Powerline Technician

Guide to Course Content

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Recognition:
To promote transparency and consistency, portions of this document have been adapted from the 2019 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:

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. The Task Matrix is broken down into the following:

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.

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.

TRAINING REQUIREMENTS FOR THE POWERLINE TRADE

To graduate from each level of the apprenticeship program, an apprentice must successfully complete the required technical training and compile enough on-the-job experience to total at least 1800 hours each year. Total trade time required is 7200 hours and at least 4 years in the trade.

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

Level One:	4 weeks equivalent (online and In-class) 12 Days in the classroom
Level Two:	3 weeks equivalent (online and in-class) 10 Days in the classroom
Level Three:	3 weeks equivalent (online and in-class) 12 Days in the classroom
Level Four:	2 weeks equivalent (online and in-class) 10 Days in the classroom

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.

Designated Trade Name	**Math Credit** at the Indicated Grade Level❶	**Science Credit** at Grade Level
Powerline Technician	Grade 11	Grade 10

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.).

*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.

For information about high school curriculum, including Math and Science course names, please see: http://www.curriculum.gov.sk.ca/#

Individuals not meeting the entrance requirements will be subject to an assessment and any required training

POWERLINE TECHNICIAN TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2019 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.

A - Performs Common 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 structures 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.

Sub-tasks listed are the minimum to be covered in a topic. Related sub-tasks not listed may be used as a reference and taught "in context" in other topics.

Level One — 12 Days In-Class (4 weeks equivalent (including online)) — 127 hours

Safety

- safety equipment, their applications, maintenance and procedures for use
- safe work practices
- regulatory requirements pertaining to safety
- 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
A-1.02 Controls powerline hazards
A-1.03 Controls environmental hazards
A-1.04 Performs lock-out and tag-out procedures

Temporary Bonding and Grounding

- grounding and bonding methods and equipment
- 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

Tools and Equipment

- 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

Electrical Measuring

- power and energy, their characteristics and associated principles
- units of measure and symbols relating to power and energy
- 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

Rigging, Hoisting and Lifting

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

Job Planning and Organization

- drawings, schematics and specifications and their applications
- interpreting and extracting information from drawings, basic schematics and specifications
- grid map reading
- procedures used to find a land location on a map
- traffic control equipment, their applications, maintenance and procedures for use
- traffic control techniques and procedures
- job tasks, procedures, and the order in which they are completed
- 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
A-3.02 Prepares worksite
A-3.03 Plans job tasks and procedures

A-6 Communication
A-6.01 Uses communication techniques

Pole Climbing, Decay and Decay Calculations

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

Work Area Access

- ladders, their applications, limitations and procedures for use
- aerial devices, their applications and operation
- basic hydraulic principles
- hydraulic equipment components, their applications and operation
- 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
A-4.03 Uses on and off-road equipment

Live Line Methods (Introduction)

- principles of live line work
- procedures used to perform live line work
- rubber gloves, their applications, maintenance and use
- 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
A-5.02 Uses rubber gloves
A-5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)

Overhead Distribution Structures (Introduction)

- overhead system construction principles
- different poles and the procedures to properly setting a pole
- 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
B-7.02 Sets pole structures
B-7.03 Installs pole structure guys and anchors

Steel Lattice Structures

- steel lattice structures, their applications and use
- 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
B-8.02 Erects steel lattice structures
B-8.03 Installs steel lattice structure guy wires and anchors

Overhead Conductors and Cables

- effects of sagging on conductors
- procedures used to sag conductors
- conductors and cables and their associated components
- methods of cable protection and their applications
- 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)*
C-9.02 Sags overhead conductors and cables
C-9.03 Ties-in overhead conductors and cables
C-9.04 Installs splices and connections to overhead conductors and cables

Overhead Distribution Systems (Introduction)

- transformer operating principles
- transformer components, their applications and operation
- procedures used to install and maintain transformers
- managing hazardous materials associated with transformers
- procedures used to install, connect, inspect, maintain, repair, troubleshoot and test overhead system components and accessories
- 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)*
D-12.04 Installs switches

D-15 Communication Devices
D-15.02 Transfers communication lines

Trade Mathematics and Electrical Theory

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

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

Live Line Methods

- principles of live line work
- procedures used to perform live line work
- insulating sticks, their applications, maintenance and use
- principles of live-line work using cover-up
- 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
A-5.02 Uses rubber gloves
A-5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)

Overhead Conductors and Cables (Tension Stringing)

- effects of sagging on conductors
- procedures used to sag conductors
- overhead conductors and cables, their characteristics and applications
- conductor and cable protection methods, procedures and their applications
- 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
C-9.02 Sags overhead conductors and cables
C-9.03 Ties-in overhead conductors and cables
C-9.04 Installs splices and connections to overhead conductors and cables

Underground Distribution Systems

- underground systems, their characteristics and applications
- underground and underwater system construction principles
- procedures used to install, splice and terminate underground and underwater conductors and cables
- 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
C-10.02 Places direct buried cable
C-10.03 Splices underground and underwater cable
C-10.04 Terminates underground and underwater cable

Street Lighting Systems

- street lighting systems, their characteristics and applications
- procedures used to install, connect, troubleshoot, inspect, maintain, repair and test street lighting systems
- 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
D-11.02 Maintains street lights

Single-Phase Transformers and Switches

- transformer operating principles
- transformer components, their applications and operation
- procedures used to install and maintain transformers
- 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
D-12.04 Installs switches

Protection Equipment

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

RSOS topics covered in this section of training:

D-13 Installs protection equipment
D-13.03 Installs fuses
D-13.04 Installs lightning arrestors

Single Phase Metering

- single-phase metering equipment, their applications and use
- 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

Distribution Systems

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

E-18 Repairs distribution systems
E-18.03 Repairs overhead distribution systems
E-18.04 Repairs underground and underwater distribution systems

Distribution and Transmission Maintenance

- procedures used to maintain pole structures for distribution and transmission systems
- tree trimming and felling, its procedures and use
- tools and equipment used during 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
E-17.04 Maintains system components
E-17.05 Trims trees

Transmission Systems

- transmission systems, their applications and operation
- transmission system components, their applications and operation
- 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
E-19.04 Repairs underground and underwater transmission systems

Electrical Theory

- AC circuits, their characteristics and operation
- procedures used to troubleshoot AC circuits
- procedures used to analyze and measure AC circuit values
- series, parallel and combination circuits, their characteristics and operation
- single-phase 3-wire circuits, their characteristics and operation
- inductance and capacitance, their characteristics and associated principles
- 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 26

3-Phase Transformers *(Wye, Delta and Combination Systems)*

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

Service Installation

- five types of service classifications
- regulations of the Electric Service Guide regarding customer interface locations
- conductor for a service installation
- clearance regulations for services
- 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)

Instrument Transformers

- construction and function of potential and current transformers
- construction and function of single-phase instrument meters
- components in a single-phase instrument connected service
- 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

Voltage Control Equipment

- 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

Underground and Underwater Work

- underground and underwater systems, their components, characteristics and applications
- underground and underwater system construction principles
- cable protection methods and their applications
- direct buried underground and underwater cable types
- procedures used to install direct buried underground and underwater systems, and their components
- procedures used to terminate and test underground and underwater cables
- procedure to fuse and operate a three-phase underground transformer
- procedure used to install temporary grounds on single-phase underground apparatus
- 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
C-10.02 Places direct buried cable
C-10.03 Splices underground and underwater cable
C-10.04 Terminates underground and underwater cable

Load Checks

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

E-17 Maintains distribution and transmission systems
E-17.01 Inspects distribution and transmission systems
E-17.02 Maintains pole structures
E-17.04 Maintains system components

Reclosers, Sectionalizers and Fuses

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

RSOS topics covered in this section of training:

D-13 Installs protection equipment
D-13.01 Installs reclosers
D-13.02 Installs sectionalizers
D-13.03 Installs fuses

Transmission System Troubleshooting

- overhead transmission systems, their characteristics and applications
- procedures to troubleshoot and test overhead transmission systems, and their components and accessories
- procedures used in temporary grounding and bonding of overhead transmission systems
- 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
E-18.02 Troubleshoots underground and underwater distribution systems
E-18.03 Repairs overhead distribution systems
E-18.04 Repairs underground and underwater distribution systems

E-19 Repairs transmission systems
E-19.01 Troubleshoots overhead transmission systems
E-19.02 Troubleshoots underground and underwater transmission systems
E-19.03 Repairs overhead transmission systems
E-19.04 Repairs underground and underwater transmission systems

Conductors and Cables (Distribution Stringing)

- procedures used to string distribution lines
- distribution and transmission lines, their components, applications and operation
- splices and connections for overhead conductors and cables
- 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)*
C-9.02 Sags overhead conductors and cables
C-9.03 Ties-in overhead conductors and cables
C-9.04 Installs splices and connections to overhead conductors and cables

Hotstick work

- principles of live-line work using FRP tools (hot sticks)
- principles of live-line work using rubber gloves
- procedures to identify and maintain FRP tools (hot sticks) and their associated tools
- procedures to identify the FRP tools (hot sticks) required to replace system components
- procedures to use cover-up
- 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
A-5.02 Uses rubber gloves
A-5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)

Switching Devices

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

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 26

25kV Rubber Glove

- different classes of rubber gloves and how to select them according to voltage
- procedures used to inspect and clean conductor supports and hotsticks
- limits of approach on a 25kV system
- safe work procedures with regard to rubber glove use
- 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
A-5.02 Uses rubber gloves
A-5.03 Uses bare-hand methods (Not Common Core)
A-5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)

Mentoring

- 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

Conductors and Cables (Transmission Stringing)

- transmission lines, their applications and operation
- procedures used to sag overhead conductors and cables
- 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
C-9.02 Sags overhead conductors and cables
C-9.03 Ties-in overhead conductors and cables
C-9.04 Installs splices and connections to overhead conductors and cables

Capacitors, Regulators and Reactors

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

RSOS topics covered in this section of training:

D-12 Installs voltage control equipment
D-12.02 Installs capacitors
D-12.03 Installs voltage regulators
D-12.05 Installs reactors

Introduction to Substations

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

E-16 Operates distribution and transmission systems
E-16.01 Operates transmission systems
E-16.02 Operates distribution systems
E-16.03 Performs station switching

Line Patrol

- tools and equipment pertaining to the maintenance of system components and describe their applications and procedures for use
- procedures used to inspect and maintain system components
- electrical principles, hazards and describe safe work practices pertaining to maintenance of system components during line patrol
- terminology and measurements associated with line patrol
- procedures used to properly diagnose and remove a fault during line patrol
- common causes for faults and outages
- transformers and power transformers, their components, applications and operation
- 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
E-17.02 Maintains pole structures
E-17.03 Maintains steel lattice structures
E-17.04 Maintains system components

E-18 Repairs distribution systems
E-18.01 Troubleshoots overhead distribution systems
E-18.02 Troubleshoots underground and underwater distribution systems
E-18.03 Repairs overhead distribution systems
E-18.04 Repairs underground and underwater distribution systems

Transmission System Repair

- procedures used to troubleshoot and test underground and underwater transmission systems, their components and accessories
- 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
E-19.02 Troubleshoots underground and underwater transmission systems
E-19.03 Repairs overhead transmission systems
E-19.04 Repairs underground and underwater transmission systems

Cellular Towers

- cellular antenna operating principles

RSOS topics covered in this section of training:

D-15 Installs communication devices
D-15.01 Installs cellular antennas

System Protection Apparatus

- 25kV GOPT switches, their application and use
- procedures used to operate a system with reclosers and an interlock
- safe work practices pertaining to recloser use
- types of distribution reclosers, their applications and use
- various controllers used with distribution reclosers
- recloser applications in relation to line protection coordination
- sectionalizer applications in relation to line protection coordination
- 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
D-13.02 Installs sectionalizers
D-13.03 Installs 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 26

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
A-1.02 Controls powerline hazards
A-1.03 Controls environmental hazards
A-1.04 Performs lock-out and tag-out procedures
A-1.05 Performs temporary grounding and bonding procedures

A-2 Tools and Equipment
A-2.01 Uses hand, power and powder-actuated tools and equipment
A-2.02 Uses electrical measuring and testing equipment
A-2.03 Uses rigging, hoisting and lifting equipment

A-3 Organizes Work
A-3.01 Interprets plans, drawings and specifications
A-3.02 Prepares worksite
A-3.03 Plans job tasks and procedures