a lab setting as part of a practical project
- Criteria**        The learner will be evaluated on:
- Care and maintenance of equipment
  - Use of rigging
  - Accuracy of applied theory



**Line (GAC):**           **G RIGGING**  
**Competency:**       **G6 Perform live line transmission rigging**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the procedures and equipment used in live line transmission rigging.
- Perform live line rigging.

**LEARNING TASKS**

**CONTENT**

- |                                 |  |
|---------------------------------|--|
| 1. Describe rigging tasks       | <ul style="list-style-type: none"> <li>• Tool selection</li> <li>• Voltages and structures <ul style="list-style-type: none"> <li>○ 138 kV timber change</li> <li>○ 230 kV dead end insulator change</li> <li>○ 138 kV wish bone timber change</li> <li>○ 138 kV medium angle insulator string change</li> </ul> </li> </ul>                   |
| 2. Calculate weights and forces | <ul style="list-style-type: none"> <li>• Calculate the weights and forces</li> <li>• Voltages and structures <ul style="list-style-type: none"> <li>○ 138 kV timber change</li> <li>○ 230 kV dead-end insulator change</li> <li>○ 138 kV wish bone timber change</li> <li>○ 138 kV medium angle insulator string change</li> </ul> </li> </ul> |
| 3. Demonstrate rigging          | <ul style="list-style-type: none"> <li>• Voltages and structures <ul style="list-style-type: none"> <li>○ 138 kV timber change</li> <li>○ 230 kV dead end insulator change</li> <li>○ 138 kV wish bone timber change</li> <li>○ 138 kV medium angle insulator string change</li> </ul> </li> </ul>   |

**Achievement Criteria**

- |             |   |
|-------------|---|
| Performance | The learner will: <ul style="list-style-type: none"> <li>• Apply rigging theory</li> <li>• Select appropriate rigging</li> </ul>  |
| Conditions  | In a lab setting as part of a practical project.  |
| Criteria    | The learner will be evaluated on: <ul style="list-style-type: none"> <li>• Care and maintenance of equipment</li> <li>• Use of rigging</li> <li>• Accuracy of applied theory</li> </ul> |

**Workplace Achievement Criteria**

Given workplace situations, the learner must be able to use tools and procedures to perform live line work transmission rigging. Employer assessment of performance and logbook entry is required for each task.



**Line (GAC):** I **UNDERGROUND DISTRIBUTION (UD)**  
**Competency:** I4 **Operate underground distribution electrical apparatus**

**Objectives**

To be competent in this area, the individual must be able to:

- Operate underground distribution electrical apparatus.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Describe operation of underground electrical apparatus distribution</li> <li>2. Install switches</li> <li>3. Demonstrate underground distribution switching</li> </ol> | <ul style="list-style-type: none"> <li>• Installation procedures for underground distribution (UD) switching apparatus</li> <li>• Operation of underground (UD) switching apparatus</li> <li>• Maintenance procedures for underground distribution (UD) switching apparatus</li> <li>• VISTAS/SF6 switching kiosks</li> <li>• Vacuum interruptors</li> <li>• Live fronts</li> <li>• Dead fronts</li> <li>• VISTAS/SF6 switching kiosks</li> <li>• Vacuum interruptors</li> <li>• Live fronts</li> <li>• Dead fronts</li> </ul> |
|--|--|

**Achievement Criteria**

- Performance** The learner will:
- Operate underground apparatus
  - Use specialized PPE/tools
- Conditions** In a lab setting as part of a practical project.
- Criteria** The learner will be evaluated on:
- Safety
  - Sequence
  - Use of PPE/tools

**Workplace Achievement Criteria**

Given workplace situations, the learner must install various electrical apparatus involved in underground distribution. Employer assessment of performance is required for each task.



**Line (GAC):** J **TRANSMISSION**  
**Competency:** J1 **Describe transmission materials**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe materials used in transmission.

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Describe pole/structure materials</li> <li>2. Identify materials and hardware for wood pole transmission lines</li> <li>3. Identify material and hardware for steel/aluminum structure transmission lines</li> <li>4. Identify suspension and dead-ending material</li> <li>5. Identify insulator types</li> <li>6. Identify types and sizes of conductors used for transmission line voltages</li> <li>7. Identify types of connectors, sleeves</li> <li>8. Identify wire dead-end material</li> <li>9. Identify cellular sites</li> </ol> | <ul style="list-style-type: none"> <li>• Wood             <ul style="list-style-type: none"> <li>○ Pole classes</li> </ul> </li> <li>• Steel</li> <li>• Voltage and structures             <ul style="list-style-type: none"> <li>○ 60 kV triangular construction</li> <li>○ 138 kV wishbone construction</li> </ul> </li> <li>• Voltage and structures             <ul style="list-style-type: none"> <li>○ 230 kV – guyed Y</li> <li>○ 500 kV self supporting A</li> </ul> </li> <li>• Suspension and dead-ending material and hardware</li> <li>• Pin</li> <li>• Post</li> <li>• Ball &amp; socket</li> <li>• kV, kg rating</li> <li>• Aluminium conductor steel reinforced (ACSR)</li> <li>• Aluminium alloy conductor (AAC)</li> <li>• Compression</li> <li>• Bolted</li> <li>• Clamps</li> <li>• Compression</li> <li>• Cellular infrastructure</li> </ul> |
|---|--|



**Line (GAC):** J **TRANSMISSION**  
**Competency:** J2 **Construct transmission lines**

**Objectives**

To be competent in this area, the individual must be able to:

- Construct transmission lines.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Describe transmission line design</li> <li>2. Describe equipment</li> <li>3. Apply grounding and equi-potential bonding principles</li> <li>4. Construct transmission structures</li> </ol> | <ul style="list-style-type: none"> <li>• Basic survey equipment</li> <li>• Job plan</li> <li>• Structure Data Sheets (SDS)</li> <li>• Construction drawings</li> <li>• Identify crossings (road or rail)</li> <li>• Digging pole holes (proper depth etc.)</li> <li>• Pole setting with line truck, crane truck or other equipment</li> <li>• Setting of poles by helicopter</li> <li>• Helicopter operation</li> <li>• Installation of rider poles</li> <li>• Arc reach</li> <li>• Pole-band transitioning</li> <li>• Grounding site</li> <li>• Bonding zone</li> <li>• Monitoring</li> <li>• Framing structures</li> <li>• Setting structures</li> <li>• Erecting structures</li> <li>• Conductor installation</li> </ul> |
|---|---|

**Achievement Criteria**

- Performance** The learner will:
- Use methods of construction for overhead transmission lines
- Conditions** In a lab setting as part of a practical project
- Criteria** The learner will be evaluated on:
- Select materials
  - Follow specifications/standards
  - Safely construct overhead transmission lines

**Workplace Achievement Criteria**

Given workplace situations, the learner must construct transmission lines as per protocol. Employer assessment of performance is required for each task.



**Line (GAC):** J **TRANSMISSION**  
**Competency:** J3 **Maintain transmission lines**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe overhead maintenance procedures.
- Perform overhead transmission maintenance procedures.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <p>1. Describe inspection methods</p>               | <ul style="list-style-type: none"> <li>• Public safety checks</li> <li>• Structure and site inspections               <ul style="list-style-type: none"> <li>○ Structure</li> <li>○ Insulator</li> <li>○ Anchor</li> </ul> </li> </ul>  |
| <p>2. Perform overhead transmission maintenance</p> | <ul style="list-style-type: none"> <li>• Structure changes               <ul style="list-style-type: none"> <li>○ Pole structure</li> <li>○ Steel lattice</li> <li>○ Guying and anchoring</li> </ul> </li> <li>• Insulator and line hardware change               <ul style="list-style-type: none"> <li>○ Spacers</li> <li>○ Armor rod</li> <li>○ Dampeners</li> <li>○ Timber or X-arm changes</li> </ul> </li> <li>• Conductor               <ul style="list-style-type: none"> <li>○ Splicing</li> <li>○ Patch rod</li> <li>○ Dead-ending</li> </ul> </li> </ul> |

**Achievement Criteria**

- Performance** The learner will:
- Use methods of construction for overhead transmission lines
- Conditions** In a lab setting as part of a practical project.
- Criteria** The learner will be evaluated on:
- Select materials
  - Follow specifications/standards
  - Safely construct overhead transmission lines

**Workplace Achievement Criteria**

Given workplace situations, the learner must maintain transmission lines as per protocol. Employer assessment of performance is required for each task.



**Line (GAC):** J **TRANSMISSION**  
**Competency:** J4 **Operate transmission electrical apparatus**

**Objectives**

To be competent in this area, the individual must be able to:

- Operate transmission electrical apparatus.

**LEARNING TASKS**

**CONTENT**

- |   |  |
|---|--|
| <p>1. Describe operation of transmission electrical apparatus</p> | <ul style="list-style-type: none"> <li>• Gang-operated air brake switches</li> <li>• Supervisory-controlled equipment</li> <li>• Ground switches</li> <li>• Capacitor stations</li> <li>• Submarine and underground transmission cable</li> <li>• Grid interconnections</li> </ul> |
|---|--|

**Achievement Criteria**

- Performance** The learner will:
- Operate overhead transmission apparatus
  - Use specialized PPE/tools
- Conditions** In a lab setting as part of a practical project.
- Criteria** The learner will be evaluated on:
- Safety
  - Sequence
  - Use of PPE/tools

**Workplace Achievement Criteria**

Given workplace situations, the learner must install, operate and maintain electrical apparatus for transmission as per protocol. Employer assessment of performance is required for each task.





# Level 4

## Powerline Technician





**Line (GAC):**        **E**   **ELECTRICAL THEORY**  
**Competency:**     **E7**   **Perform system switching**

**Objectives**

To be competent in this area, the individual must be able to:

- Perform system switching.

**LEARNING TASKS**

1. Perform switching

**CONTENT**

- Electrical utility print reading
- Field switching order requirements
  - Overhead
  - Underground
- Transfer bus
- Fused-switch operation and coordination
- Isolation or de-energization devices
- Gang-operated air-break switches
- Single solid-blade disconnects
- Field pot-head disconnects and sectionalizers
- Load and non-load break switches and cut-outs
- Paralleling feeders

**Achievement Criteria**

**Performance**   The learner will:

- Use single-line diagrams to create a switching plan
- Prepare and communicate switching orders
- Operate apparatus

**Conditions**    In a lab setting as part of a practical project.

**Criteria**       The learner will be evaluated on:

- Written and verbal communication
- Safety
- Accuracy
- Use of specialized PPE/tools









**Line (GAC):** H **OVERHEAD DISTRIBUTION (OD)**  
**Competency:** H7 **Operate overhead distribution (OD) electrical apparatus**

**Objectives**

To be competent in this area, the individual must be able to:

- Operate overhead distribution electrical apparatus.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <p>1. Operate overhead distribution electrical apparatus</p> | <ul style="list-style-type: none"> <li>• Gang-operated air brake switches</li> <li>• Circuit reclosers</li> <li>• Sectionalizers</li> <li>• Capacitors</li> <li>• Voltage regulators</li> <li>• Circuit breakers</li> <li>• Supervisory-operated switches</li> </ul> |
|--|--|

**Achievement Criteria**

- Performance The learner will:
- Operate overhead apparatus
  - Use specialized PPE/tools
- Conditions In a lab setting as part of a practical project.
- Criteria The learner will be evaluated on:
- Safety
  - Sequence
  - Use of PPE/tools



**Line (GAC):** H OVERHEAD DISTRIBUTION (OD)  
**Competency:** H8 Troubleshoot overhead distribution system components

**Objectives**

To be competent in this area, the individual must be able to:

- Troubleshoot overhead distribution system components.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Identify causes of trouble</li> <br/> <li>2. Describe troubleshooting process</li> </ol> | <ul style="list-style-type: none"> <li>• Common causes of trouble               <ul style="list-style-type: none"> <li>○ Weather</li> <li>○ MVA</li> <li>○ Animal/birds</li> <li>○ Equipment failure</li> </ul> </li> <br/> <li>• One line diagrams and local maps</li> <li>• Area/location of trouble</li> <li>• Area/customers affected</li> <li>• Switching locations</li> <li>• Grounding procedures</li> <li>• Line patrol</li> </ul> |
|--|--|

**Workplace Achievement Criteria**

Given workplace situations, the learner must perform trouble shooting procedures on System Components. Employer assessment of performance is required for each task.



**Line (GAC):** I **UNDERGROUND DISTRIBUTION (UD)**  
**Competency:** I5 **Troubleshoot underground distribution system components**

**Objectives**

To be competent in this area, the individual must be able to:

- Troubleshoot overhead distribution system components.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Identify causes of trouble</li> <br/> <li>2. Describe troubleshooting process</li> </ol> | <ul style="list-style-type: none"> <li>• Dig-ins</li> <li>• Equipment failure</li> <li>• Weather</li> <li>• MVA</li> <br/> <li>• One-sline diagrams and local maps</li> <li>• Area/location of trouble</li> <li>• Area/customers affected</li> <li>• Switching locations</li> <li>• Grounding procedures</li> <li>• Fault location</li> </ul> |
|--|---|

**Workplace Achievement Criteria**

Given workplace situations, the learner must perform trouble shooting procedures on System Components. Employer assessment of performance is required for each task.



**Line (GAC):** J TRANSMISSION  
**Competency:** J3 Maintain transmission lines

### Objectives

To be competent in this area, the individual must be able to:

- Describe bare hand methods.

### LEARNING TASKS

1. Describe bare hand methods

### CONTENT

- Testing
  - Suit
  - Truck
- Second-point contact
- Access methods
- Use of FRPs



**Line (GAC):** J TRANSMISSION  
**Competency:** J5 Troubleshoot overhead transmission system components

**Objectives**

To be competent in this area, the individual must be able to:

- Troubleshoot overhead transmission system components.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Identify causes of trouble</li> <br/> <li>2. Describe troubleshooting process</li> </ol> | <ul style="list-style-type: none"> <li>• Common causes of trouble               <ul style="list-style-type: none"> <li>○ Weather</li> <li>○ MVA</li> <li>○ Animal/birds</li> <li>○ Equipment failure</li> </ul> </li> <br/> <li>• One line diagrams and local maps</li> <li>• Area/location of trouble</li> <li>• Area/customers affected</li> <li>• Switching locations</li> <li>• Grounding procedures</li> <li>• Line patrol</li> </ul> |
|--|--|

**Workplace Achievement Criteria**

Given workplace situations, the learner must perform trouble shooting procedures on System Components. Employer assessment of performance is required for each task.





# Section 4

## ASSESSMENT GUIDELINES



## Assessment Guidelines – Level 1

### Level 1 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		Powerline Technician LEVEL 1	
LINE	TRAINING TOPICS	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	SAFETY AND SAFE WORK PRACTICES	17%	14%
B	CLIMBING	12 %	14%
C	POLICIES AND REGULATIONS	8%	0%
D	TOOLS AND INSTRUMENTS	9%	14%
E	ELECTRICAL THEORY	15%	16%
F	EQUIPMENT	0%	9%
G	RIGGING	10%	5%
H	OVERHEAD DISTRIBUTION (OD)	16%	14%
I	UNDERGROUND DISTRIBUTION (UD)	8%	0%
K	COMMUNICATION	5%	14%
	Total	100%	100%
<b>Calculated by the Training Provider</b> Powerline Technician in-school theory & practical subject competency weighting		60%	40%
<b>Training Provider enters final in-school mark into ITA Direct Access</b>		X%	

<b>Calculated by ITA: In-school Mark</b> ITA Direct Access calculates the percentage weighting once the in-school mark is entered. Combined theory and practical subject competency multiplied by	80%
<b>Calculated by ITA: Standard Level Exam Mark</b> ITA Direct Access will calculate the percentage weighting once the standard level exam marks have been entered. The exam score is multiplied by	20%
<b>Calculated by ITA: Final Mark</b> The final mark for determining credit is calculated by ITA Direct Access.	FINAL%



## Assessment Guidelines – Level 2

### Level 2 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		Powerline Technician LEVEL 2	
LINE	TRAINING TOPICS	THEORY WEIGHTING	PRACTICAL WEIGHTING
D	TOOLS AND INSTRUMENTS	9%	8%
E	ELECTRICAL THEORY	22%	8%
G	RIGGING	16%	20%
H	OVERHEAD DISTRIBUTION (OD)	24%	27%
I	UNDERGROUND DISTRIBUTION (UD)	21 %	23%
K	COMMUNICATION	8%	14%
	Total	100%	100%
<b>Calculated by the Training Provider</b> Powerline Technician in-school theory & practical subject competency weighting		60%	40%
<b>Training Provider enters final in-school mark into ITA Direct Access</b>		X%	

<p><b>Calculated by ITA: In-school Mark</b></p> <p>ITA Direct Access calculates the percentage weighting once the in-school mark is entered. Combined theory and practical subject competency multiplied by</p>	80%
<p><b>Calculated by ITA: Standard Level Exam Mark</b></p> <p>ITA Direct Access will calculate the percentage weighting once the standard level exam marks have been entered. The exam score is multiplied by</p>	20%
<p>Calculated by ITA: Final Mark</p> <p>The final mark for determining credit is calculated by ITA Direct Access.</p>	FINAL%



## Assessment Guidelines – Level 3

### Level 3 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		Powerline Technician LEVEL 3	
LINE	TRAINING TOPICS	THEORY WEIGHTING	PRACTICAL WEIGHTING
E	ELECTRICAL THEORY	27%	27%
F	EQUIPMENT	0%	0%
G	RIGGING	29%	18%
I	UNDERGROUND DISTRIBUTION (UD)	16%	23%
J	TRANSMISSION	23%	20%
K	COMMUNICATION	5%	12%
	Total	100%	100%
<b>Calculated by the Training Provider</b> Powerline Technician in-school theory & practical subject competency weighting		50%	50%

<p><b>Final in-school percentage score</b></p> <p>Apprentices must achieve a minimum 70% as the final in-school percentage score to be eligible to write the Interprovincial Red Seal or ITA CofQ exam.</p>	IN-SCHOOL %
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## Assessment Guidelines – Level 4

### Level 4 Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		Powerline Technician LEVEL 4	
LINE	TRAINING TOPICS	THEORY WEIGHTING	PRACTICAL WEIGHTING
E	ELECTRICAL THEORY	30%	30%
F	EQUIPMENT	5%	0%
H	OVERHEAD DISTRIBUTION	30%	40%
I	UNDERGROUND DISTRIBUTION	10%	30%
J	TRANSMISSION	10%	0%
K	COMMUNICATION	15%	0%
	Total	100%	100%
<b>Calculated by the Training Provider</b> Powerline Technician in-school theory & practical subject competency weighting		50%	50%

**All apprentices who complete Level 4 of the Powerline Technician program with a FINAL level percentage score of 70% or greater will write the Interprovincial Red Seal examination as their final assessment.**

**ITA will enter the apprentices' Powerline Technician Interprovincial Red Seal examination percentage score in ITA Direct Access.**

**A minimum percentage score of 70% on the examination is required for a pass.**



# Section 5

## TRAINING PROVIDER STANDARDS



## Facility Requirements

### Classroom Area

- 900 sq. ft. classroom
- 14 networked computer workstations + 1 for the instructor
- Instructional media to include multimedia projector, projection screen, DVD player, flipchart and whiteboard

### Indoor Lab Training Area

- 450 sq. ft. for each class
  - Low voltage simulator
  - Primary metering installations
- 900 sq. ft. for each class
  - Underground distribution equipment
  - Cable termination
  - Splicing
- Well heated and ventilated
- Lighting appropriate to detailed work

### Outdoor Training Yard

- 3 acres (approx) for a class of 14 students
- Simulated overhead power distribution system
- Simulated overhead power transmission system
- Simulated underground distribution system
- Simulated substation

### Instructor's Office Space

- 80 sq. ft. per instructor, with a desk, chairs and materials storage / filing system

### Storage

- 800 sq. ft. indoor materials storage
- 5,000 sq. ft. outdoor storage
  - Pole bunks
  - Parking for specialized vehicles and equipment



## Tools and Equipment

### Hand Tools

Allen keys	Hack saw
Bolt cutters	Hammers
Broom	Knives
Cable cutters	Levels
Cable Jacks	Pliers – nine inch
Cant hook	Pliers – needle-nose
Chain jacks	Nut drivers
Compression tools (M-D6, Y-35, Y-45, etc.)	Peavey
Crow bar	Pick
Digging bar	Plumb bob
Digging spade	Screwdrivers
Drill bits	Shovel
Files	Sledge hammer
	Vice
	Wire cutters
	Wrenches

### Personal Protective Equipment

Climbing gear	Hearing protection
Face shield	Insulated gloves
Fire-retardant clothing	Leather gloves
Flash glasses	Rubber gloves
Hard hat and two-point chin strap	Safety glasses
Harness to meet WorkSafeBC regulations	Safety-toe footwear
	Safety vest

### Safety Equipment

Barricades	Fume and toxic gas detector
Breathing protection	Grounding devices
Bucket / tower rescue and descent equipment	Grounding mat
Caution tape	Insulated gloves
Cones	Life lines
Confined space evacuation equipment	Plastic line guards
Fire blankets	Plastic pole guards
Fire extinguisher	Pole-top rescue equipment
First-aid equipment	Rescue devices
	Rubber protective cover-up
	Wheel chocks



**Live Line Tools**

Auxiliary arm and insulators  
 By-pass jumper  
 Cut-out covers  
 Elbow puller  
 Hot sticks-clamp, grip all, P-2  
 Insulated web hoist

Insulator support  
 Live line cutters  
 Load break tool  
 Rubber blankets  
 Rubber hoses/cover up  
 Spiral link sticks  
 Sticks and attachments

**Electrical Measuring Equipment**

Cable identifier  
 Continuity tester  
 Current leakage meter  
 Energized insulator tester  
 Ground resistance tester  
 High-voltage phasing sticks  
 Megger

Ohm meter  
 Potential testing meter  
 Rotation meter  
 Transformer tester  
 Voltage/amp meters
 

- Digital and analog

**Power Tools**

Battery drill  
 Chain saw  
 Gas drill  
 Hydraulic cutters

Hydraulic drill  
 Hydraulic/electric press (Y-35, Y-45)  
 Hydraulic ground rod pounder  
 Portable generator

**Specialty Tools and Equipment**

Cable locator  
 Cable stripper  
 Powder-actuated tool  
 Feed through device  
 Gaff gauge  
 Ground rod driver

Infrared gun  
 Insulated telescopic (40 ft.) work stick  
 Reel jacks  
 Running ground  
 Silicon cloth

**Aerial Work Platforms**

Fibreglass ladders  
 Insulated pole platform (diving board)

Material Handling Aerial Device (MHAD)



**Rigging, Hoisting and Lifting Equipment**

Block and tackle  
Boom truck (RBD)  
Capstan hoist  
Dynamometer  
Hand line  
Hoists

Pole jack (butt puller)  
Slings / grips  
Kellum grip

**Communication Equipment**

Cellular phone  
Computer  
Fax machine  
Pager

Printer  
Telephone  
Two-way radio



## Reference Materials

The following list of textbooks and learning materials may be needed to enhance the technical training component of the Powerline Technician Apprenticeship program.

### Required Reference Materials

- WorkSafe BC Regulations Online
- Delmar's Standard Textbook of Electricity – Current Edition; S.L. Delmar, Thompson Delmar Learning
- The Lineworker's Rigging Handbook – Current Edition; Alexander Publications
- Transformation for Live Line Workers – Current Edition; Alexander Publications
- Live Line Work Practices – Current Edition; Alexander Publications
- Underground Distribution – Current Edition; Alexander Publications
- The Lineman's and Cableman's Handbook; Shoemaker and Mack, McGraw Hill
- Field Manual for Powerline Workers; Solman

### Recommended Resources

- Distribution Transformer Handbook; Alexander Publications



## Instructor Requirements

### Occupation Qualification

The instructor must possess:

- Powerline Technician Red Seal certification
- Certifications and qualifications appropriate to the tools, equipment and systems involved in specific lessons or modules
- For specialized topics, an instructor who may not meet the criteria above will have equivalent levels of appropriate certification and experience

### Work Experience

A minimum of 2 years of experience working in the industry as a journeyman.

### Instructional Experience and Education

It is preferred that the instructor also possesses one of the following:

- Provincial (BC) Instructor Diploma or completion of a similar Trainer Training / Instructional Methods program, plus
- Demonstrated effectiveness of communication skills, instructional and interpersonal



# Appendices



## Appendix A: Glossary

<b>Baker board</b>	a fiberglass work platform
<b>Bell</b>	suspension or dead-end insulators
<b>Bell wrench</b>	wrench for tightening various square head bolts
<b>Bonding</b>	making a mechanically secure electrical connection between two or more objects to ensure they are at the same potential
<b>Buck</b>	to lower or attempt to lower the voltage
<b>Buck arm</b>	two sets of crossarms at 90 degree angles to each other.
<b>Bucket truck</b>	an aerial lift truck for raising workers high enough to work on lines from the insulated bucket of the truck
<b>Bug</b>	a transformer
<b>Bull line</b>	heavy line for pulling in wires
<b>Bull wheel</b>	a reel device used to hold tension on a transmission conductor during stringing operations
<b>Bundle</b>	multiple strings of conductor
<b>Capacitor</b>	device that improves power quality
<b>Cascade lighting</b>	method of switching street lights in the first circuit, which, upon being energized, activates a relay that, in turn, energizes the second; the second then energizes the third, and so on
<b>Chicken wing</b>	steel post insulator standoff
<b>Cold</b>	a de-energized line
<b>Conductor</b>	that part of a cable, overhead line or apparatus intended to conduct the flow of electrical energy
<b>Counterpoise</b>	method of bonding, either to ground or to each other
<b>Cribbing</b>	method of increasing pole stability in poor soil conditions
<b>D.A. Bolt</b>	double arming bolt
<b>De-energized</b>	disconnected from a source of electricity
<b>Diaper pin</b>	a clamp to hold rubber blankets
<b>Digging bar</b>	long, round steel bar with 2-in. chisel on one end
<b>Distribution system</b>	operating system which deliver energy from substation to customers and generally operates between 2400 volts to 34,500 volts
<b>Diving board</b>	a platform board (see also 'baker board')
<b>Door</b>	the fuse tube on open type cutouts
<b>Elbow</b>	underground cable terminator
<b>Electrical apparatus</b>	an appliance or device related to power systems
<b>Energized</b>	connected to a source of electricity
<b>Fault indicators</b>	device which indicates a defect or abnormal condition on the system



<b>Fibreglass reinforced plastic (FRP) tool</b>	insulated live-line tools; also known as hot stick
<b>Footing</b>	concrete or grillage support for a structure; the base
<b>Gin</b>	temporary lifting device; also known as pole gin or transformer gin
<b>Grillage</b>	buried portion of a steel tower acting as a footing
<b>Grounding</b>	placing interconnected parts at ground/earth potential
<b>Guy wires</b>	high tensile steel wire attached to an anchor point which is installed to offset a conductor tension and equipment load
<b>Half-power</b>	partial/part power to a service
<b>Hard line</b>	steel bull line for pulling in wires
<b>Headache</b>	1) vocal warning of danger. 2) anything falling from above on pole.
<b>High pot</b>	to apply high potential to electrical machine or equipment, normally done during insulation testing.
<b>Hood</b>	insulator cover
<b>Hooks</b>	climbers, used for climbing poles
<b>Hose</b>	rubber or plastic cover up equipment (conductor cover)
<b>Hot</b>	a live or energized line
<b>House knob</b>	a wire holder (also known as an Emily knob)
<b>Hydro-vacuum excavation</b>	excavating with high-pressure water and a vacuum system
<b>Isolated</b>	physically disconnected or separated from all sources of dynamic energy
<b>Jack straps</b>	small (2-in.) blocks for pulling up small wire secondary
<b>Johnny-ball</b>	guy strain insulator
<b>Jumper</b>	a slack electrical connection between two points
<b>Jumper holding stick</b>	wire holding stick
<b>Laminated poles</b>	poles made of laminated wood
<b>Lock-out and tag-out</b>	procedure to prevent unauthorized operation of equipment
<b>Maintenance programs</b>	preventative or pro-active programs to ensure reliability of system
<b>Meggering</b>	to apply potential to test electrical equipment for continuity and insulation
<b>Metering equipment</b>	equipment used to track customer consumption of electricity for billing purposes
<b>Network systems</b>	connecting points of generation or supply sources
<b>Nomenclature</b>	powerlines and electrical apparatus designated by alphabetic and numeric codes
<b>Nose bag</b>	canvas tool pouch
<b>Phase</b>	one (single) conductor



<b>Pig-tail</b>	spiral disconnect or spiral link stick
<b>Ping</b>	deformation of threads to prevent nuts from loosening due to vibration
<b>Potential</b>	latent energy (potential presence of voltage)
<b>Powder-actuated tools</b>	tools that requires an explosive charge to operate
<b>Pothead</b>	the termination device used on end of an underground cable
<b>Primary</b>	voltage above 751 volts alternating current (distribution system)
<b>Reactor</b>	equipment that stabilizes over-voltage conditions
<b>Riser pole</b>	a transition pole going from overhead to underground distribution (also known as 'dip pole')
<b>Secondary</b>	voltage 750 volts alternating current, and below (distribution system)
<b>Sectionalize</b>	to isolate or separate sections of line
<b>Sheaves</b>	part of a rope block
<b>Shot gun stick</b>	a Grip-All stick
<b>Skywire</b>	a ground wire on top of poles and towers to protect the lines from lightning; also known as shield wire, static wire or overhead shield wire (OHSW)
<b>Sleeve</b>	a splice
<b>Splicing</b>	the joining of two conductors together end to end
<b>Standards</b>	local or utility-based structural designs
<b>Structure</b>	a device used to support conductors or cables and related equipment; for example, poles and towers
<b>Switch stick</b>	a disconnect stick
<b>Tag line</b>	rope used to tie off line or to control load being lifted
<b>Thumper</b>	underground fault locator
<b>Tongs</b>	usually refer to pole tongs, used for controlling pole when setting
<b>Thru-bolt</b>	a machine bolt
<b>Spoon</b>	a shovel; cup-shaped with long handle
<b>Squeeze on</b>	a compression fitting (connectors). Also known as a 'crimp-it'
<b>Line guard</b>	plastic protective cover
<b>Switching</b>	an operation that affects or modifies the status of a system
<b>Transformer 'bank'</b>	two or three transformers at same location connected to the same circuit
<b>Transmission line</b>	operating voltage over 35,000 volts
<b>Transmission system</b>	operating system with a voltage between 69,000 volts to 765,000 volts
<b>Tree</b>	pole mounted auxiliary arm used for lifting conductors
<b>Weatherhead</b>	the top of the conduit that contains the customer service conductors, constructed so it will resist the action of rain, sun, etc.



## Appendix B: Acronyms

<b>AAC</b>	Aluminum Alloy Conductor
<b>AR</b>	Arc Rated (note: all AR clothing is flame resistant (FR), but not all FR clothing has been Arc Rated)
<b>ACSR</b>	Aluminum conductor steel reinforced
<b>CCA</b>	chromated copper arsenates (pole treatment material)
<b>C.S.P.</b>	completely self-protected transformer
<b>C.T.</b>	current transformer, a device used to transfer current from one value to another
<b>FR</b>	Flame Resistant (note: all AR clothing is flame resistant (FR), but not all FR clothing has been Arc Rated).
<b>FRC</b>	flame retardant clothing
<b>FRP</b>	fibreglass reinforced plastic (hotline sticks)
<b>GIS</b>	Geographical Information System
<b>GPS</b>	Global Positioning System
<b>KVA</b>	kilovolt ampere
<b>LED</b>	light emitting diode
<b>OD</b>	Overhead Distribution
<b>O.C.B.</b>	oil circuit breaker
<b>OH&amp;S</b>	Occupational Health and Safety
<b>P.C.B.</b>	polychlorinated biphenyl chemical
<b>PPE</b>	personal protective equipment
<b>P.T.O.</b>	power take off
<b>RBD</b>	radial boom derricks
<b>SF6</b>	Sulphur hexafluoride gas
<b>SWL</b>	Safe working load
<b>TDG</b>	Transportation of Dangerous Goods
<b>ULF</b>	Ultra low frequency
<b>URD</b>	Underground Residential/Rural Distribution
<b>UD</b>	Underground Distribution
<b>VLF</b>	Very low frequency
<b>WHMIS</b>	Workplace Hazardous Materials Information System
<b>WLL</b>	working load limit