

# Construction Electrician Guide to Course Content



Online: [www.saskapprenticeship.ca](http://www.saskapprenticeship.ca)

*Recognition:*

*To promote transparency and consistency, this document has been adapted from the 2015 Construction Electrician Red Seal Occupational Standard (Employment and Social Development Canada).*

*A complete version of the Occupational Standard can be found at [www.red-seal.ca](http://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 Construction Electrician 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 will be implemented in 2017/2018, level two 2018/2019, level three 2019/2020, and level four in 2020/2021.

**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 Construction Electrician 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.

The Red Seal Construction Electrician Curriculum Outline, which provides additional detail of the Harmonized technical training, can be found at [www.red-seal.ca](http://www.red-seal.ca)

# DESCRIPTION OF THE CONSTRUCTION ELECTRICIAN TRADE

Construction electricians install, repair, test and maintain wiring, controls, motors and other electrical devices in a variety of locations and includes all “work of electrical installation.”

Construction electricians plan, design, assemble, install, alter, repair, inspect, verify, commission, connect, operate, maintain and decommission electrical systems. Electrical systems provide heating, lighting, power, alarm, security, communication and control in residential, commercial, institutional, industrial, transportation and entertainment environments. Construction electricians may be self-employed or employed by electrical contractors, utilities, and operations and maintenance departments of various facilities and municipalities.

Construction electricians must read and interpret electrical, mechanical, civil and architectural drawings and specifications such as electrical, building, fire, and jurisdictional codes to complete electrical installations. They use electrical test equipment and digital technology to ensure system safety, functionality and compatibility.

Construction electricians require good communication skills to negotiate, coordinate and facilitate work with clients, co-workers, jurisdictional authorities and other trades. Organizational skills are required to successfully plan and execute their work. They also require strong analytical and problem-solving skills in order to read and interpret diagrams, drawings and specifications. They require mechanical aptitude to install, diagnose and repair systems and components. It is beneficial for construction electricians to have good vision, the ability to distinguish colours, manual dexterity and a willingness to keep up with new developments in the trade. With changing technologies, digital and computer skills are necessary to this trade for job performance, learning methods and updating skills.

Their work may be performed indoors or outdoors, at heights, in confined spaces and in hazardous environments. They require stamina as construction electricians spend much of their time performing static and physical tasks such as climbing. Occupational risks include shocks, industrial diseases, arc flashes, falls and injury from repetitive motion, lifting and kneeling.

Construction electricians play a crucial role as mentors and trainers to apprentices in the trade. They may also advance to positions such as foremen, instructors, project managers, superintendents, estimators, technicians, system designers, electrical inspectors or start their own contracting business. Construction electricians may enhance their skills in different fields such as restorative, service or retrofit work rather than new construction.

**Training Requirements:** 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 Saskatchewan Polytechnic in Moose Jaw, Regina, and Saskatoon.

- Level One: 8 weeks
- Level Two: 8 weeks
- Level Three: 9 weeks
- Level Four: 8 weeks

**\*Any person who is not a journeyperson construction electrician must become registered as an apprentice to work in this trade.**

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	<b>Math Credit</b> at the Indicated Grade Level <sup>❶</sup>	<b>Science Credit</b> at Grade Level
Construction Electrician	Grade 11	Grade 10
<p><sup>❶</sup> - (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:  <a href="http://www.curriculum.gov.sk.ca/#">http://www.curriculum.gov.sk.ca/#</a></p> <p><b>Individuals not meeting the entrance requirements will be subject to an assessment and any required training</b></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](http://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](http://www.red-seal.ca).

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## READING

Construction electricians read several types of documents such as purchase order agreements and instructions for installing systems and components. They also need to read and understand the Canadian Electrical Code (CEC), which contains legal and highly technical language. They also read other tradespersons' plans and specifications to understand the sequences of installation and locations of apparatus.

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## DOCUMENT USE

Construction electricians apply document use skills when they read, interpret and collate information from several documents such as plans, specifications, diagrams and schematics. They reference and interpret these documents when installing, assembling, diagnosing and repairing electrical components and systems. The translation of two-dimensional and three-dimensional drawings into three-dimensional applications also requires strong document use skills.

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## WRITING

Writing skills are required for construction electricians to record information about their daily work, including hours worked, job locations and details of conversations about the job. They may also be required to record details on an incident or an accident report. They also make notations on as-built drawings to indicate changes from the original drawings, accurately describing the current installation. Labelling and identifying electrical systems also require this skill.

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## ORAL COMMUNICATION



Strong oral communication skills are needed for construction electricians as they often need to relay messages, give directions, coordinate tasks with co-workers and discuss electrical code requirements with safety or building inspectors. They also regularly interact with supervisors, engineers, owners, architects, inspectors and other tradespersons to solve technical problems, to discuss work progress, and to ensure that work can meet scheduling and code requirements. They also exchange opinions with co-workers regarding critical safety issues related to complex installations.

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## NUMERACY



Construction electricians use their numeracy skills to size and place electrical systems and components, ensuring that installations meet electrical code requirements. They take measurements and perform complex calculations using principles of mathematics such as geometry and trigonometry. Construction electricians also use numeracy skills to design or modify electrical installations.

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## THINKING SKILLS



Construction electricians use thinking skills when they plan their work in order to ensure efficient use of time and resources. These skills also entail resolving issues such as system routing, and equipment placement and interconnection taking into account client specifications and code requirements. Additionally, these skills are called upon when consulting with other experienced tradespersons, manufacturers' representatives or engineers to solve technical problems.

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## WORKING WITH OTHERS



Construction electricians often work with co-workers, other trades, supervisors, owner representatives, architects, engineers, inspectors and suppliers. They may be required to demonstrate how to perform a task to other workers, mentor and orient or train new employees. They also participate in discussions about work processes or product improvement.

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## DIGITAL TECHNOLOGY



Construction electricians use different types of hand-held digital devices such as oscilloscopes, multimeters and Power Quality Analyzers (PQA) to aid in diagnosing system and component failure. They also use different types of software to interface with these devices. They use their computer skills to improve the efficiency of product research, communication, record keeping, job tracking and information exchange with co-workers, other trades, supervisors, owner representatives, architects, engineers, inspectors and suppliers.

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## CONTINUOUS LEARNING



It is important for construction electricians to stay up-to-date with changing requirements of the electrical code or with changes in technology, such as computer controls. They must be adaptable to change to advance their skills and increase their knowledge. These learning skills are applied when attending classes offered through unions, employers and other groups.

# 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 Construction Electrician.

## 2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for the Construction Electrician trade is 4.

## 3. Total Training Hours during Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for the Construction Electrician 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 will be implemented in 2017/2018, level two 2018/2019, level three 2019/2020, and level four in 2020/2021.

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.

<b>Level 1</b> (2017/2018 implementation)	<b>Level 2</b> (2018/2019 implementation)	<b>Level 3</b> (2019/2020 implementation)	<b>Level 4</b> (2020/2021 implementation)
Organizes Work	Organizes Work	Organizes Work	Organizes Work
Protection Devices	Protection Devices	Protection Devices	Protection Devices
Plans, Drawings and Specifications			
Electronics (no task in RSOS)			

<b>Level 1</b> (2017/2018 implementation)	<b>Level 2</b> (2018/2019 implementation)	<b>Level 3</b> (2019/2020 implementation)	<b>Level 4</b> (2020/2021 implementation)
Canadian Electrical Code	Canadian Electrical Code	Canadian Electrical Code	Canadian Electrical Code
Support Components	Support Components	Support Components	Support Components
Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures
Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems
Safety			
Tools and Equipment			
Communication and Mentoring Techniques			Communication and Mentoring Techniques
Grounding, Bonding	Grounding, Bonding (Single-Phase)	Grounding, Bonding (Three-Phase)	Grounding, Bonding, Ground Fault Detection Systems
Branch Circuitry and Devices (AC/DC Introduction)	Branch Circuitry and Devices (Single-Phase AC)	Branch Circuitry and Devices (Three-Phase AC)	Branch Circuitry and Devices (Specialty)
Consumer/Supply Services and Metering Equipment (Single-Phase)		Consumer/Supply Services and Metering Equipment (Three-Phase)	
Distribution Equipment (Single-Phase)		Distribution Equipment (Three-Phase)	
	Power Generating Systems (DC)	Power Generating Systems (AC)	
	Transformers (Single-Phase)	Transformers (Three-Phase)	
	Exit and Emergency Lighting Systems		
	Cathodic Protection Systems		
Signalling Systems			Signalling Systems

**Level 1**  
(2017/2018  
implementation)

**Level 2**  
(2018/2019  
implementation)

**Level 3**  
(2019/2020  
implementation)

**Level 4**  
(2020/2021  
implementation)

**Electric Heating  
Systems and  
Controls**

**Heating, Ventilation  
and Air  
Conditioning  
(HVAC)**

**Motor Starters and  
Controls**

**Motors  
(DC)**

**Motor Starters and  
Controls**

**Motors  
(Single-Phase and  
Three-Phase)**

**(Motor) Drives**

**Motors  
(Install/Maintain)**

**Renewable Energy  
Generating and  
Storage Systems**

**Communication  
Systems**

**High Voltage  
Systems**

**UPS and Surge  
Suppression  
Systems**

**Renewable Energy  
Generating and  
Storage Systems**

**Communication  
Systems**

**Building  
Automation  
Systems**

**Automated Control  
Systems**

# CONSTRUCTION ELECTRICIAN

## TASK MATRIX AND WEIGHTINGS

This chart outlines the major work activities, tasks and sub-tasks from the 2015 Construction Electrician 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. Currently only Level One is harmonized. Implementation for harmonization will take place progressively. Level one will be implemented in 2017/2018, level two 2018/2019, level three 2019/2020, and level four in 2020/2021.

### A - PERFORMS COMMON OCCUPATIONAL SKILLS

<b>Task A-1</b> <b>Performs safety-related functions.</b>	<b>A-1.01 Uses personal protective equipment (PPE) and safety equipment.</b>  <b>1</b>	<b>A-1.02 Maintains safe work environment.</b>  <b>1</b>	<b>A-1.03 Performs lock-out and tag-out procedures.</b>  <b>1</b>
<b>Task A-2</b> <b>Uses tools and equipment.</b>	<b>A-2.01 Uses common and specialty tools and equipment.</b>  <b>1</b>	<b>A-2.02 Uses access equipment.</b>  <b>1</b>	<b>A-2.03 Uses rigging, hoisting and lifting equipment.</b>  <b>1</b>
<b>Task A-3</b> <b>Organizes work.</b>	<b>A-3.01 Interprets plans, drawings and specifications.</b>  <b>1</b>	<b>A-3.02 Organizes materials and supplies.</b>  <b>1</b>	<b>A-3.03 Plans project tasks and procedures.</b>  <b>1</b>
	<b>A-3.04 Prepares worksite.</b>  <b>1</b>	<b>A-3.05 Finalizes required documentation.</b>  <b>1</b>	
<b>Task A-4</b> <b>Fabricates and installs support components.</b>	<b>A-4.01 Fabricates support structures.</b>  <b>1</b>	<b>A-4.02 Installs brackets, hangers and fasteners.</b>  <b>1</b>	<b>A-4.03 Installs seismic restraint systems.</b>  <b>1</b>

**Task A-5**  
Commissions and decommissions electrical systems.

**A-5.01. Performs startup and shutdown procedures.**  
  
1

**A-5.02 Performs commissioning and decommissioning of systems.**  
  
1

**Task A-6**  
Uses communication and mentoring techniques.

**A-6.01 Uses communication techniques.**  
  
1

**A-6.02 Uses mentoring techniques.**  


## B - INSTALLS, SERVICES AND MAINTAINS GENERATING, DISTRIBUTION AND SERVICE SYSTEMS

**Task B-7**  
Installs, services and maintains consumer/supply services and metering equipment.

**B-7.01 Installs single-phase consumer/supply services and metering equipment.**  
  
1

**B-7.02 Installs three-phase consumer/supply services and metering equipment.**  


**B-7.03 Performs servicing and maintenance of single-phase services and metering equipment.**  
  
1

**B-7.04 Performs servicing and maintenance of three-phase services and metering equipment.**  


**Task B-8**  
Installs, services and maintains protection devices.

**B-8.01 Installs overcurrent protection devices.**  
  
1

**B-8.02 Installs ground fault, arc fault and surge protection devices.**  
  
1

**B-8.03 Performs servicing and maintenance of protection devices.**  
  
1

**Task B-9**  
Installs, services and maintains distribution equipment.

**B-9.01 Installs power distribution equipment.**  
  
1

**B-9.02 Performs servicing and maintenance of power distribution equipment.**  
  
1

**Task B-10**  
Installs, services and maintains power conditioning, uninterruptible power supply (UPS) and surge suppression systems.

**B-10.01 Installs power conditioning, UPS and surge suppression systems.**  
  
1

**B-10.02 Performs servicing and maintenance of power conditioning, UPS and surge suppression systems.**  


<b>Task B-11</b> Installs, services and maintains bonding and grounding protection systems.	<b>B-11.01 Installs grounding and bonding systems.</b>  1	<b>B-11.02 Installs ground fault systems.</b>  1	<b>B-11.03 Installs lightning protection systems.</b>  1
	<b>B-11.04 Performs servicing and maintenance of bonding and grounding systems.</b> 		
<b>Task B-12</b> Installs, services and maintains power generation systems.	<b>B-12.01 Installs AC (alternating current) generating systems.</b> 	<b>B-12.02 Performs servicing and maintenance of AC generating systems.</b> 	<b>B-12.03 Installs DC (direct current) generating systems. (NOT COMMON CORE)</b> 
	<b>B-12.04 Performs servicing and maintenance of DC generating systems. (NOT COMMON CORE)</b> 		
<b>Task B-13</b> Installs, services and maintains renewable energy systems.	<b>B-13.01 Installs renewable energy systems.</b> 	<b>B-13.02 Performs servicing and maintenance of renewable energy systems.</b> 	
<b>Task B-14</b> Installs, services and maintains high voltage systems.	<b>B-14.01 Installs high voltage equipment.</b> 	<b>B-14.02 Installs high voltage cables.</b> 	<b>B-14.03 Performs servicing and maintenance of high voltage systems.</b> 
<b>Task B-15</b> Installs, services and maintains transformers.	<b>B-15.01 Installs extra-low voltage transformers.</b> 	<b>B-15.02 Installs low-voltage single-phase transformers.</b> 	<b>B-15.03 Installs low-voltage three-phase transformers.</b> 
	<b>B-15.04 Installs high voltage transformers.</b> 	<b>B-15.05 Performs servicing and maintenance of transformers.</b> 	

# C - INSTALLS, SERVICES AND MAINTAINS WIRING SYSTEMS

<b>Task C-16</b> Installs, services and maintains raceways, cables and enclosures.	<b>C-16.01 Installs conductors and cables.</b>  1	<b>C-16.02 Installs conduit, tubing and fittings.</b>  1	<b>C-16.03 Installs raceways.</b>  1		
	<b>C-16.04 Installs boxes and enclosures.</b>  1	<b>C-16.05 Performs servicing and maintenance of raceways, cables and enclosures.</b>  1			
	<b>Task C-17</b> Installs, services and maintains branch circuitry.	<b>C-17.01 Installs luminaires.</b>  1	<b>C-17.02 Installs wiring devices.</b>  1	<b>C-17.03 Installs lighting controls.</b>  1	
<b>C-17.04 Installs lighting standards.</b>  1		<b>C-17.05 Performs servicing of branch circuitry.</b>  1	<b>C-17.06 Installs, services and maintains airport runway lighting systems.</b> 		
<b>C-17.07 Installs, services and maintains traffic signal lights and controls.</b> 					
<b>Task C-18</b> Installs, services and maintains heating, ventilating and air-conditioning (HVAC) systems.		<b>C-18.01 Connects HVAC systems.</b> 	<b>C-18.02 Installs HVAC controls.</b> 	<b>C-18.03 Performs servicing and maintenance of HVAC systems and controls.</b> 	
		<b>Task C-19</b> Installs, services and maintains electric heating systems.	<b>C-19.01 Installs electric heating systems.</b> 	<b>C-19.02 Installs electric heating system controls.</b> 	<b>C-19.03 Performs servicing and maintenance of electric heating systems and controls.</b> 
	<b>Task C-20</b> Installs, services and maintains exit and emergency lighting systems.		<b>C-20.01 Installs exit and emergency lighting.</b> 	<b>C-20.02 Performs servicing and maintenance of exit and emergency lighting systems.</b> 	
<b>Task C-21</b> Installs, services and maintains cathodic protection systems.		<b>C-21.01 Installs cathodic protection systems.</b> 	<b>C-21.02 Performs servicing and maintenance of cathodic protection systems.</b> 		

# D - INSTALLS, SERVICES AND MAINTAINS MOTORS AND CONTROL SYSTEMS

<b>Task D-22</b> Installs, services and maintains motor starters and controls.	<b>D-22.01 Installs motor starters.</b> 	<b>D-22.02 Performs servicing and maintenance of motor starters.</b> 	<b>D-22.03 Installs motor controls.</b> 
	<b>D-22.04 Performs servicing and maintenance of motor controls.</b> 		
<b>Task D-23</b> Installs, services and maintains drives.	<b>D-23.01 Installs AC drives.</b> 	<b>D-23.02 Performs servicing and maintenance of AC drives.</b> 	<b>D-23.03 Installs DC drives.</b> 
	<b>D-23.04 Performs servicing and maintenance of DC drives.</b> 		
<b>Task D-24</b> Installs, services and maintains motors.	<b>D-24.01 Installs single-phase motors.</b> 	<b>D-24.02 Performs servicing and maintenance of single-phase motors.</b> 	<b>D-24.03 Installs three-phase motors.</b> 
	<b>D-24.04 Performs servicing and maintenance of three-phase motors.</b> 	<b>D-24.05 Installs DC motors.</b> 	<b>D-24.06 Performs servicing and maintenance of DC motors.</b> 
<b>Task D-25</b> Installs, programs, services and maintains automated control systems.	<b>D-25.01 Installs automated control systems.</b> 	<b>D-25.02 Performs servicing and maintenance of automated control systems.</b> 	<b>D-25.03 Programs and configures automated control systems.</b> 

# E - INSTALLS, SERVICES AND MAINTAINS SIGNALLING AND COMMUNICATION SYSTEMS

<b>Task E-26</b> Installs, services and maintains signaling systems.	<b>E-26.01 Installs fire alarm systems.</b>  1	<b>E-26.02 Performs servicing and maintenance of fire alarm systems.</b>  1	<b>E-26.03 Installs security and surveillance systems.</b>  1
	<b>E-26.04 Performs servicing and maintenance of security and surveillance systems.</b>  1		
<b>Task E-27</b> Installs, services and maintains communication systems.	<b>E-27.01 Installs voice/data/video (VDV) and community antenna television (CATV) systems.</b>  1	<b>E-27.02 Installs public address (PA) and intercom systems.</b>  1	<b>E-27.03 Installs nurse call systems.</b>  1
	<b>E-27.04 Performs servicing and maintenance of communication systems.</b>  1		
<b>Task E-28</b> Installs, services and maintains integrated control systems.	<b>E-28.01 Installs building automation systems.</b>  1	<b>E-28.02 Installs building control systems.</b>  1	<b>E-28.03 Performs servicing and maintenance of integrated control systems.</b>  1

# TRAINING PROFILE CHART

The Harmonization Initiative's goal is to *substantively align* apprenticeship systems across Canada by making apprenticeship training requirements more consistent in Red Seal trades. This Training Profile Chart represents Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing in relation to the Harmonized apprenticeship technical training sequencing, at the topic level, as published in the 2015 Construction Electrician Red Seal Occupational Standard (RSOS). See Appendix A for the finalized curriculum comparisons.

Implementation for harmonization will take place progressively. Level one will be implemented in 2017/2018, level two 2018/2019, level three 2019/2020, and level four in 2020/2021.

SATCC Level One	Transcript Code	Hours	Pan-Canadian Harmonized Level One
In Context			Organizes Work
			Protection Devices
			Canadian Electrical Code
			Commissions and Decommissions Systems
Safety and Personal Protective Equipment	SFTY 131	20	Safety
			Tools and Equipment
Introductory Electrical Theory and Practices	BT 131	48	Communication and Mentoring Techniques
			Support Components
Extra-Low Voltage, Magnetism and Meters	BWC 131	36	Signaling Systems
			Communication Systems
Wiring Methods	WM 130	34	Raceways, Cables, Conductors and Enclosures
Single Dwelling Plans, Lighting and Services	PLS 130	36	Distribution Equipment (Single-Phase)
			Consumer/Supply Services and Metering Equipment (Single-Phase)
			Plans, Drawings, and Specifications
Solving DC Circuits	BT 130	36	Branch Circuitry and Devices (AC/DC Introduction)
Conductors and Branch Circuits	BWC 130	30	Grounding, Bonding
		240	

SATCC Level Two	Transcript Code	Hours	Pan-Canadian Harmonized Level One
AC Theory and Meters	BT 220	24	Implementation September 2018. See page 23 for current curriculum.
Resistive, Inductive and Capacitive Circuits	BT 224	12	
Three-Phase Theory/Alternators	BT 225	24	
DC Machines	EMC 225	24	
AC Motors	EMC 226	24	
Motor Control	EMC 227	18	
Mathematics	MATH 225	16	
Electronic Instruments, Rectification and Filtering	IE 222	40	
Services Under 900 Square Meters	PLS 222	30	
Transformers	TRNS 220	12	
Hazardous Locations	WM 220	16	
		240	

SATCC Level Three	Transcript Code	Hours	Pan-Canadian Harmonized Level One
Full Voltage Motor Control	EMC 325	30	Implementation September 2019. See page 24 for current curriculum.
Fire Alarm Systems	FA 320	30	
Residential Electric Heat	HC 321	6	
Heating and Cooling Systems	HC 320	30	
Three-Phase Rectification and DC Power Supplies	IE 322	36	
Sensors and Phase Control and Data Cabling	IE 323	36	
Services for Occupancies Over 900 Square Metres	PLS 323	36	
Three-Phase Four-Wire Services	PLS 324	30	
Paralleling Transformers	TRNS 321	24	
Rigging	WM 323	12	
		270	

SATCC Level Four	Transcript Code	Hours	Pan-Canadian Harmonized Level One
Starting Current and Torque in AC Motors	EMC 427	12	Implementation September 2020. See page 26 for current curriculum.
Paralleling DC and AC Generators	EMC 428	21	
Power Factor Correction	BT 426	24	
Electric Motor Speed Control	EMC 426	36	
Thyristors	IE 425	24	
Programmable Logic Controllers	IE 427	42	
Primary Metering and High Voltage	HVM 424	30	
Three Phase Transformers	TRNS 422	33	
Code Review	REV 420	18	
		240	

#### Exceed Topics

Throughout this *Guide to Course Content* there are topics, which exceed the scope of work set out by the Construction Electrician RSOS. Industry in Saskatchewan has deemed certain topics to fall within the scope of work of the Construction Electrician trade and therefore require technical training to also cover these topics.

# 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 will be implemented in 2017/2018, level two 2018/2019, level three 2019/2020, and level four in 2020/2021.

The Red Seal Construction Electrician Curriculum Outline, which provides additional detail of the Harmonized technical training, can be found at [www.red-seal.ca](http://www.red-seal.ca)

<b>Level One</b>	<b>8 weeks</b>	<b>240 hours</b>
<b>Safety and Personal Protective Equipment</b>		<b>20 hours</b>
<ul style="list-style-type: none"> <li>• Describe <i>The Saskatchewan Employment Act</i> and <i>The Occupational Health and Safety Regulations</i> requirements in the electrical trade</li> <li>• Describe personal protective equipment</li> <li>• Describe arc flash</li> <li>• Describe rigging equipment</li> <li>• Describe applicable health and safety regulation and legislation in rigging applications</li> <li>• Describe safe hoisting operations</li> <li>• Describe safe hoisting or pulling operations without a crane</li> </ul>		
<b>RSOS topics covered in this section of training:</b>		
<b>A-1 Performs safety-related functions</b>		
A-1.01 Uses personal protective equipment (PPE) and safety equipment		
<ul style="list-style-type: none"> <li>• PPE and safety equipment, their applications, maintenance, storage, and procedures for use</li> <li>• regulatory requirements pertaining to PPE and safety equipment</li> </ul>		
A-1.02 Maintains safe work environment		
<ul style="list-style-type: none"> <li>• safe work practices</li> <li>• regulatory requirements pertaining to hazards and emergency situations</li> </ul>		
A-1.03 Performs lock-out and tag-out procedures		
<ul style="list-style-type: none"> <li>• lock-out and tag-out procedures and legislation governing minimum standards</li> <li>• safety checks of equipment</li> <li>• procedures for voltage testing</li> </ul>		
<b>A-2 Tools and Equipment</b>		
A-2.01 Uses common and specialty tools and equipment		
<ul style="list-style-type: none"> <li>• tools and equipment, their applications and procedures for use</li> <li>• manufacturers' specifications, and operating and maintenance instructions</li> <li>• inspection procedures</li> <li>• limitations and ratings of electrical measuring equipment</li> <li>• certification requirements to operate powder-actuated tools</li> </ul>		
A-2.02 Uses access equipment		
<ul style="list-style-type: none"> <li>• identify traffic areas and potential hazards</li> <li>• install barricades and signage to contain work zone</li> <li>• select access equipment</li> <li>• set up and secure step ladders and extension ladders</li> <li>• visually and mechanically inspect for worn, damaged and defective access equipment</li> <li>• report, tag and decommission unsafe, worn, damaged and defective access equipment</li> </ul>		

- organize and store access equipment
  - work from approved and certified access equipment
- A-2.03 Uses rigging, hoisting and lifting equipment
- hoisting, lifting and rigging equipment, their applications, limitations, and procedures for use
  - regulatory requirements pertaining to hoisting, lifting and rigging equipment
  - basic hoisting and lifting operations

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### **Introductory Electrical Theory and Practices**

**48 hours**

- Describe the electrician trade in Saskatchewan
- Describe the application of the Canadian Electrical Code
- Describe basic principles of electricity
- Describe basic electrical circuit concepts
- Describe common electrical devices
- Select common fasteners
- Terminate conductors
- Connect basic electrical circuits

#### **RSOS topics covered in this section of training:**

#### **A-4 Fabricates and installs support components**

A-4.01 Fabricates support structures

A-4.02 Installs brackets, hangers and fasteners

A-4.03 Installs seismic restraint systems

#### **A-6 Uses communication and mentoring techniques**

A-6.01 Uses communication techniques

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### **Extra-Low Voltage, Magnetism, and Meters**

**36 hours**

- Describe the principles of electromagnetism
- Describe the operating principles of meters
- Use meters for voltage measurement
- Use meters for current measurement
- Use meters for resistance measurement
- Use meters for power and energy measurement
- Install basic signal systems
- Install remote control relay systems

#### **RSOS topics covered in this section of training:**

#### **E-26 Installs, services, and maintains signaling systems**

E-26.01 Installs fire alarm systems

- types of fire alarm systems, their applications and operation
- install, upgrade and connect fire alarm systems and their components

E-26.02 Performs servicing and maintenance of fire alarm systems

- fire alarm systems, their applications and operation
- service and maintain fire alarm systems

E-26.03 Installs security and surveillance systems

- security and surveillance systems, their applications and operation
- install, upgrade and connect security and surveillance systems and their components

E-26.04 Performs servicing and maintenance of security and surveillance systems

- security and surveillance systems, their applications and operation
- service and maintain security and surveillance systems

#### **E-27 Installs, services and maintains communication systems**

E-27.01 Installs voice/data/video (VDV) and community antenna television (CATV) systems

- VDV and CATV systems, their applications and operation
-

- procedures used to install VDV and CATV systems
- E-27.02 Installs public address (PA) and intercom systems.
- PA and intercom systems, their applications and operation
  - the procedures used to install, upgrade and connect PA and intercom systems
- E-27.03 Installs nurse call systems
- nurse call systems, their applications and operation
  - the procedures used to install nurse call systems
- E-27.04 Performs servicing and maintenance of communication systems
- communication systems, their applications and operation
  - procedures used to service and maintain communication systems

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### **Wiring Methods**

**34 hours**

- Install non-metallic sheathed cable
- Install armoured cable
- Describe aluminum sheathed cable
- Describe mineral insulated cable
- Describe raceways
- Describe rigid and flexible conduit
- Describe electrical metallic tubing
- Describe rigid PVC conduit
- Describe surface raceways
- Describe installation requirements for data cabling
- Terminate data cabling

### **RSOS topics covered in this section of training:**

#### **C-16 Installs, services and maintains raceways, cables and enclosures**

- C-16.01 Installs conductors and cables
- types of conductors and cables and their associated components
  - procedures used to remove and/or install conductors and cables
- C-16.02 Installs conduit, tubing and fittings
- types of conduit, tubing and fittings, their components and applications
  - procedures to remove and/or install conduit, tubing and fittings
- C-16.03 Installs raceways
- types of raceways and their components
  - procedures used to remove and/or install and support raceways
- C-16.04 Installs boxes and enclosures
- boxes and enclosures
  - procedures used to remove and/or install and support boxes and enclosures
- C-16.05 Performs servicing and maintenance of raceways, cables and enclosures
- procedures to service raceways, cables and enclosures
  - procedures to maintain raceways, cables and enclosures

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### **Single Dwelling Plans, Lighting, and Services**

**36 hours**

- Describe common construction drawings
- Describe electrical drawings, symbols and schedules
- Determine lighting requirements
- Determine single dwelling service requirements
- Install single dwelling services

### **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
  - imperial and SI units in trade documentation
-

- interpretation and extraction of information from drawings, schematics, and specifications

### **B-7 Installs, services and maintains consumer/supply services and metering equipment**

B-7.01 Installs single-phase consumer/supply services and metering equipment

- single-phase services and their applications
- single-phase service installation methods
- load calculations for a single-phase service

B-7.03 Performs servicing and maintenance of single-phase services and metering equipment

- methods used to service and maintain single-phase service
- theory of single-phase systems

### **B-9 Installs, services and maintains distribution equipment**

B-9.01 Installs power distribution equipment

- power distribution equipment, their applications and operation
- the procedures used to install power distribution equipment

B-9.02 Performs servicing and maintenance of power distribution equipment

- the methods and theory used to service and maintain power distribution equipment

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### **Conductors and Branch Circuits**

**30 hours**

- Describe common conductors
- Calculate conductor resistance and ampacity
- Select overcurrent devices
- Select bonding conductors
- Determine branch circuit requirements

### **Solving DC Circuits**

**36 hours**

- Analyze series circuits
- Analyze parallel circuits
- Analyze combination circuits
- Analyze three-wire circuits
- Connect cells and batteries

### **RSOS topics covered in this section of training:**

#### **B-11 Installs, services, and maintains bonding and grounding protection systems**

B-11.01 Installs grounding and bonding systems

- grounding and bonding methods and equipment
- procedures used to install grounding systems
- procedures used to install bonding systems

B-11.02 Installs ground fault systems

- ground fault systems and their operation
- ground fault system installation methods

B-11.03 Installs lightning protection systems

- lightning protection systems and their operation
- lightning protection system installation methods

#### **C-17 Installs, services and maintains branch circuitry**

C-17.01 Installs luminaires

- luminaires, their applications and operation
- procedures used to remove and/or install and support luminaires

C-17.02 Installs wiring devices

- wiring devices, their applications and operation
- procedures used to remove and install wiring devices

C-17.03 Installs lighting controls

- types of lighting control components, their applications and operation

- procedures used to remove and/or install, connect and test lighting control components
- C-17.04 Installs lighting standards
- lighting standards and their applications
  - procedures used to remove and install lighting standards
- C-17.05 Performs servicing of branch circuitry
- branch circuitry and branch circuitry components
- procedures used to service branch circuitry and branch circuitry components

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**Level One topics from the RSOS that are taught in context:**

***A-3 Organizes Work***

***A-5 Commissions and Decommissions Systems***

***B-8 Installs, services and maintains protection devices***

***Canadian Electrical Code***

***For details regarding the In Context Topic, see page 28***

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<b>Level Two</b>	<b>8 weeks</b>	<b>240 hours</b>
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**AC Theory and Meters**

- Describe resistance, voltage and current
- Describe power meters
- Describe principles of electromagnetic induction
- Describe operation of an elementary AC generator
- Calculate instantaneous, average, and RMS values for sine waves
- Compare resistance, inductive reactance and capacitive reactance in an AC circuit
- Describe AC resistive, inductive, and capacitive circuits

**24 hours**

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**Resistive, Inductive and Capacitive Circuits**

- Sketch sine wave and phasors for parallel circuits
- Solve AC parallel circuits
- Calculate AC power units and power formulas
- Solve AC series circuit problems

**12 hours**

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**Three – Phase Theory/Alternators**

- Describe AC generator principles and configurations
- Describe AC generators set components
- Describe AC generator terminal markings and connections
- Solve three-phase loads and solve three-phase load problems
- Describe AC generator operation with mixed PF loads
- Use instruments (used to find frequency, phase sequence, motor rotation, shaft speed [tachometers], and insulation resistance)

**24 hours**

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**DC Machines**

- Describe typical DC machine construction
- Describe common DC generator connections
- Connect DC generators
- Describe DC motor connections
- Connect DC motors

**24 hours**

<b>AC Motors</b>	<b>24 hours</b>
<ul style="list-style-type: none"> <li>Describe construction and Operation of three-phase AC motors</li> <li>Connect three-phase squirrel cage motors</li> <li>Connect three-phase wound rotor motors</li> <li>Connect three-phase synchronous motors</li> <li>Describe three-phase motors (maintenance requirements)</li> <li>Describe single-phase AC motors(construction and operation)</li> <li>Connect single-phase squirrel cage, split phase, induction motors</li> <li>Describe single-phase repulsion motors</li> <li>Describe single-phase motors (maintenance requirements)</li> </ul>	
<b>Motor Control</b>	<b>18 hours</b>
<ul style="list-style-type: none"> <li>Connect manual motor control circuits</li> <li>Connect overload protection</li> <li>Connect electromagnetic motor control circuits</li> <li>Determine motor control (installation standards)</li> </ul>	
<b>Electronic Instruments, Rectification and Filtering</b>	<b>40 hours</b>
<ul style="list-style-type: none"> <li>Select resistors for electronic circuits</li> <li>Use voltmeters in electronic circuits</li> <li>Use AC wave forms and DC</li> <li>Describe semi-conductor junction diodes</li> <li>Connect single phase 1/2 wave rectifier circuit</li> <li>Connect single phase bi-phase rectifier circuit</li> <li>Connect single phase bridge rectifier circuit</li> <li>Describe resistive/capacitive (RC) time constants</li> <li>Connect basic rectifier filter circuits</li> </ul>	
<b>Mathematics</b>	<b>16 hours</b>
<ul style="list-style-type: none"> <li>Solve problems using trigonometry, vector operations, and electrical, algebraic equations</li> </ul>	
<b>Services of 900 Square Meters or Less</b>	<b>30 hours</b>
<ul style="list-style-type: none"> <li>Determine single phase motors (branch circuit and feeder requirements)</li> <li>Determine feeder requirements (motors and other loads combined)</li> <li>Determine feeder requirements for motors and other loads combined</li> <li>Determine service entrance requirements (for institutional buildings up to and including 900 sq. metres, for common institutional and commercial buildings, and for row housing and apartment building complexes)</li> </ul>	
<b>Transformers</b>	<b>12 hours</b>
<ul style="list-style-type: none"> <li>Describe basic transformers</li> <li>Describe single-phase transformer construction</li> <li>Connect typical dual-secondary single-phase transformers</li> <li>Calculate winding turns, voltages and currents using transformer ratio formulas</li> <li>Describe basic instrument transformer circuits</li> </ul>	
<b>Hazardous Locations</b>	<b>16 hours</b>
<ul style="list-style-type: none"> <li>Describe installation requirements for hazardous locations and for patient care specification areas</li> </ul>	

<b>Level Three</b>	<b>9 weeks</b>	<b>270 hours</b>
<b>Full Voltage Motor Control</b>		<b>30 hours</b>
<ul style="list-style-type: none"> <li>• Interpret schematic and wiring diagrams (for various motor control applications)</li> <li>• Install motor control devices (for three phase motors in manual and automatic applications)</li> <li>• Install advanced motor control devices (for three phase motors in manual and automatic applications)</li> <li>• Determine regulatory standards (motor control)</li> </ul>		
<b>Fire Alarm Systems</b>		<b>30 hours</b>
<ul style="list-style-type: none"> <li>• Describe fire alarm systems and components</li> <li>• Determine fire alarm system requirements</li> <li>• Determine wiring requirements for fire alarm systems</li> <li>• Connect typical fire alarm panels</li> <li>• Troubleshoot typical fire alarm systems</li> </ul>		
<b>Heating and Cooling Systems</b>		<b>30 hours</b>
<ul style="list-style-type: none"> <li>• Install residential heating and cooling systems</li> <li>• Install commercial and industrial burner controls</li> </ul>		
<b>Residential Electric Heat</b>		<b>6 hours</b>
<ul style="list-style-type: none"> <li>• Determine residential electric heating requirements</li> <li>• Describe installation requirements</li> </ul>		
<b>Three – Phase Rectification and DC Power Supplies</b>		<b>36 hours</b>
<ul style="list-style-type: none"> <li>• Connect three-phase wye rectifier circuits</li> <li>• Connect three-phase full-wave bridge rectifier circuits</li> <li>• Describe zener diodes</li> <li>• Describe bi-polar transistors</li> <li>• Connect voltage regulator circuits</li> </ul>		
<b>Sensors, Phase Control and Data Cabling</b>		<b>36 hours</b>
<ul style="list-style-type: none"> <li>• Describe temperature sensing devices</li> <li>• Describe optical devices</li> <li>• Describe proximity sensing switches</li> <li>• Connect SCR phase control circuits</li> <li>• Describe J-Fets and Mos-Fets</li> <li>• Terminate data cabling</li> </ul>		
<b>Services for Occupancies Over 900 Square Metres</b>		<b>36 hours</b>
<ul style="list-style-type: none"> <li>• Determine lighting requirements</li> <li>• Determine three-phase squirrel cage and synchronous motor branch circuits and feeders</li> <li>• Calculate wound rotor and continuous duty motor branch circuits and feeders</li> <li>• Calculate welder branch circuits and feeders</li> <li>• Determine services and feeders for buildings with an area exceeding 900 square metres</li> </ul>		

<b>Three-Phase Four-Wire Services</b>		<b>30 hours</b>
<ul style="list-style-type: none"> <li>Describe 3-phase 3-wire and 3-phase 4-wire circuits (three-phase circuit loading characteristics)</li> <li>Calculate requirements for services and feeders (for buildings to be supplied with 3-phase energy)</li> <li>Determine electrical requirements considering conductor voltage drop</li> <li>Determine installation requirements for specialized wiring methods</li> <li>Describe thermit weld conductor terminations</li> </ul>		
<b>Paralleling Transformers</b>		<b>24 hours</b>
<ul style="list-style-type: none"> <li>Calculate transformer values</li> <li>Identify unmarked transformer leads</li> <li>Conduct transformer impedance tests</li> <li>Connect transformers in parallel</li> <li>Connect autotransformers</li> </ul>		
<b>Rigging</b>		<b>12 hours</b>
<ul style="list-style-type: none"> <li>Describe applicable Health and Safety regulations and legislation</li> <li>Describe safe hoisting operation</li> <li>Describe safe hoisting or pulling operation without a crane</li> </ul>		
<b>Level Four</b>	<b>8 weeks</b>	<b>240 hours</b>
<b>Power Factor Correction</b>		<b>24 hours</b>
<ul style="list-style-type: none"> <li>Describe power factor correction</li> <li>Apply AC induction motors</li> <li>Describe power factor correction principles (using synchronous motors)</li> </ul>		
<b>Electric Motor Speed Control</b>		<b>36 hours</b>
<ul style="list-style-type: none"> <li>Describe operational amplifier</li> <li>Connect IC operational amplifiers</li> <li>Connect DC motor starters and adjustable speed drives</li> <li>Describe AC motor characteristics and driven load requirements</li> <li>Describe AC adjustable speed drives types</li> <li>Connect AC variable frequency drives</li> </ul>		
<b>Starting Current and Torque in AC Motors</b>		<b>12 hours</b>
<ul style="list-style-type: none"> <li>Describe principles of motor operation and control</li> <li>Describe methods to control starting current and torque for AC motors</li> </ul>		
<b>Paralleling DC and AC Generators</b>		<b>21 hours</b>
<ul style="list-style-type: none"> <li>Connect DC generators in parallel</li> <li>Connect AC generators in parallel</li> </ul>		
<b>Thyristors</b>		<b>24 hours</b>
<ul style="list-style-type: none"> <li>Connect semi-converter phase control circuit and components</li> <li>Connect inverse-parallel SCR phase control circuit and components</li> <li>Connect protective devices for transient voltages and rate-turn on</li> <li>Connect ramp and pedestal firing circuit</li> <li>Connect TRIAC phase control circuit and components</li> <li>Connect solid-state contactors</li> </ul>		

<b>Programmable Logic Controllers</b> <ul style="list-style-type: none"> <li>• Connect standard logic gate control circuits</li> <li>• Connect inverted logic gate control circuits</li> <li>• Describe numbering systems used in programmable controllers</li> <li>• Program logic controller hardware, memory structure, addressing, and control sequence</li> <li>• Program logic controller (for digital and analog control)</li> </ul>	<b>42 hours</b>
<b>Three Phase Transformers</b> <ul style="list-style-type: none"> <li>• Describe transformers</li> <li>• Describe characteristics of various three-phase transformer connections</li> <li>• Determine Canadian Electrical Code (rules for transformer installations)</li> </ul>	<b>33 hours</b>
<b>Primary Metering and High Voltage</b> <ul style="list-style-type: none"> <li>• Determine high voltage metering and installation requirements</li> <li>• Describe safe high voltage system practices including PPE and arc flash awareness</li> </ul>	<b>30 hours</b>
<b>Code Review</b> <ul style="list-style-type: none"> <li>• Describe effective trade qualification exam preparation techniques</li> <li>• Identify Canadian Electrical Code rules</li> </ul>	<b>18 hours</b>

# 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.

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## In-Context

### **A-3 Organizes work**

A-3.02 Organizes materials and supplies

- procedures used to plan and organize materials and supplies

A-3.03 Plans project tasks and procedures

- procedures used to plan and organize job tasks and procedures

A-3.04 Prepares worksite

- procedures used to prepare worksite
- procedures used to locate elements encased in concrete and soil

A-3.05 Finalizes required documentation

- documentation, its purpose, application and use

### **A-5 Commissions and decommissions electrical systems**

A-5.01 Performs startup and shutdown procedures

A-5.02 Performs commissioning and decommissioning of systems

### **B-8 Installs, services and maintains protection devices**

B-8.01 Installs overcurrent protection devices

- overcurrent devices, their applications and operation
- procedures used to install overcurrent devices

B-8.02 Installs ground fault, arc fault and surge protection devices

- ground fault, arc fault and surge protection devices, their applications and operation
- procedures used to install ground fault, arc fault and surge protection devices

B-8.03 Performs servicing and maintenance of ground fault, arc fault and surge protection devices

- methods and theory used to service and maintain protection devices

## **Canadian Electrical Code**

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# 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 will be implemented in 2017/2018, level two 2018/2019, level three 2019/2020, and level four in 2020/2021.

SATCC Level One	Transcript Code	Hours	Pan-Canadian Harmonized Level One
In Context			Organizes Work
			Protection Devices
			Canadian Electrical Code
			Commissions and Decommissions Systems
Safety and Personal Protective Equipment	SFTY 131	20	Safety
			Tools and Equipment
Introductory Electrical Theory and Practices	BT 131	48	Communication and Mentoring Techniques
			Support Components
Extra-Low Voltage, Magnetism and Meters	BWC 131	36	Signalling Systems
			Communication Systems
Wiring Methods	WM 130	34	Raceways, Cables, Conductors and Enclosures
Single Dwelling Plans, Lighting and Services	PLS 130	36	Distribution Equipment (Single-Phase)
			Consumer/Supply Services and Metering Equipment (Single-Phase)
			Plans, Drawings, and Specifications
Solving DC Circuits	BT 130	36	Branch Circuitry and Devices (AC/DC Introduction)
Conductors and Branch Circuits	BWC 130	30	Grounding, Bonding
		240	

SATCC Level Two	Transcript Code	Hours	Pan-Canadian Harmonized Level Two
In Context			Organizes Work
			Protection Devices
			Plans, Drawings, and Specifications
			Canadian Electrical Code
			Support Components
			Commissions and Decommissions Systems
DC Machines	EMC 225	30	Power Generating Systems
			Motors
Motor Starters and Controls	EMC 227	18	Motor Starters and Controls
Electronic Instruments, Rectification and Filtering	IE222	36	Electronics
Services Under 900 Square Meters	PLS 222	42	Grounding, Bonding
			Raceways, Cables, Conductors, and Enclosures
			Exit and Emergency Lighting Systems
			Renewable Energy Generating and Storage Systems
			Cathodic Protection Systems
Transformers	TRNS 220	36	Transformers
Residential Electric Heat	HC 221	6	Branch Circuitry and Devices
			Electric Heating Systems and Controls
Heating and Cooling Systems	HC 220	30	Heating, Ventilation, and Air Conditioning
AC Theory and Meters	BT 220	24	Exceed
Resistive, Inductive and Capacitive Circuits	BT 224	18	Exceed
		240	

SATCC Level Three	Transcript Code	Hours	Pan-Canadian Harmonized Level Three
In Context			Organizes Work
			Protection Devices
			Plans, Drawings, and Specifications
			Canadian Electrical Code
			Support Components
			Raceways, Cables, Conductors, and Enclosures
			Commissions and Decommissions Systems
AC Motors	EMC 326	24	Motors
			Drives
Three-Phase Theory/Alternators	BT 325	33	Power Generating Systems
Motor Starters and Controls	EMC 325	42	Motor Starters and Controls
Three-Phase Rectification and DC Power Supplies	IE 322	36	Electronics
Sensors and Phase Control and Data Cabling	IE 323	36	
Services for Occupancies Over 900 Square Metres	PLS 323	36	Grounding, Bonding
			Branch Circuitry and Devices
Three-Phase Four-Wire Services	PLS 324	30	Consumer/Supply Services and Metering Equipment
			Distribution Equipment
Three Phase Transformers	TRNS 322	33	Transformers
		270	

SATCC Level Four	Transcript Code	Hours	Pan-Canadian Harmonized Level Four
In Context			Organizes Work
			Protection Devices
			Plans, Drawings, and Specifications
			Support Components
			Raceways, Cables, Conductors, and Enclosures
			Commissions and Decommissions Systems
Fire Alarm Systems	FA 420	30	Signaling Systems
Power Factor Correction	BT 426	24	Electronics
Thyristors	IE 425	24	
Electric Motor Speed Control	EMC 426	36	Motors
Programmable Logic Controllers	IE 427	42	Programmable Logic Controllers
Primary Metering and High Voltage	HVM 424	30	High Voltage Systems
Building Systems	NA	24	Branch Circuitry and Devices
			UPS and Surge Suppression Systems
			Renewable Energy Generating and Storage Systems
			Communication Systems
			Building Automation Systems
			Automated Control Systems
			Grounding, Bonding, Ground Fault Detection Systems
Code Review	REV 420	18	Communications and Mentoring Techniques
			Canadian Electrical Code
Hazardous Locations	WM 420	12	Exceed
		240	

### Exceed Topics

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