



Powerline Technician

Guide to Course Content

2024

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Saskatchewan
Apprenticeship and
Trade Certification
Commission

Online: www.saskapprenticeship.ca

Recognition:

To promote transparency and consistency, this document has been adapted from the 2018 Powerline Technician Red Seal Occupational Standard (Employment and Social Development Canada).

A complete version of the Occupational Standard can be found at www.red-seal.ca

STRUCTURE OF THE GUIDE TO COURSE CONTENT

To facilitate understanding of the occupation, this guide to course content contains the following sections:

Description of the Powerline Technician trade: an overview of the trade's duties and training requirements.

Essential Skills Summary: an overview of how each of the nine essential skills is applied in this trade.

Elements of harmonization of apprenticeship training: includes adoption of Red Seal trade name, number of levels of apprenticeship, total training hours (on-the-job and in-school) and consistent sequencing of technical training content. Implementation for harmonization will take place progressively. Level one was implemented in 2020.

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard detailing the essential skills and the level of training where the content is covered.

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities.

Task: distinct actions that describe the activities within a major work activity.

Sub-task: distinct actions that describe the activities within a task.

Training Profile Chart: a chart which outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

Technical Training Course Content for the Powerline Technician trade: a chart which outlines the model for SATCC technical training sequencing. For the harmonized level of training, a cross reference to the Harmonized apprenticeship technical training sequencing, at the learning outcome level, is provided.

Appendix A: Post Harmonization Training Profile Chart: a chart which outlines the finalized model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

DESCRIPTION OF THE POWERLINE TECHNICIAN TRADE

Powerline technicians construct, operate, maintain and repair overhead and underground electrical transmission and distribution systems. They erect and maintain steel, wood, fibreglass, laminate and concrete poles, structures and other related hardware. They install, maintain and repair overhead and underground powerlines and cables, and other associated equipment such as insulators, conductors, lightning arrestors, switches, metering systems, transformers and lighting systems. They splice and terminate conductors and related wiring to connect power distribution and transmission networks. In some jurisdictions, powerline technicians may also install underwater cables and install/transfer communication cables.

Powerline technicians are employed by electric power generation, transmission or distribution companies, electrical contractors and public utility commissions. In larger utilities, powerline technicians may also specialize in one of the following areas: transmission lines, overhead or underground distribution systems, communication networks and electrical power stations.

Powerline technicians require good communication skills to coordinate and facilitate work with customers, co-workers and other trades. They also require strong analytical skills in order to read and interpret diagrams, drawings and specifications. They must have good mechanical aptitude to install, troubleshoot and repair equipment. They must also have good vision and the ability to distinguish colours. The ability to adapt to change and a willingness to keep up with new developments is important to this trade.

Powerline technicians work outdoors at various worksites, at any hour and in any weather. The work always involves travel to and from the worksite, which is often in remote areas, necessitating the use of a variety of access equipment such as all-terrain vehicles, snowmobiles, aircrafts and watercrafts. Occupational hazards in this trade are working with high voltage equipment, working in confined spaces and working at heights. The work may be strenuous and requires frequent heavy lifting, working in awkward positions, carrying and reaching. Getting to powerlines requires climbing poles and structures, working from a bucket attached to an aerial lift boom and entering maintenance holes and underground vaults. Other inherent occupational hazards in this trade are electrical shocks, working in confined spaces and falling.

This analysis recognizes similarities or overlaps with the work of construction electricians and industrial electricians. Powerline technicians work with a wide variety of tradespersons, engineers and inspectors.

With experience, powerline technicians may act as mentors and trainers to apprentices in the trade. They may advance to senior journeyman, foreperson, supervisory or managerial positions. They can also transfer their skills to related occupations in areas such as design, planning, safety, technical support services and system control.

Training Requirements: 7200 hours and 4 years of technical training sessions at the Southeast College training facility in Weyburn. An apprentice must successfully complete the required technical training and compile enough on-the-job experience to total at least 1800 hours each year.

There are four levels of technical training delivered by Southeast College at their training facility in Weyburn, Saskatchewan.

- Level One: 12 Days
- Level Two: 10 Days
- Level Three: 12 Days
- Level Four: 10 Days

It is the employer’s or journeyperson’s training responsibility to supervise an apprentice’s practical skills development until a satisfactory level of proficiency has been reached.

The information contained in this guide to course content details the technical training delivered for each level of apprenticeship. An apprentice spends approximately 15% of their apprenticeship term in a technical training institute learning the technical and theoretical aspects of the trade. The hours and percentages of technical and practical training may vary according to class needs and progress.

The content of the technical training components is subject to change without notice.

Entrance Requirements for Apprenticeship Training

Your grade twelve transcripts (with no modified classes) or GED 12 is your guarantee that you meet the educational entrance requirements for apprenticeship in Saskatchewan. In fact, employers prefer and recommend apprentices who have completed high school. This ensures the individual has all of the necessary skills required to successfully complete the apprenticeship program and receive journeyperson certification.

Individuals with “modified” or “general” classes in math or science do not meet our entry requirements. These individuals are required to take an entrance assessment prescribed by the SATCC.

English is the language of instruction in all apprenticeship programs and is the common language for business in Saskatchewan. Before admission, all apprentices and/or “upgraders” must be able to understand and communicate in the English language. Applicants whose first language is not English must have a minimum Canadian Language Benchmark Assessment of six (CLB6).

Note: A CLB assessment is valid for a one-year period from date of issue.

Designated Trade Name	Math Credit at the Indicated Grade Level ^❶	Science Credit at Grade Level
Powerline Technician	Grade 11	Grade 10
<p>^❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).</p> <p>*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.</p> <p>For information about high school curriculum, including Math and Science course names, please see: http://www.curriculum.gov.sk.ca/#</p> <p>Individuals not meeting the entrance requirements will be subject to an assessment and any required training</p>		

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

The application of these skills may be described throughout this document within the skills and knowledge which support each sub-task of the trade. The most important essential skills for each sub-task have also been identified. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at www.red-seal.ca.

READING

Powerline technicians read short notes on drawings and forms that contain technical information related to construction standards or specifications. They read emails and other correspondence from manufacturers or electrical grid personnel to stay informed on issues. They consult textbooks to determine steps to take when encountering new or infrequent tasks. They also consult summaries of the Highway Traffic Act to prepare for work on public roads. Powerline technicians also read a variety of code books, standards and regulations to ensure work is done in compliance with industry standards.

DOCUMENT USE

Powerline technicians read information on lists, logbooks and timesheets, and they scan work orders for information about current projects such as job location, job description, timelines, scheduling, contractor requirements, project hazards and project contacts. They use area maps and equipment identification codes to identify their work location. They complete forms to track the disposal of hazardous materials. They interpret symbols and codes on construction drawings and use schematic drawings to assemble a piece of equipment or to isolate a circuit. Powerline technicians use information taken from tables and charts to perform calculations such as voltage drop or appropriate conductor sag.

WRITING

Powerline technicians keep a daily logbook containing reminders and notes about job progress, deliveries, weather conditions and unusual occurrences. They may prepare training evaluations, switching authorizations and work protection documents. They document safety hazards and precautions or measures taken to mitigate potential hazards.

ORAL COMMUNICATION

Powerline technicians communicate with dispatchers to exchange information about work in progress or to obtain new assignments, and with supervisors and other crew members several times a day to share crucial information about tasks that need to be completed and unforeseen problems. They maintain constant contact with all crew members during operations to ensure safety of all workers. Powerline technicians interact with property owners, the general public and various contractors. They also explain and demonstrate safe working techniques to new employees.

NUMERACY

Powerline technicians estimate time and verify or determine materials and equipment required for a job. They calculate to what depth to bury poles, the weight of a load to be rigged, fuse size, the tension and angle of guy wires, and the average kilowatt demand for a building. Powerline technicians work in both metric and imperial systems of measurement and must be able to convert between the two systems.

THINKING

Powerline technicians use problem solving skills to determine how to proceed with an installation when safety hazards or unforeseen obstructions present themselves. They identify the people such as fire fighters, police, city representatives, tenants and dispatchers, who need to be consulted to determine course of action when faced with emergencies such as downed wires or traffic lights, and storms.

Powerline technicians use decision making skills to decide alternate work activities to be completed when weather prevents outside work. They decide on the suitability of materials and proper procedures to follow to accomplish tasks in a safe and efficient manner. Powerline technicians establish critical timelines for assigned projects keeping in mind that electrical power must be restored as quickly as possible.

WORKING WITH OTHERS

Powerline technicians work as part of a crew to perform critical and often highly hazardous work; therefore, collaboration is crucial. They participate in formal and informal discussions with co-workers and supervisors about work processes. They monitor the work of others and may assign tasks to them or inform them how to perform a task.

DIGITAL TECHNOLOGY

Powerline technicians use communications software such as email to communicate with supervisors. They may access the Internet to obtain information, or to review electrical schematics or construction drawings. They also use other computer applications such as GIS software to locate or place powerline devices or components.

CONTINUOUS LEARNING

Powerline technicians need to maintain and upgrade their skills and knowledge of industry standards and regulations by attending educational sessions or courses offered by provincial or federal associations. Powerline technicians must also maintain their safety certifications such as cardiopulmonary resuscitation (CPR) and First Aid. They also learn from experienced co-workers.

ELEMENTS OF HARMONIZATION FOR APPRENTICESHIP TRAINING

At the request of industry, the Harmonization Initiative was launched in 2013 to *substantively align* apprenticeship systems across Canada by making training requirements more consistent in the Red Seal trades. Harmonization aims to improve the mobility of apprentices, support an increase in their completion rates and enable employers to access a larger pool of apprentices.

As part of this work, the Canadian Council of the Directors of Apprenticeship (CCDA) identified four main harmonization priorities in consultation with industry and training stakeholders:

1. Trade name

The official Red Seal name for this trade is Powerline Technician.

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for the Powerline Technician trade is four.

3. Total Training Hours during Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for the Powerline Technician trade is 7200.

4. Consistent sequencing of training content (at each level) using the most recent Occupational Standard

Implementation for harmonization will take place progressively. Level one was implemented in 2020/2021, level two 2021/2022, level three 2022/2023, and level four in 2023/2024. See Appendix A for the finalized curriculum comparisons.

White boxes are “Topics,” grey boxes are “In Context”. In context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in context topics are accomplished in other topics in that level.

Level 1 (2020/2021 implementation)	Level 2 (2021/2022 implementation)	Level 3 (2022/2023 implementation)	Level 4 (2023/2024 implementation)
	Safety-related functions	Safety-related functions	Safety-related functions
	Organizes Work	Organizes Work	Organizes Work
	Tools and equipment	Tools and equipment	Tools and equipment
Safety-related functions			
Tools and equipment			

Level 1 (2020/2021 implementation)	Level 2 (2021/2022 implementation)	Level 3 (2022/2023 implementation)	Level 4 (2023/2024 implementation)
Organizes Work			
Work Area Access			
Live-Line Methods (Introduction)	Live-Line Methods	Live-Line Methods	Live-Line Methods
Communication			Mentoring
Pole Structures			
Steel Lattice Structures			
Overhead Conductors and Cables	Overhead Conductors and Cables	Overhead Conductors and Cables	Overhead Conductors and Cables
	Underground and Underwater Cable (Secondary)	Underground and Underwater Cable (Primary)	
	Lighting Systems		
Voltage Control Equipment	Voltage Control Equipment	Voltage Control Equipment	Voltage Control Equipment
	Protection Equipment	Protection Equipment	Protection Equipment
	Metering Equipment	Metering Equipment	
Communication Devices			Communication Equipment
	Distribution and Transmission Systems (Operation)	Distribution and Transmission Systems (Operation)	Distribution and Transmission Systems (Operation)
	Distribution and Transmission Systems (Maintenance)	Distribution and Transmission Systems (Maintenance)	Distribution and Transmission Systems (Maintenance)
	Distribution Systems (Repair)	Distribution Systems (Troubleshoot and Repair)	Distribution Systems (Troubleshoot and Repair)
	Transmission Systems (Repair)	Transmission Systems (Troubleshoot and Repair)	Transmission Systems (Troubleshoot and Repair)

POWERLINE TECHNICIAN

TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2018 Powerline Technician Red Seal Occupational Standard. Each sub-task details the corresponding essential skill and level of training where the content is covered. *

* Sub-tasks with numbers in the boxes is where the content will be delivered in training. The Task Matrix Chart will be updated every year until Harmonization implementation is complete. Implementation for harmonization will take place progressively. Level one was implemented in 2020/2021, level two 2021/2021, level three 2022/2023, and level four in 2023/2024. See Appendix A for the finalized curriculum comparisons.

A – Performs routine occupational skills

26%

A-1 Performs safety-related functions	1.01 Uses personal protective equipment (PPE) and safety equipment 1 (2, 3, 4 in-context)	1.02 Controls powerline hazards 1 (2, 3, 4 in-context)	1.03 Controls environmental hazards 1 (2, 3, 4 in-context)	1.04 Performs lock-out and tag-out procedures 1 (2, 3, 4 in-context)	1.05 Performs temporary grounding and bonding procedures 1 (2, 3, 4 in-context)
A-2 Uses and maintains tools and equipment	2.01 Uses hand, power and powder-actuated tools and equipment 1 (2, 3, 4 in-context)	2.02 Uses electrical measuring and testing equipment 1 (2, 3, 4 in-context)	2.03 Uses rigging, hoisting and lifting equipment 1 (2, 3, 4 in-context)		
A-3 Organizes work	3.01 Interprets plans, drawings and specifications 1 (2, 3, 4 in-context)	3.02 Prepares worksite 1 (2, 3, 4 in-context)	3.03 Plans job tasks and procedures 1 (2, 3, 4 in-context)		
A-4 Accesses work area	4.01 Climbs poles and steel lattice structures 1	4.02 Uses access equipment 1	4.03 Uses on- and off-road equipment 1		
A-5 Uses live-line methods	5.01 Uses cover-up 1, 2, 3, 4	5.02 Uses rubber gloves 1, 2, 3, 4	5.03 Uses bare-hand methods (Not Common Core) 4	5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks) 1, 2, 3, 4	

A-6 Uses communication and mentoring techniques

6.01 Uses communication Techniques

1

6.02 Uses mentoring techniques

4

B – Installs structures

13%

B-7 Installs pole structures

7.01 Frames pole structures

1

7.02 Sets pole structures

1

7.03 Installs pole structure guys and anchors

1

B-8 Installs steel lattice structures

8.01 Assembles steel lattice structures

1

8.02 Erects steel lattice structures

1

8.03 Installs steel lattice structure guy wires and anchors

1

C – Installs conductor systems

15%

C-9 Installs overhead conductors and cables

9.01 Strings overhead conductors and cables

1, 2, 3, 4

9.02 Sags overhead conductors and cables

1, 2, 3, 4

9.03 Ties-in overhead conductors and cables

1, 2, 3, 4

9.04 Installs splices and connections to overhead conductors and cables

1, 2, 3, 4

C-10 Installs underground and underwater cable

10.01 Installs conduit and cable

2, 3

10.02 Places direct buried cable

2, 3

10.03 Splices underground and underwater cable

2, 3

10.04 Terminates underground and underwater cable

2, 3

D – Installs auxiliary equipment

21%

D-11 Installs lighting systems

11.01 Installs street lights

2

11.02 Maintains street lights

2

D-12 Installs voltage control equipment	12.01 Installs transformers 1, 2, 3	12.02 Installs capacitors 4	12.03 Installs voltage regulators 3, 4	12.04 Installs switches 1, 2, 3	12.05 Installs reactors (Not Common Core) 4
D-13 Installs protection equipment	13.01 Installs reclosers 3, 4	13.02 Installs sectionalizers 3, 4	13.03 Installs fuses 2, 3, 4	13.04 Installs lightning arrestors 2	
D-14 Installs metering equipment	14.01 Installs primary metering equipment 3	14.02 Installs secondary metering equipment 2			
D-15 Installs communication devices	15.01 Installs cellular antennas 4	15.02 Transfers communication lines 1			

E – Performs operation, maintenance and repair

25%

E-16 Operates distribution and transmission systems	16.01 Operates transmission systems 3, 4	16.02 Operates distribution Systems 2, 4	16.03 Performs station switching 4		
E-17 Maintains distribution and transmission systems	17.01 Inspects distribution and transmission systems 3, 4	17.02 Maintains pole 2, 3, 4	17.03 Maintains steel lattice structures 4	17.04 Maintains system components 2, 3, 4	17.05 Trims trees 2
E-18 Repairs distribution systems	18.01 Troubleshoots overhead distribution systems 3, 4	18.02 Troubleshoots underground and underwater distribution systems 3, 4	18.03 Repairs overhead distribution systems 2, 3, 4	18.04 Repairs underground and underwater distribution systems 2, 3, 4	
E-19 Repairs transmission systems	19.01 Troubleshoots overhead transmission systems 3, 4	19.02 Troubleshoots underground and underwater transmission systems 3, 4	19.03 Repairs overhead transmission systems 2, 3, 4	19.04 Repairs underground and underwater transmission systems 2, 3, 4	

TRAINING PROFILE CHART

This Training Profile Chart represents Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training at the topic level.

Level One	Transcript Code	Hours
Safety	SFTY 100	
Temporary Bonding and Grounding	BOND 100	
Tools and Equipment	TOOL 100	
Electrical Measuring	EMSR 100	
Rigging, Hoisting and Lifting	RIGG 100	
Job Planning and Organization	JOBP 100	
Pole Climbing, Decay and Decay Calculations	POLE 100	
Work Area Access	ACES 100	
Live Line Methods (Introduction)	LLMI 100	
Overhead Distribution Structures (Introduction)	OHDS 100	
Steel Lattice Structures	SLAT 100	
Overhead Conductors and Cables	OHCC 100	
Overhead Distribution Systems (Introduction)	OSYS 100	
Trade Mathematics	TMET 100	
		127

Level Two	Transcript Code	Hours
Live Line Methods (Intermediate)	LLMI 200	
Overhead Conductors and Cables (Tension Stringing)	OHCC 200	
Underground Distribution Systems	USYS 200	
Street Lighting Systems	STRT 200	
Single-Phase Transformers and Switches	TRNS 200	
Protection Equipment	PROC 200	
Single-Phase Metering	METR 200	
Distribution Systems	OSYS 200	
Distribution and Transmission Maintenance	MAIN 200	
Transmission Systems	TSYS 200	
Electrical Theory	THRY 200	
		112

Level Three	Transcript Code	Hours
3-Phase Transformers	TRNS 300	
Voltage Control Equipment	VCEM 300	
Underground and Underwater Work	UWRK 300	
Load Checks	LOAD 300	
Reclosers, Sectionalizers and Fuses	PROC 300	
Transmission System Troubleshooting	TRBL 300	
Service Installations	SRVC 300	
Switching Devices	SWTC 300	
Instrument Transformers	INST 300	
Conductors and Cables (Distribution Stringing)	OHCC 300	
Hotstick Work	HWRK 300	
		112

Level Four	Transcript Code	Hours
Mentoring	MENT 400	
25KV Rubber Glove	RBGL 400	
Conductors and Cables	OHCC 400	
Capacitors, Regulators and Reactors	CRAR 400	
System Protection Apparatus	SYSP 400	
Introduction to Substations	SUBS 400	
Line Patrol	PRTL 400	
Transmission System Repair	TSYS 400	
Cellular Towers	CELL 400	
		75

TECHNICAL TRAINING COURSE CONTENT

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing. For the harmonized level of training, a cross reference to the Red Seal Occupational Standard (RSOS) apprenticeship technical training sequencing, at the learning outcome level, is provided.

Implementation for harmonization will take place progressively. Level one was implemented in 2020/2021, level two 2021/2021, level three 2022/2023, and level four in 2023/2024. See Appendix A for the finalized curriculum comparisons.

The Red Seal Powerline Technician Curriculum Outline, which provides additional detail of the Harmonized technical training, can be found at www.red-seal.ca

Level One	12 Days	127 hours
Safety		SFTY 100
<ul style="list-style-type: none">• demonstrate knowledge of safety equipment, their applications, maintenance and procedures for use• demonstrate knowledge of safe work practices• demonstrate knowledge of regulatory requirements pertaining to safety• demonstrate knowledge of lock-out and tag-out procedures, their applications and use		
RSOS topics covered in this section of training:		
A-1 Safety-related functions		
A-1.01 Uses personal protective equipment (PPE) and safety equipment		
<ul style="list-style-type: none">• safety equipment, their applications, maintenance and procedures for use• safe work practices• regulatory requirements pertaining to safety		
A-1.02 Controls powerline hazards		
<ul style="list-style-type: none">• safety equipment and PPE, their applications, maintenance and procedures for use• safe work practices• live-line work and its applications• regulatory requirements pertaining to safety• principles of live-line work• procedures used to perform live-line work		
A-1.03 Controls environmental hazards		
<ul style="list-style-type: none">• safety equipment and PPE, their applications, maintenance and procedures for use• safe work practices• regulatory requirements pertaining to environmental hazards		
A-1.04 Performs lock-out and tag-out procedures		
<ul style="list-style-type: none">• lock-out and tag-out procedures and legislation• safety checks of equipment• procedures for checking for potential		
<hr/> Temporary Bonding and Grounding		BOND 100
<ul style="list-style-type: none">• demonstrate knowledge of grounding and bonding methods and equipment• demonstrate knowledge of the procedures used to install, inspect and maintain grounding and bonding systems		

RSOS topics covered in this section of training:

A-1 Safety related functions

A-1.05 Performs temporary grounding and bonding procedures

- principles of temporary grounding and bonding procedures
- procedures used to perform temporary grounding and bonding

Tools and Equipment

TOOL 100

- demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use

RSOS topics covered in this section of training:

A-2 Tools and equipment

A-2.01 Uses hand, power and powder-actuated tools and equipment

- tools and equipment, their applications, and procedures for use
- procedures used to inspect and maintain tools and equipment

Electrical Measuring

EMSR 100

- demonstrate knowledge of power and energy, their characteristics and associated principles
- demonstrate knowledge of units of measure and symbols relating to power and energy
- demonstrate knowledge of the instruments and procedures used to measure power and energy

RSOS topics covered in this section of training:

A-2 Tools and equipment

A-2.02 Uses electrical measuring and testing equipment

- electrical measuring and testing equipment, their components, applications, maintenance and procedures for use
- procedures to use electrical measuring and testing equipment, and their components

Rigging, Hoisting and Lifting

RIGG 100

- demonstrate knowledge of rigging, hoisting and lifting equipment, their applications, limitations and procedures for use
- demonstrate knowledge of basic rigging, hoisting and lifting techniques

RSOS topics covered in this section of training:

A-2 Tools and equipment

A-2.03 Uses rigging, hoisting and lifting equipment

- rigging, hoisting and lifting equipment, their applications, limitations and procedures for use
- rigging, hoisting and lifting techniques

Job Planning and Organization

JOBP 100

- demonstrate knowledge of drawings, schematics and specifications and their applications
- demonstrate knowledge of interpreting and extracting information from drawings, basic schematics and specifications
- demonstrate knowledge of grid map reading
- demonstrate knowledge of the procedures used to find a land location on a map
- demonstrate knowledge of traffic control equipment, their applications, maintenance and procedures for use
- demonstrate knowledge of traffic control techniques and procedures
- demonstrate knowledge of job tasks, procedures, and the order in which they are completed

- demonstrate knowledge of different communication techniques, their applications and use

RSOS topics covered in this section of training:

A-3 Organizes work

A-3.01 Interprets plans, drawings and specifications

- drawings, schematics and specifications and their applications
- interpreting and extracting information from drawings, schematics and specifications

A-3.02 Prepares worksite

- safe work practices
- regulatory requirements pertaining to safety
- procedures used to prepare the worksite

A-3.03 Plans job tasks and procedures

- procedures used to plan and organize job tasks

A-6 Communication

A-6.01 Uses communication techniques

- trade terminology
- effective communication practices

Pole Climbing, Decay and Decay Calculations

POLE 100

- demonstrate knowledge of pole decay and decay calculations, their application and use
- demonstrate knowledge of how to tag and stub a pole, its application and use
- demonstrate knowledge of pole climbing, its applications, limitations and procedures for use
- demonstrate knowledge of pole climbing equipment, its applications, limitations and procedures for use

RSOS topics covered in this section of training:

A-4 Work area access

A-4.01 Climbs poles and steel lattice structures

- pole structure climbing, pole climbing equipment, and its applications, limitations and procedures for use
- procedures used to climb pole structures and inspect and maintain pole climbing equipment
- steel lattice structure climbing, steel lattice structure climbing equipment, its applications, limitations and procedures for use
- procedures used to climb steel lattice structures and inspect and maintain steel lattice structure climbing equipment

Work Area Access

ACES 100

- demonstrate knowledge of ladders, their applications, limitations and procedures for use
- demonstrate knowledge of aerial devices, their applications and operation
- demonstrate knowledge of basic hydraulic principles
- demonstrate knowledge of hydraulic equipment components, their applications and operation
- demonstrate knowledge of on and off-road equipment, their applications, maintenance and operating procedures

RSOS topics covered in this section of training:

A-4 Work area access

A-4.02 Uses access equipment

- access equipment, their characteristics, applications and limitations
- procedures used to erect, remove, inspect, maintain, transport and store access equipment, their characteristics, applications and limitations

A-4.03 Uses on and off-road equipment

- on and off-road equipment and their characteristics and applications

- procedures used to operate, inspect and maintain on and off-road equipment

Live Line Methods (Introduction)

LLMI 100

- demonstrate knowledge of the principles of live line work
- demonstrate knowledge of the procedures used to perform live line work
- demonstrate knowledge of rubber gloves, their applications, maintenance and use
- demonstrate knowledge of insulating sticks, their applications, maintenance and use

RSOS topics covered in this section of training:

A-5 Live line methods (Introduction)

A-5.01 Uses cover-up

- principles of live-line work using cover-up
- procedures to use cover-up

A-5.02 Uses rubber gloves

- principles of live-line work using rubber gloves
- procedures used to perform live-line work using rubber gloves

A-5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)

- principles of live-line work using FRP tools (hot sticks)
- procedures to use FRP tools (hot sticks)

Overhead Distribution Structures (Introduction)

OHDS 100

- demonstrate knowledge of overhead system construction principles
- demonstrate knowledge of different poles and the procedures to properly setting a pole
- demonstrate the knowledge of the angles and lengths involved in tensioning lines and equipment

RSOS topics covered in this section of training:

B-7 Installs pole structures

B-7.01 Frames pole structures

- pole structures, their components, characteristics and applications
- procedures used to frame pole structures, their components and accessories

B-7.02 Sets pole structures

- principles of setting pole structures
- procedures used to set pole structures

B-7.03 Installs pole structure guys and anchors

- principles of pole guys and anchors and their applications for use
- procedures used to install pole guys and anchors

Steel Lattice Structures

SLAT 100

- demonstrate knowledge of steel lattice structures, their applications and use
- demonstrate knowledge to assemble, erect and install steel lattice structures

RSOS topics covered in this section of training:

B-8 Steel lattice structures

B-8.01 Assembles steel lattice structures

- assembling steel lattice structures, their components, characteristics and applications
- procedures used to assemble steel lattice structures and their components

B-8.02 Erects steel lattice structures

- procedures used to erect steel lattice structures and their components

B-8.03 Installs steel lattice structure guy wires and anchors

- guy wires and anchors, their characteristics and applications

- procedures used to install guy wires and anchors

Overhead Conductors and Cables

OHCC 100

- demonstrate knowledge of the effects of sagging on conductors
- demonstrate knowledge of the procedures used to sag conductors
- demonstrate knowledge of conductors and cables and their associated components
- demonstrate knowledge of methods of cable protection and their applications
- demonstrate knowledge of the procedures used to mechanically protect and support cables

RSOS topics covered in this section of training:

C-9 Overhead conductors and cables

C-9.01 Strings overhead conductors and cables (*Non-tension method*)

- overhead conductors and cables, their characteristics and applications
- conductor and cable protection methods, procedures and their applications
- distribution lines, their applications and operation
- procedures used to string distribution lines
- transmission lines, their applications and operation
- electrical principles
- procedures used in the temporary grounding and bonding of transmission and distribution lines

C-9.02 Sags overhead conductors and cables

- effects of sagging on overhead conductors and cables
- procedures used to sag overhead conductors and cables

C-9.03 Ties in overhead conductors and cables

- overhead conductor and cable tie-ins and components
- conductor and cable protection methods used for tie-ins
- distribution and transmission lines, their components, applications and operation

C-9.04 Installs splices and connections to overhead conductors and cables

- splices and connections for overhead conductors and cables
- conductor and cable protection methods for splices and connections
- procedures used to splice conductors and cables

Overhead Distribution Systems (Introduction)

OSYS 100

- demonstrate knowledge of transformer operating principles
- transformer components, their applications and operation
- demonstrate knowledge of the procedures used to install and maintain transformers
- demonstrate knowledge of managing hazardous materials associated with transformers
- demonstrate knowledge of the procedures used to install, connect, inspect, maintain, repair, troubleshoot and test overhead system components and accessories
- demonstrate knowledge of communication lines and their use within a distribution system

RSOS topics covered in this section of training:

D-12 Voltage control equipment

D-12.01 Installs transformers (*single-phase*)

- transformer operating principles
- transformer components, their applications and operation
- procedures used to install transformers
- managing hazardous materials associated with transformers
- transformer banking
- self-contained three-phase transformers
- procedures used to bank transformers
- transformer connection types, their applications and implications

- power transformer operating principles
 - procedures used to install and parallel power transformers
 - power transformer components, their applications and operation
- D-12.04 Installs switches
- switches, their characteristics and applications
 - operating principles of switches procedures used to install, operate, troubleshoot and inspect switches

Trade Mathematics and Electrical Theory**TMET 100**

- demonstrate knowledge of basic mathematical principles, their use and applications
- demonstrate knowledge of the different units of measure used in industry
- demonstrate knowledge of fundamental electrical principles
- demonstrate knowledge of basic DC series and parallel circuits
- demonstrate knowledge of single-phase circuits, their characteristics and operation
- demonstrate knowledge of electromagnetic induction, its characteristics and applications

No RSOS topics covered in this section of training

Live Line Methods**LLMI 200**

- demonstrate knowledge of the principles of live line work
- demonstrate knowledge of the procedures used to perform live line work
- demonstrate knowledge of insulating sticks, their applications, maintenance and use
- demonstrate knowledge of principles of live-line work using cover-up
- demonstrate knowledge of procedures to use cover-up

RSOS topics covered in this section of training:**A-5 Uses live-line methods****A-5.01 Uses cover-up**

- principles of live-line work using cover-up
- procedures to use cover-up

A-5.02 Uses rubber gloves

- principles of live-line work using rubber gloves
- procedures used to perform live-line work using rubber gloves

A-5.04 Uses fiberglass reinforced plastic (FRP) tools (hot sticks)

- principles of live-line work using FRP tools (hot sticks)
- procedures to use FRP tools (hot sticks)

Overhead Conductors and Cables (Tension Stringing)**OHCC 200**

- demonstrate knowledge of the effects of sagging on conductors
- demonstrate knowledge of the procedures used to sag conductors
- demonstrate knowledge of overhead conductors and cables, their characteristics and applications
- demonstrate knowledge of conductor and cable protection methods, procedures and their applications
- demonstrate knowledge of the procedures used to mechanically protect and support cables

RSOS topics covered in this section of training:**C-9 Installs overhead conductors and cables****C-9.01 Strings overhead conductors and cables**

- overhead conductors and cables, their characteristics and applications
- conductor and cable protection methods, procedures and their applications
- distribution lines, their applications and operation
- procedures used to string distribution lines
- transmission lines, their applications and operation
- electrical principles
- procedures used in the temporary grounding and bonding of transmission and distribution lines

C-9.02 Sags overhead conductors and cables

- effects of sagging on overhead conductors and cables
- procedures used to sag overhead conductors and cables

C-9.03 Ties in overhead conductors and cables

- overhead conductor and cable tie-ins and components
- conductor and cable protection methods used for tie-ins
- distribution and transmission lines, their components, applications and operation

C-9.04 Installs splices and connections to overhead conductors and cables

- splices and connections for overhead conductors and cables
- conductor and cable protection methods for splices and connections
- procedures used to splice conductors and cables

Underground Distribution Systems

USYS 200

- demonstrate knowledge of underground systems, their characteristics and applications
- demonstrate knowledge of underground and underwater system construction principles
- demonstrate knowledge of the procedures used to install, splice and terminate underground and underwater conductors and cables
- demonstrate knowledge of the procedures used to install, connect, inspect maintain, troubleshoot, repair and test underground and underwater system components and accessories

RSOS topics covered in this section of training:

C-10 Installs underground and underwater cable

C-10.01 Installs conduit and cable

- underground and underwater systems, their components, characteristics and applications
- cable protection methods and their applications
- underground and underwater systems construction principles
- procedures used to install underground and underwater systems, and their components

C-10.02 Place direct buried cable

- direct buried underground and underwater cable
- cable protection methods and their applications
- direct buried underground and underwater systems construction principles
- procedures used to install direct buried underground and underwater systems, and their components

C-10.03 Splices underground and underwater cable

- underground and underwater splices for cables, their characteristics and applications
- cable protection methods and their characteristics, applications and procedures used to provide protection
- underground and underwater systems, their characteristics and applications
- underground and underwater systems construction principles
- procedures used to splice and test underground and underwater cables

C-10.04 Terminates underground and underwater cable

- underground and underwater cable terminations
- underground and underwater cable protection methods and their applications
- underground and underwater systems, their characteristics and applications
- underground and underwater system construction principles
- procedures used to terminate and test underground and underwater cables

Street Lighting Systems

STRT 200

- demonstrate knowledge of street lighting systems, their characteristics and applications
- demonstrate knowledge of the procedures used to install, connect, troubleshoot, inspect, maintain, repair and test street lighting systems
- demonstrate knowledge of the procedures used to store and dispose of ballasts, capacitors and lamps

RSOS topics covered in this section of training:

D-11 Installs lighting systems

D-11.01 Installs street lights

- street lighting systems, their characteristics and applications
- procedures used to install, connect, troubleshoot and test street lighting systems, their components and accessories
- procedures used to store and dispose of ballasts, capacitors and lamps

D-11.02 Maintains street lights

- street lighting systems, their characteristics and applications

- procedures used to troubleshoot, inspect, maintain, repair and test street lighting systems, their components and accessories
- procedures used to store and dispose of ballasts, capacitors and lamps

Single-Phase Transformers and Switches

TRNS 200

- demonstrate knowledge of transformer operating principles
- demonstrate knowledge of transformer components, their applications and operation
- demonstrate knowledge of the procedures used to install and maintain transformers
- demonstrate knowledge of managing hazardous materials associated with transformers

RSOS topics covered in this section of training:

D-12 Installs voltage control equipment

D-12.01 Installs transformers

- transformer operating principles
- transformer components, their applications and operation
- procedures used to install transformers
- managing hazardous materials associated with transformers
- transformer banking
- self-contained three-phase transformers
- procedures used to install transformer banks
- transformer connection types, their applications and implications
- power transformer operating principles
- procedures used to install and parallel power transformers
- power transformer components, their applications and operation

D-12.04 Installs switches

- switches, their characteristics and applications
- operating principles of switches
- procedures used to install, operate, troubleshoot and inspect switches

Protection Equipment

PROC 200

- demonstrate knowledge of fuses, their characteristics and applications
- demonstrate knowledge of operating principles of fuses
- demonstrate knowledge of procedures used to install fuses
- demonstrate knowledge of lightning arrestors, their characteristics and applications
- demonstrate knowledge of operating principles of lightning arrestors
- demonstrate knowledge of procedures used to install lightning arrestors

RSOS topics covered in this section of training:

D-13 Installs protection equipment

D-13.03 Installs fuses

- fuses, their characteristics and applications
- operating principles of fuses
- procedures used to install fuses

D-13.04 Installs lightning arrestors

- lightning arrestors, their characteristics and applications
- operating principles of lightning arrestors
- procedures used to install lightning arrestors

Single Phase Metering

METR 200

- demonstrate knowledge of single-phase metering equipment, their applications and use
- demonstrate knowledge of the procedures used to install single-phase metering equipment

RSOS topics covered in this section of training:

D-14 Installs metering equipment

D-14.02 Installs secondary metering equipment

- secondary metering equipment, their components and applications
- secondary metering equipment operating procedures
- procedures used to remove and install secondary metering equipment

Distribution Systems

OSYS 200

- demonstrate knowledge of primary and secondary distribution lines, their applications and operation
- demonstrate knowledge of primary and secondary distribution line components, their applications and operation
- demonstrate knowledge of the procedures used to install, inspect, maintain, repair, troubleshoot and test distribution lines
- demonstrate knowledge of overhead systems, their characteristics and applications
- demonstrate knowledge of overhead system construction principles
- demonstrate knowledge of the procedures used to install, connect, inspect, maintain, repair, troubleshoot and test overhead system components and accessories
- demonstrate knowledge of underground systems, their characteristics and applications
- demonstrate knowledge of underground system construction principles
- demonstrate knowledge of the procedures used to install, splice and terminate conductors and cables
- demonstrate knowledge of the procedures used to install, connect, inspect maintain, troubleshoot, repair and test underground system components and accessories

RSOS topics covered in this section of training:

E-16 Operates distribution and transmission systems

E-16.02 Operates distribution systems

- overhead, underground and underwater distribution systems, their characteristics and applications
- electrical principles
- operating procedures for overhead, underground and underwater distribution systems, and their components and accessories

E-18 Repairs distribution systems

E-18.03 Repairs overhead distribution systems

- overhead distribution systems, their applications and operation
- overhead distribution system construction principles
- electrical principles
- requirements and procedures used in temporary grounding and bonding of overhead distribution systems
- procedures used to repair, test and operate overhead distribution system components and accessories

E-18.04 Repairs underground and underwater distribution systems

- underground and underwater systems, their characteristics and applications
- underground and underwater distribution system construction principles
- electrical principles

- procedures used to repair and test underground and underwater systems, and their components and accessories
- procedures used to fish, install, splice, cut, strip and terminate cables
- procedures used in temporary grounding and bonding of underground and underwater distribution systems

Distribution and Transmission Maintenance

MAIN 200

- the procedures used to maintain pole structures for distribution and transmission systems
- tree trimming and felling, its procedure and use
- tools and equipment used tree trimming and felling

RSOS topics covered in this section of training:

E-17 Maintains distribution and transmission systems

E-17.02 Maintains pole structures

- pole structures, their characteristics and applications, and maintenance
- pole structure components and accessories, their characteristics, applications and operation
- procedures used to inspect and maintain pole structures, their components and accessories
- overhead distribution system construction principles
- electrical principles

E-17.04 Maintains system components

- system components, their operation, characteristics and applications
- procedures used to inspect and maintain system components
- transformers and power transformers, their components, applications and operation
- managing hazardous materials associated with transformers
- electrical principles
- procedures used to mechanically protect and support cables
- single-phase and three-phase metering procedures
- procedures used to inspect and maintain protective devices
- procedures used to inspect, maintain and test line capacitors, their components and accessories

E-17.05 Trims trees

- tree trimming, equipment, their applications, maintenance and procedures for use
- techniques and procedures used to trim trees

Transmission Systems

TSYS 200

- transmission systems, their applications and operation
- transmission system components, their applications and operation
- the procedures used to install, inspect, maintain, repair, troubleshoot and test transmission systems

RSOS topics covered in this section of training:

E-19 Repairs transmission systems

E-19.03 Repairs overhead transmission systems

- repairing overhead transmission systems, their applications and operation
- overhead transmission system construction principles
- electrical principles
- procedures used in temporary grounding and bonding of overhead transmission systems
- procedures used to repair and test overhead transmission system components and accessories

E-19.04 Repairs underground and underwater transmission systems

- underground and underwater transmission systems, their characteristics and applications
- underground and underwater system construction principles

- electrical principles
- procedures used to repair and test underground and underwater system components
- procedures used to fish, install, splice, cut, strip and terminate cables
- procedures used in temporary grounding and bonding of underground and underwater transmission systems

Electrical Theory

THRY 200

- demonstrate knowledge of AC circuits, their characteristics and operation
- demonstrate knowledge of the procedures used to troubleshoot AC circuits
- demonstrate knowledge of the procedures used to analyze and measure AC circuit values
- demonstrate knowledge of series, parallel and combination circuits, their characteristics and operation
- demonstrate knowledge of single-phase 3-wire circuits, their characteristics and operation
- demonstrate knowledge of inductance and capacitance, their characteristics and associated principles
- demonstrate knowledge of how inductance and capacitance are encountered on the job

This section of training exceeds the minimum sequencing as set out by the Powerline Technician RSOS.

Level Two topics from the RSOS that are taught in context:

A-1 Safety Related Functions

A-2 Tools and Equipment

A-3 Organizes Work

For details regarding the In Context Topic, see page 40

3-Phase Transformers**TRNS 300***Wye, Delta and Combination Systems*

- explain the connections and characteristics of wye, delta and combination connected systems
- draw and label a wye, delta and combination connected line and load using vectors
- calculate line and coil values for current and voltage in wye, delta and combination systems
- calculate the voltage, current or kVA in a balanced three-phase combination circuit
- calculate the three-phase power factor and phase angle in a balanced three-phase combination circuit
- explain service and system voltage configurations and their line/coil values
- describe the guidelines for connecting a closed transformer bank
- select and connect three transformers to provide single-phase and three-phase service voltage
- describe the guidelines for connecting an open transformer bank
- select and connect two transformers to build an open transformer bank
- describe the guidelines for paralleling three-phase banks
- determine both coil and line current and coil and line voltage values
- describe the procedure to determine the load in kVA on an alive substation or three-phase transformer bank
- explain the rated three-phase capacity of a substation or transformer bank
- explain the fuse and riser sizing for a transformer bank

RSOS topics covered in this section of training:**D-12 Installs voltage control equipment**

D-12.01 Installs transformers (three-phase)

- transformer operating principles
- transformer components, their applications and operation
- procedures used to install transformers
- managing hazardous materials associated with transformers
- transformer banking
- self-contained three-phase transformers
- procedures used to install transformer banks
- transformer connection types, their applications and implications
- power transformer operating principles
- procedures used to install and parallel power transformers
- power transformer components, their applications and operation

Service Installation**SRVC 300**

- explain the five types of service classifications
- explain the regulations of the Electric Service Guide regarding customer interface locations
- determine the appropriate conductor for a service installation
- explain the clearance regulations for services
- explain the procedure to install or change a three-phase service

RSOS topics covered in this section of training:**D-12 Installs voltage control equipment**

D-12.01 Installs transformers (three-phase)

- transformer operating principles
- transformer components, their applications and operation
- procedures used to install transformers

- managing hazardous materials associated with transformers
- transformer banking
- self-contained three-phase transformers
- procedures used to install transformer banks
- transformer connection types, their applications and implications
- power transformer operating principles
- procedures used to install and parallel power transformers
- power transformer components, their applications and operation

Instrument Transformers

INST 300

- explain the construction and function of potential and current transformers
- explain the construction and function of single-phase instrument meters
- connect all components in a single-phase instrument connected service
- determine the billing multiplier, consumption and cost for an instrument connected single-phase service

RSOS topics covered in this section of training:

D-14 Installs metering equipment

D-14.01 Installs primary metering equipment

- primary metering equipment, their components, characteristics and applications
- primary metering equipment operating procedures
- procedures used to remove and install primary metering equipment

Voltage Control Equipment

VCEM 300

- procedures used to install and operate voltage regulation and control devices
- potential overvoltage situations
- different types of overvoltage protection
- functions and applications of a shield wire
- function of lightning arrestors
- voltage regulation, its application and use
- devices and components used in voltage regulation, their application and use

RSOS topics covered in this section of training:

D-12 Installs voltage control equipment

D-12.03 Installs voltage regulators

- install and operate voltage regulation and control devices
- voltage regulation and control devices, their characteristics and applications

Underground and Underwater Work

UWRK 300

- demonstrate knowledge of underground and underwater systems, their components, characteristics and applications
- demonstrate knowledge of underground and underwater system construction principles
- demonstrate knowledge of procedures used to install underground and underwater systems, and their components
- demonstrate knowledge of cable protection methods and their applications
- demonstrate knowledge of direct buried underground and underwater cable
- demonstrate knowledge of direct buried underground and underwater systems construction principles
- demonstrate knowledge of procedures used to install direct buried underground and underwater systems, and their components
- demonstrate knowledge of underground and underwater cable terminations

- demonstrate knowledge of procedures used to terminate and test underground and underwater cables
- explain the procedure to fuse and operate a three-phase underground transformer
- the procedure to fuse and operate a three-phase underground transformer
- explain the procedure used to install temporary grounds on single-phase underground apparatus
- explain the procedure used to install temporary grounds on a single- phase underground cable

RSOS topics covered in this section of training:

C-10 Installs underground and underwater cable

C-10.01 Installs conduit and cable

- underground and underwater systems, their components, characteristics and applications
- cable protection methods and their applications
- underground and underwater systems construction principles
- procedures used to install underground and underwater systems, and their components

C-10.02 Place direct buried cable

- direct buried underground and underwater cable
- cable protection methods and their applications
- direct buried underground and underwater systems construction principles
- procedures used to install direct buried underground and underwater systems, and their components

C-10.03 Splices underground and underwater cable

- underground and underwater splices for cables, their characteristics and applications
- cable protection methods and their characteristics, applications and procedures used to provide protection
- underground and underwater systems, their characteristics and applications
- underground and underwater systems construction principles
- splice and test underground and underwater cables

C-10.04 Terminates underground and underwater cable

- underground and underwater cable terminations
- underground and underwater cable protection methods and their applications
- underground and underwater systems, their characteristics and applications
- underground and underwater system construction principles
- procedures used to terminate and test underground and underwater cables

Load Checks

LOAD 300

- demonstrate knowledge of distribution and transmission systems, their characteristics and applications
- demonstrate knowledge of procedures used to inspect, maintain and operate overhead, underground and underwater distribution and transmission systems
- demonstrate knowledge of pole structures, their characteristics and applications, and maintenance
- demonstrate knowledge of procedures used to inspect and maintain system components

RSOS topics covered in this section of training:

E-16 Operates distribution and transmission systems

E-16.01 Operates transmission systems

- overhead, underground and underwater transmission systems, their characteristics and applications
- electrical principles
- procedures used to operate overhead, underground and underwater transmission systems

E-17 Maintains distribution and transmission systems

E-17.01 Inspects distribution and transmission systems

- distribution and transmission systems, their characteristics and applications
- electrical principles
- procedures used to inspect, maintain and operate overhead, underground and underwater distribution and transmission systems

E-17.02 Maintains pole structures

- pole structures, their characteristics and applications, and maintenance
- pole structure components and accessories, their characteristics, applications and operation
- inspect and maintain pole structures, their components and accessories
- overhead distribution system construction principles
- electrical principles

E-17.04 Maintains system components

- system components, their operation, characteristics and applications
- procedures used to inspect and maintain system components
- transformers and power transformers, their components, applications and operation
- electrical principles
- managing hazardous materials associated with transformers
- methods of cable protection and their applications
- procedures used to mechanically protect and support cables
- single-phase and three-phase metering procedures
- procedures used to inspect and maintain protective devices
- procedures used to inspect, maintain and test line capacitors, their components and accessories

Reclosers, Sectionalizers and Fuses

PROC 300

- demonstrate knowledge of procedures used to install different types of reclosers
- demonstrate knowledge of coordinated system protection
- demonstrate knowledge of operating principles of sectionalizers
- demonstrate knowledge of procedures used to install sectionalizers
- demonstrate knowledge of the operating principles of different types of reclosers, their application and use
- demonstrate knowledge of the function and installation of both fuses and thermal breakers
- demonstrate knowledge of procedures used to install reclosers

RSOS topics covered in this section of training:

D-13 Installs protection equipment

D-13.01 Installs reclosers

- reclosers, their characteristics and applications
- operating principles of reclosers
- procedures used to install reclosers

D-13.02 Installs sectionalizers

- sectionalizers, their characteristics and applications
- operating principles of sectionalizers
- procedures used to install sectionalizers

D-13.03 Installs fuses

- fuses, their characteristics and applications
- operating principles of fuses
- procedures used to install fuses



- demonstrate knowledge of overhead transmission systems, their characteristics and applications
- demonstrate knowledge of procedures to troubleshoot and test overhead transmission systems, and their components and accessories
- demonstrate knowledge of procedures used in temporary grounding and bonding of overhead transmission systems
- demonstrate knowledge of underground and underwater transmission systems, and their characteristics and applications

RSOS topics covered in this section of training:**E-18 Repairs distribution systems****E-18.01 Troubleshoots overhead distribution systems**

- overhead distribution systems, their applications and operation
- distribution system construction principles
- electrical principles
- procedures to troubleshoot and test overhead distribution systems, and their components and accessories
- procedures used in temporary grounding and bonding of overhead distribution systems

E-18.02 Troubleshoots underground and underwater distribution systems

- underground and underwater distribution systems, their characteristics, applications and operating procedures
- underground and underwater distribution system construction principles
- electrical principles
- troubleshoot and test underground and underwater distribution systems, and their components and accessories
- procedures used to fish, install, splice, cut, strip and terminate cables
- temporary grounding and bonding of underground and underwater distribution systems

E-18.03 Repairs overhead distribution systems

- overhead distribution systems, their applications and operation
- overhead distribution system construction principles
- electrical principles
- requirements and procedures used in temporary grounding and bonding of overhead distribution systems
- procedures used to repair, test and operate overhead distribution system components and accessories

E-18.04 Repairs underground and underwater distribution systems

- underground and underwater systems, their characteristics and applications
- underground and underwater distribution system construction principles
- electrical principles
- procedures used to repair and test underground and underwater systems, and their components and accessories
- procedures used to fish, install, splice, cut, strip and terminate cables
- procedures used in temporary grounding and bonding of underground and underwater distribution systems

E-19 Repairs transmission systems**E-19.01 Troubleshoots overhead transmission systems**

- overhead transmission systems, their characteristics and applications
- overhead transmission system construction principles
- electrical principles
- troubleshoot and test overhead transmission systems, and their components and accessories
- procedures used in temporary grounding and bonding of overhead transmission systems

- E-19.02 Troubleshoots underground and underwater transmission systems
 - underground and underwater transmission systems, and their characteristics and applications
 - underground and underwater transmission system construction principles
 - electrical principles
 - troubleshoot and test underground and underwater transmission systems, their components and accessories
 - fish, install, splice, cut, strip and terminate cables
 - procedures used in temporary grounding and bonding of underground and underwater transmission systems
- E-19.03 Repairs overhead transmission systems
 - repairing overhead transmission systems, their applications and operation
 - overhead transmission system construction principles
 - electrical principles
 - procedures used in temporary grounding and bonding of overhead transmission systems
 - procedures used to repair and test overhead transmission system components and accessories
- E-19.04 Repairs underground and underwater transmission systems
 - underground and underwater transmission systems, their characteristics and applications
 - underground and underwater system construction principles
 - electrical principles
 - repair and test underground and underwater system components
 - fish, install, splice, cut, strip and terminate cables
 - procedures used in temporary grounding and bonding of underground and underwater transmission systems

Conductors and Cables (Distribution Stringing)

OHCC 300

- demonstrate knowledge of procedures used to string distribution lines
- demonstrate knowledge of distribution and transmission lines, their components, applications and operation
- demonstrate knowledge of splices and connections for overhead conductors and cables
- demonstrate knowledge of conductor and cable protection methods for splices and connections

RSOS topics covered in this section of training:

C-9 Installs overhead conductors and cables

- C-9.01 Strings overhead conductors and cables (*Distribution tension method*)
 - overhead conductors and cables, their characteristics and applications
 - conductor and cable protection methods, procedures and their applications
 - distribution lines, their applications and operation
 - procedures used to string distribution lines
 - transmission lines, their applications and operation
 - electrical principles
 - procedures used in temporary grounding and bonding of transmission and distribution lines
- C-9.02 Sags overhead conductors and cables
 - effects of sagging on overhead conductors and cables
 - procedures used to sag overhead conductors and cables
- C-9.03 Ties in overhead conductors and cables
 - overhead conductor and cable tie-ins and components
 - distribution and transmission lines, their components, applications and operation
 - conductor and cable protection methods used for tie-ins
- C-9.04 Installs splices and connections to overhead conductors and cables
 - splices and connections for overhead conductors and cables
 - conductor and cable protection methods for splices and connections

- procedures used to splice conductors and cables

Hotstick work

HWRK 300

- demonstrate knowledge of principles of live-line work using FRP tools (hot sticks)
- demonstrate knowledge of principles of live-line work using rubber gloves
- demonstrate knowledge of the procedures to identify and maintain FRP tools (hot sticks) and their associated tools
- demonstrate knowledge of the procedures to identify the FRP tools (hot sticks) required to replace system components
- demonstrate knowledge of procedures to use cover-up
- demonstrate knowledge of the procedures used to calculate the weight and dead-end tension of a conductor

RSOS topics covered in this section of training:

A-5 Uses live-line methods

A-5.01 Uses cover-up

- principles of live-line work using cover-up
- procedures to use cover-up

A-5.02 Uses rubber gloves

- principles of live-line work using rubber gloves
- procedures used to perform live-line work using rubber gloves

A-5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)

- principles of live-line work using FRP tools (hot sticks)
- procedures to use FRP tools (hot sticks)

Switching Devices

SWTC 300

- demonstrate knowledge of the function, types and installation of cutouts
- demonstrate knowledge of the procedure used to operate a cutout
- demonstrate knowledge of the function and operation of primary single-phase and three-phase switching devices
- demonstrate knowledge of the function and operation of secondary switching devices

RSOS topics covered in this section of training:

D-12 Installs voltage control equipment

D-12.04 Installs switches

- switches, their characteristics and applications
- operating principles of switches
- procedures used to install, operate, troubleshoot and inspect switches

Level Three topics from the RSOS that are taught in context:

A-1 Safety Related Functions

A-2 Tools and Equipment

A-3 Organizes Work

For details regarding the In Context Topic, see page 40

25kV Rubber Glove**RGBL 400**

- demonstrate knowledge of the different classes of rubber gloves and how to select them according to voltage
- demonstrate knowledge of the procedures used to inspect and clean conductor supports and hotsticks
- demonstrate knowledge of the limits of approach on a 25kV system
- demonstrate knowledge of safe work procedures with regard to rubber glove use
- demonstrate knowledge of the conditions required for safe removal of rubber gloves

RSOS topics covered in this section of training:**A-5 Uses live-line methods**

A-5.01 Uses cover-up

- principles of live-line work using cover-up
- procedures to use cover-up

A-5.02 Uses rubber gloves

- principles of live-line work using rubber gloves
- procedures used to perform live-line work using rubber gloves

A-5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)

- principles of live-line work using FRP tools (hot sticks)
- procedures to use FRP tools (hot sticks)

Mentoring**MENT 400**

- demonstrate knowledge of strategies for teaching workplace skills

RSOS topics covered in this section of training:**A-6 Uses communication and mentoring techniques**

A-6.02 Uses mentoring techniques

- strategies for learning skills in the workplace
- strategies for teaching workplace skills

Conductors and Cables (Transmission Stringing)**OHCC 400**

- demonstrate knowledge of transmission lines, their applications and operation
- demonstrate knowledge of the procedures used to sag overhead conductors and cables
- demonstrate knowledge of distribution and transmission lines, their components, applications and operation

RSOS topics covered in this section of training:**C-9 Installs overhead conductors and cables**

C-9.01 Strings overhead conductors and cables

- overhead conductors and cables, their characteristics and applications
- conductor and cable protection methods, procedures and their applications
- distribution lines, their applications and operation
- procedures used to string distribution lines
- transmission lines, their applications and operation
- electrical principles
- procedures used in temporary grounding and bonding of transmission and distribution lines

C-9.02 Sags overhead conductors and cables

- effects of sagging on overhead conductors and cables
 - procedures used to sag overhead conductors and cables
- C-9.03 Ties-in overhead conductors and cables
- overhead conductor and cable tie-ins and components
 - conductor and cable protection methods used for tie-ins
 - distribution and transmission lines, their components, applications and operation
- C-9.04 Installs splices and connections to overhead conductors and cables
- splices and connections for overhead conductors and cables
 - conductor and cable protection methods for splices and connections
 - procedures used to splice conductors and cables

Capacitors, Regulators and Reactors

CRAR 400

- demonstrate knowledge of capacitors, their characteristics and applications
- demonstrate knowledge of the procedures used to install, operate, protect, inspect and test capacitors
- demonstrate knowledge of voltage regulation and control devices, their characteristics and applications
- demonstrate knowledge of the procedures used to install and operate voltage regulation and control devices
- demonstrate knowledge of reactors, their characteristics and applications

RSOS topics covered in this section of training:

D-12 Installs voltage control equipment

D-12.02 Installs capacitors

- capacitors, their characteristics and applications
- operating principles of capacitors
- procedures used to install, operate, protect, inspect and test capacitors

D-12.03 Installs voltage regulators

- voltage regulation and control devices, their characteristics and applications
- procedures used to install and operate voltage regulation and control devices

D-12.05 Installs reactors

- reactors, their characteristics and applications
- operating principles of reactors
- procedures used to install, operate, troubleshoot and inspect reactors

Introduction to Substations

SUBS 400

- demonstrate knowledge of hazards and describe safe work practices pertaining to substations
- demonstrate knowledge of components and accessories used in substations
- demonstrate knowledge of primary protective devices used in a substation
- demonstrate knowledge of substation, switching station and terminal components and describe their operation
- demonstrate knowledge of different types of substations, switching stations and terminals and describe their characteristics and applications
- demonstrate knowledge of the procedures used to inspect and maintain substations, and their components and accessories

RSOS topics covered in this section of training:

D-15 Installs communication devices

D-15.01 Installs cellular antennas

- cellular antenna operating principles
- procedures used to install cellular antennas

E-16 Operates distribution and transmission systems

E-16.01 Operates transmission systems

- overhead, underground and underwater transmission systems, their characteristics and applications
- electrical principles
- procedures used to operate overhead, underground and underwater transmission systems

E-16.02 Operates distribution systems

- overhead, underground and underwater distribution systems, their characteristics and applications
- electrical principles
- operating procedures for overhead, underground and underwater distribution systems, and their components and accessories

E-16.03 Performs station switching

- substations, switching stations and terminals, their characteristics and applications
- electrical principles
- procedures used to inspect and maintain substations, switching stations and terminals

Line Patrol

PRTL 400

- demonstrate knowledge of the tools and equipment pertaining to the maintenance of system components and describe their applications and procedures for use
- demonstrate knowledge of procedures used to inspect and maintain system components
- demonstrate knowledge of electrical principles
- demonstrate knowledge of hazards and describe safe work practices pertaining to maintenance of system components during line patrol
- demonstrate knowledge of terminology and measurements associated with line patrol
- demonstrate knowledge of the procedures used to properly diagnose and remove a fault during line patrol
- demonstrate knowledge of common causes for faults and outages
- demonstrate knowledge of transformers and power transformers, their components, applications and operation
- identify types of system components and describe their characteristics, applications and accessories

RSOS topics covered in this section of training:

E-17 Maintains distribution and transmission systems

E-17.01 Inspects distribution and transmission systems

- distribution and transmission systems, their characteristics and applications
- electrical principles
- procedures used to inspect, maintain and operate overhead, underground and underwater distribution and transmission systems

E-17.02 Maintains pole structures

- pole structures, their characteristics and applications, and maintenance
- pole structure components and accessories, their characteristics, applications and operation
- procedures used to inspect and maintain pole structures, their components and accessories
- overhead distribution system construction principles
- electrical principles

E-17.03 Maintains steel lattice structures

- steel lattice structures, their characteristics and applications
- electrical principles
- procedures used to inspect and maintain steel lattice structures, their components and accessories

E-17.04 Maintains system components

- system components, their operation, characteristics and applications

- procedures used to inspect and maintain system components
- transformers and power transformers, their components, applications and operation
- electrical principles
- managing hazardous materials associated with transformers
- methods of cable protection and their applications
- procedures used to mechanically protect and support cables
- single-phase and three-phase metering procedures
- procedures used to inspect and maintain protective devices
- procedures used to inspect, maintain and test line capacitors, their components and accessories

E-18 Repairs distribution systems

E-18.01 Troubleshoots overhead distribution systems

- overhead distribution systems, their applications and operation
- overhead distribution system construction principles
- electrical principles
- procedures to troubleshoot and test overhead distribution systems, and their components and accessories
- procedures used in temporary grounding and bonding of overhead distribution systems

E-18.02 Troubleshoots underground and underwater distribution systems

- underground and underwater distribution systems, their characteristics, applications and operating procedures
- underground and underwater distribution system construction principles
- electrical principles
- procedures used to troubleshoot and test underground and underwater distribution systems, and their components and accessories
- procedures used to fish, install, splice, cut, strip and terminate cables
- procedures used in temporary grounding and bonding of underground and underwater distribution systems

E-18.03 Repairs overhead distribution systems

- overhead distribution systems, their applications and operation
- overhead distribution system construction principles
- electrical principles
- requirements and procedures used in temporary grounding and bonding of overhead distribution systems
- procedures used to repair, test and operate overhead distribution system components and accessories

E-18.04 Repairs underground and underwater distribution systems

- underground and underwater systems, their characteristics and applications
- underground and underwater distribution system construction principles
- electrical principles
- procedures used to repair and test underground and underwater systems, and their components and accessories
- procedures used to fish, install, splice, cut, strip and terminate cables
- procedures used in temporary grounding and bonding of underground and underwater distribution systems

Transmission System Repair

TSYS 400

- demonstrate knowledge of procedures used to troubleshoot and test underground and underwater transmission systems, their components and accessories
- demonstrate knowledge of the procedures used to repair and test overhead transmission system components and accessories

RSOS topics covered in this section of training:

E-19 Repairs transmission systems

E-19.01 Troubleshoots overhead transmission systems

- overhead transmission systems, their characteristics and applications
- electrical principles
- overhead transmission system construction principles
- procedures to troubleshoot and test overhead transmission systems, and their components and accessories
- procedures used in temporary grounding and bonding of overhead transmission systems

E-19.02 Troubleshoots underground and underwater transmission systems

- underground and underwater transmission systems, and their characteristics and applications
- underground and underwater transmission system construction principles
- electrical principles
- procedures used to troubleshoot and test underground and underwater transmission systems, their components and accessories
- procedures used to fish, install, splice, cut, strip and terminate cables
- procedures used in temporary grounding and bonding of underground and underwater transmission systems

E-19.03 Repairs overhead transmission systems

- repairing overhead transmission systems, their applications and operation
- overhead transmission system construction principles
- electrical principles
- procedures used in temporary grounding and bonding of overhead transmission systems
- procedures used to repair and test overhead transmission system components and accessories

E-19.04 Repairs underground and underwater transmission systems

- underground and underwater transmission systems, their characteristics and applications
- underground and underwater system construction principles
- electrical principles
- procedures used to repair and test underground and underwater system components
- procedures used to fish, install, splice, cut, strip and terminate cables
- procedures used in temporary grounding and bonding of underground and underwater transmission systems

Cellular Towers

CELL 400

- demonstrate knowledge of cellular antenna operating principles

RSOS topics covered in this section of training:

D-15 Installs communication devices

D-15.01 Installs cellular antennas

- cellular antenna operating principles
- procedures used to install cellular antennas

System Protection Apparatus

SYSP 400

- demonstrate knowledge of 25kV GOPT switches, their application and use
- demonstrate knowledge of the procedures used to operate a system with reclosers and an interlock
- demonstrate safe work practices pertaining to recloser use
- demonstrate knowledge of the different types of distribution reclosers, their applications and use
- demonstrate knowledge of the various controllers used with distribution reclosers

- demonstrate knowledge of recloser applications in relation to line protection coordination
- demonstrate knowledge of sectionalizer applications in relation to line protection coordination
- demonstrate knowledge of fuse application in relation to line protection coordination

RSOS topics covered in this section of training:

D-13 Installs protection equipment

D-13.01 Installs reclosers

- reclosers, their characteristics and applications
- operating principles of reclosers
- procedures used to install reclosers

D-13.02 Installs sectionalizers

- sectionalizers, their characteristics and applications
- operating principles of sectionalizers
- procedures used to install sectionalizers

D-13.03 Installs fuses

- fuses, their characteristics and applications
- operating principles of fuses
- procedures used to install fuses

Level Four topics from the RSOS that are taught in context:

A-1 Safety Related Functions

A-2 Tools and Equipment

A-3 Organizes Work

For details regarding the In Context Topic, see page 40

In-Context Topics

In-context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in-context topics are accomplished in other topics in that level.

A-1 Safety-related functions

A-1.01 Uses personal protective equipment (PPE) and safety equipment

- safety equipment, their applications, maintenance and procedures for use
- safe work practices
- regulatory requirements pertaining to safety

A-1.02 Controls powerline hazards

- safety equipment and PPE, their applications, maintenance and procedures for use
- safe work practices
- live-line work and its applications
- regulatory requirements pertaining to safety
- principles of live-line work
- procedures used to perform live-line work

A-1.03 Controls environmental hazards

- safety equipment and PPE, their applications, maintenance and procedures for use
- safe work practices
- regulatory requirements pertaining to environmental hazards

A-1.04 Performs lock-out and tag-out procedures

- lock-out and tag-out procedures and legislation
- safety checks of equipment
- procedures for checking for potential

A-1.05 Performs temporary grounding and bonding procedures

- principles of temporary grounding and bonding procedures
- procedures used to perform temporary grounding and bonding

A-2 Tools and equipment

A-2.01 Uses hand, power and powder-actuated tools and equipment

- tools and equipment, their applications and procedures for use
- procedures used to inspect and maintain tools and equipment

A-2.02 Uses electrical measuring and testing equipment

- electrical measuring and testing equipment, their components, applications, maintenance and procedures for use
- procedures to use electrical measuring and testing equipment and their components

A-2.03 Uses rigging, hoisting and lifting equipment

- rigging, hoisting and lifting equipment, their applications, limitations and procedures for use
- rigging, hoisting and lifting techniques

A-3 Organizes work

A-3.01 Interprets plans, drawings and specifications

- drawings, schematics and specifications and their applications
- interpreting and extracting information from drawings, schematics and specifications

A-3.02 Prepares worksite

- safe work practices
- regulatory requirements pertaining to safety
- procedures used to prepare the worksite

A-3.03 Plans job tasks and procedures

- procedures used to plan and organize job tasks

APPENDIX A: POST HARMONIZATION TRAINING PROFILE CHART

This chart which outlines the finalized model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

Implementation for harmonization will take place progressively. Level one was implemented in 2020/20221, level two 2021/2022, level three 2022/2023, and level four in 2023/2024.

SATCC Level One	Transcript Code	Hours	Pan-Canadian Harmonized Level One
Safety	SFTY 100		Safety-Related Functions
Temporary Bonding and Grounding	BOND 100		
Tools and Equipment	TOOL 100		Tools and Equipment
Electrical Measuring	EMSR 100		
Rigging, Hoisting Lifting	RIGG 100		
Job Planning and Organization	JOBP 100		Organizes Work
			Communication
Pole Climbing, Decay and Decay Calculations	POLE 100		Work Area Access
Work Area Access	ACES 100		
Live Line Methods (Introduction)	LLMI 100		Live Line Methods
Overhead Distribution Structures (Introduction)	OHDS 100		Pole Structures
Steel Lattice Structure	SLAT 100		Steel Lattice Structures
Overhead Conductors and Cables	OHCC 100		Overhead Conductors and Cables
Overhead Distributions Systems (Introduction)	OSYS 100		Voltage Control Equipment
			Communication Devices
Trade Mathematics (Exceed)	TMET 100		
		127	

SATCC Level Two	Transcript Code	Hours	Pan-Canadian Harmonized Level Two
<i>*in-Context</i>	--		Safety-related functions (In-Context)
			Organizes Work (In-Context)
			Tools and Equipment (In-Context)
Live Line Methods (Intermediate)	LLMI 200		Live Line Methods
Conductors and Cables (Tension Stringing)	OHCC 200		Overhead Conductors and Cables
Underground Distribution Systems	USYS 200		Underground and Underwater Cable (Secondary)
Street Lighting Systems	STRT 200		Lighting Systems
Single-Phase Transformers and Switches	TRNS 200		Voltage Control Equipment
Protection Equipment	PROC 200		Protection Equipment
Single-Phase Metering	METR 200		Metering Equipment
Distribution Systems	OSYS 200		Distribution and Transmission Systems (Operation)
			Distribution Systems (Repair)
Distribution and Transmission Maintenance	MAIN 200		Distribution and Transmission Systems (Maintenance)
Transmission Systems	TSYS 200		Transmission Systems (Repair)
Electrical Theory (Exceed)			
		112	

SATCC Level Three	Transcript Code	Hours	Pan-Canadian Harmonized Level Three
<i>*in-Context</i>	--		Safety-related functions (In-Context)
			Organizes Work (In-Context)
			Tools and Equipment (In-Context)
Hotstick Work	HWRK 300		Live Line Methods
Conductors and Cables (Distribution Stringing)	OHCC 300		Overhead Conductors and Cables
Underground and Underwater Work	UWRK 300		Underground and Underwater Cable (Primary)
Three-Phase Transformers	TRNS 300		Voltage Control Equipment
Voltage Control Equipment	VCEM 300		
Switching Devices	SWTC 300		
Reclosers, Sectionalizers and Fuses	PROC 300		Protection Equipment
Instrument Transformers	INST 300		Metering Equipment
Service Installations	SRVC 300		Distribution and Transmission Systems (Operation)
			Distribution Systems (Troubleshoot and Repair)
Load Checks	LOAD 300		Distribution and Transmission Systems (Maintenance)
		112	

SATCC Level Four	Transcript Code	Hours	Pan-Canadian Harmonized Level Four
<i>*in-Context</i>	--		Safety-related functions (In-Context)
			Organizes Work (In-Context)
			Tools and Equipment (In-Context)
Mentoring	MENT 400		Mentoring
25kV Rubber Glove	RBGL 400		Live Line Methods
Conductors and Cables (Transmission Stringing)	OHCC 400		Overhead Conductors and Cables
Capacitors, Regulators and Reactors	CRAR 400		Voltage Control Equipment
System Protection Apparatus	PROC 400		Protection Equipment
Introduction to Substations	SUBS 400		Distribution and Transmission Systems (Operation)
			Distribution and Transmission Systems (Troubleshoot and Repair)
Line Patrol	PRTL 400		Distribution and Transmission Systems (Maintenance)
Transmission System Repair	TSYS 400		Transmission Systems (Troubleshoot and Repair)
Cellular Towers	CELL 400		Communication Equipment
			75

Exceed Topics

Throughout this guide to course content there are topics which exceed the minimum scope of work as set out in the Powerline RSOS. Industry in Saskatchewan has deemed certain topics to fall within the scope of work of the Powerline trade in Saskatchewan and therefore require technical training to cover these topics.