



# Plumber

# Guide to Course Content

2023

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*Recognition:*

*To promote transparency and consistency, this document has been adapted from the 2023 Plumber 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 Plumber trade:** an overview of the trade's duties and training requirements.

**Essential Skills Summary:** an overview of how each of the 9 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.

**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 Plumber trade:** a chart which outlines the model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the learning outcome level.

The Red Seal Plumber 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 PLUMBER TRADE

*Plumbers install, replace and maintain water and sewage systems, and hydronic heating systems in residential, commercial and industrial buildings. They may also be licensed to perform gasfitting work.*

Plumbers may be employed by plumbing/mechanical contractors, service companies, and maintenance departments of manufacturing, commercial, health care and educational facilities. They may also be self-employed. Plumbers install piping and equipment in residential, commercial, institutional, and industrial buildings and sites.

Plumbers use a variety of tools and equipment such as hand and power tools, welding and soldering/brazing equipment, and hoisting and lifting equipment to perform the tasks in their trade. To perform some tasks or use some equipment, specific certification may be required. Plumbers work with a variety of piping materials such as copper, steel, plastic, glass, cast iron, cement, fibreglass and specialty materials. Before assembling and fitting pipe sections, tubing and fittings, the pipes must be measured, cut and bent as required. Joining pipe may be done by various means, such as threading, using mechanical joints, welding, soldering/brazing and using fastening materials and compounds. Plumbers test and commission systems to ensure proper operation. They perform scheduled, unscheduled, and emergency maintenance and repair.

Safety awareness is essential for plumbers. They may work indoors or outdoors and working conditions vary from one job to another. The work of plumbers can be physically demanding. Plumbers often need to lift and carry heavy materials and equipment. While performing their duties, plumbers are also required to do considerable standing, climbing and kneeling. They may work at heights and in confined spaces. Special precautions may have to be taken when working with fluids, gases, steam and hazardous elements. Plumbers need to assess the systems and the environment to identify possible dangers.

Key attributes for people entering this trade are good mechanical, mathematical and spatial visualization skills. Plumbers also need good communication skills to communicate with co-workers and clients. Analytical/problem solving skills are required to interpret building plans, inspect piping systems and diagnose system faults and/or malfunctions.

With experience, plumbers act as mentors and trainers to apprentices in the trade. They may also move into other positions such as instructors, inspectors, estimators and project managers.

**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 Saskatoon. Level one and two are also delivered by Saskatchewan Polytechnic in Regina:

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

**\*Any person who is not a journeyperson plumber 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
<b>Plumber</b>	<b>Grade 10</b>	<b>Grade 10</b>
<p>❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).</p> <p>*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.</p> <p>For information about high school curriculum, including Math and Science course names, please see: <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: <https://www.canada.ca/en/employment-social-development/programs/essential-skills/tools.html>

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

Plumbers require strong reading skills to consult installation procedures, reference manuals, Safety Data Sheets (SDS), the National Plumbing Code (NPC) and industry standards and safety requirements when installing, repairing and maintaining plumbing fixtures and systems. They also refer to project specifications and work orders when planning a job.

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## DOCUMENT USE

Document use is important in the work of plumbers. Plumbers interpret diagrams in the NPC to ensure compliance with regulatory standards. They interpret schematics and working drawings when planning the installation of piping systems. Plumbers read assembly drawings to install fixtures and appliances. They prepare sketches and drawings to plan a job.

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## WRITING

Writing skills are used by plumbers to perform tasks such as writing lists of materials required for a job, completing order forms to request materials, and keeping daily logs to track work status and reminders. When required, they must write incident or accident reports. They may be required to communicate in writing to other trade professionals such as engineers and architects.

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## ORAL COMMUNICATION

Plumbers require good oral communication skills to interact with colleagues, apprentices, supervisors, suppliers, inspectors, clients and other tradespersons when co-ordinating work, resolving problems and ensuring safety.

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## **NUMERACY**

Plumbers work in both imperial and metric systems of measurement. They locate and mark positions for pipe connections. They perform a variety of calculations such as offsets, drain line fall, hydraulic load, and temperature and pressure calculations depending on the type of piping system being installed. Plumbers estimate materials and supplies needed to complete a project. They may estimate labour requirements and prepare quotations and invoices.

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## **THINKING**

Plumbers diagnose and solve problems. They decide on work priorities and plan and organize their work accordingly. Plumbers may determine the most cost-effective way to use materials and supplies when installing plumbing and heating systems.

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## **WORKING WITH OTHERS**

During the course of a workday, plumbers must interact with others such as co-workers, suppliers, clients and other trades.

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## **DIGITAL TECHNOLOGY**

Plumbers use computers and other digital devices more commonly as sources of resource information, communication, and cost reporting. They are also used as a tool for design, layout, research, system diagnosis and estimating.

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## **CONTINUOUS LEARNING**

Changes to the NPC periodically modify procedures and methods for the design and installation of piping systems. Advances in technology are also changing the design, applications, and materials of systems. There is an increased emphasis on worker health and safety. All these changes mean that related training and certification is often mandatory for both apprentices and journeypersons.

# 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 Plumber.

## 2. Number of Levels of Apprenticeship

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

## 3. Total Training Hours during Apprenticeship Training

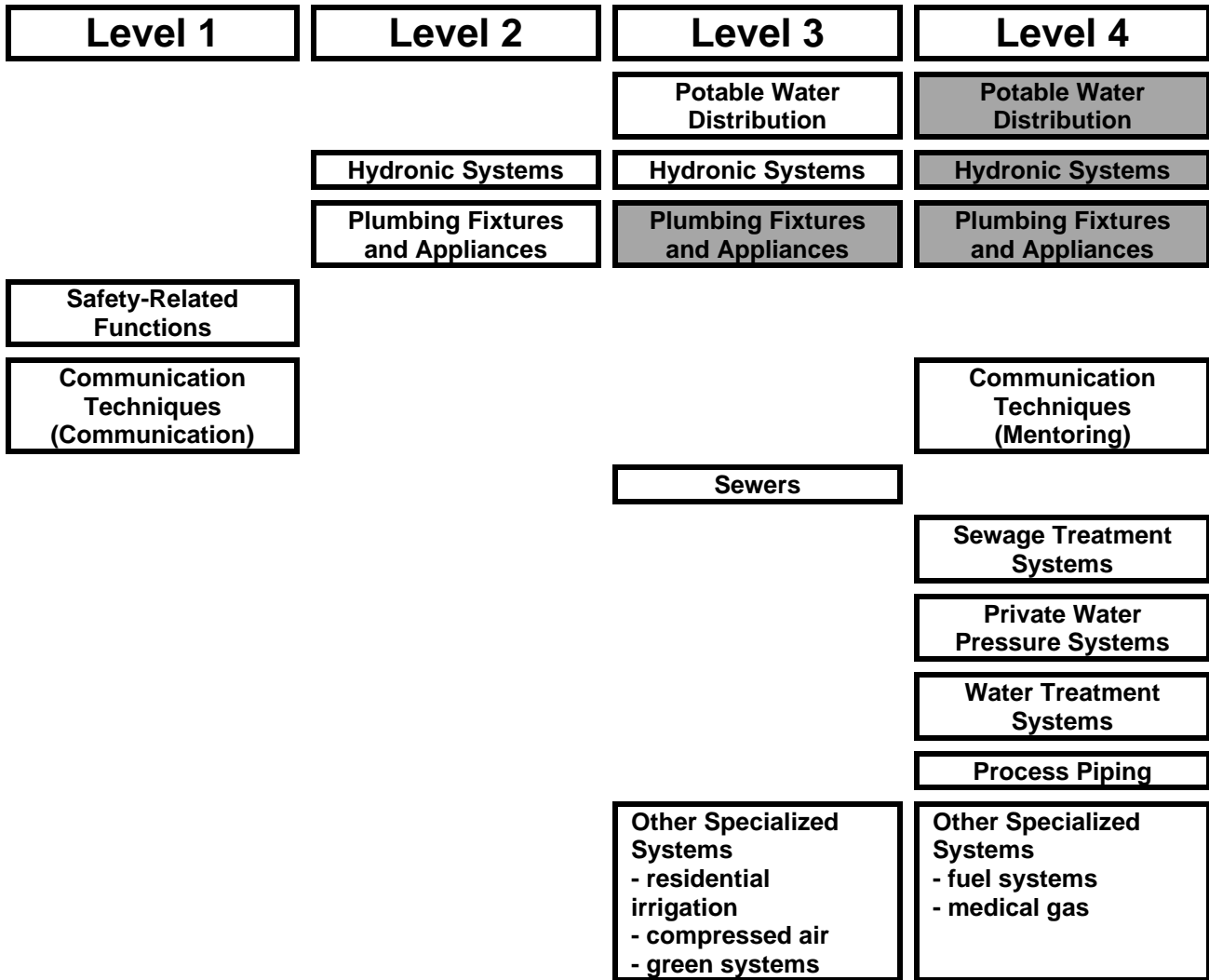
The total hours of training, including both on-the-job and in-school training for the Plumber trade is 7200.

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

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

Level 1	Level 2	Level 3	Level 4
Tools and Equipment	Tools and Equipment	Tools and Equipment	Tools and Equipment
Organizes Work	Organizes Work	Organizes Work	Organizes Work
Routine Trade Activities	Routine Trade Activities	Routine Trade Activities	Routine Trade Activities
Prepares Tube, Tubing and Pipe	Prepares Tube, Tubing and Pipe	Prepares Tube, Tubing and Pipe	Prepares Tube, Tubing and Pipe
Joins Tube, Tubing and Pipe	Joins Tube, Tubing and Pipe	Joins Tube, Tubing and Pipe	Joins Tube, Tubing and Pipe
Interior Drainage, Waste and Vent (DWV) Systems (Introduction)	Interior Drainage, Waste and Vent (DWV) Systems	Interior Drainage, Waste and Vent (DWV) Systems	Interior Drainage, Waste and Vent (DWV) Systems
		Water Services	Water Services





# PLUMBER TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2023 Plumber 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

11%

<b>A-1 Performs safety-related functions</b>	<b>1.01 Maintains safe work environment</b>  1	<b>1.02 Uses personal protective equipment (PPE) and safety equipment</b>  1	<b>1.03 Performs lock-out and tag-out procedures</b>  1		
<b>A-2 Uses and maintains tools and equipment</b>	<b>2.01 Uses common tools and equipment</b>  1 (2, 3, 4 In-Context)	<b>2.02 Uses access equipment</b>  1 (2, 3, 4 In-Context)	<b>2.03 Uses rigging, hoisting, lifting and positioning equipment</b>  1 (2, 3, 4 In-Context)	<b>2.04 Rigs loads for cranes</b>  1 (2, 3, 4 In-Context)	<b>2.05 Uses welding equipment</b>  1 (2, 3, 4 In-Context)
	<b>2.06 Uses soldering and brazing equipment</b>  1 (2, 3, 4 In-Context)				
<b>A-3 Organizes work</b>	<b>3.01 Organizes project tasks and procedures</b>  1 (2, 3, 4 In-Context)	<b>3.02 Organizes materials and supplies</b>  1 (2, 3, 4 In-Context)	<b>3.03 Uses Documentation</b>  1 (2, 3, 4 In-Context)		
<b>A-4 Performs routine trade activities</b>	<b>4.01 Plans layout for piping system</b>  1, 2 (3, 4 In-Context)	<b>4.02 Calculates tube, tubing and pipe lengths</b>  1, 2 (3, 4 In-Context)	<b>4.03 Installs piping supports</b>  1, 2 (3, 4 In-Context)	<b>4.04 Installs piping sleeves</b>  1, 2 (3, 4 In-Context)	<b>4.05 Commissions systems</b>  1, 2 (3, 4 In-Context)
	<b>4.06 Protects piping systems, equipment and structure from damage</b>  1, 2 (3, 4 In-Context)	<b>4.07 Coordinates excavation and backfilling of trenches</b>  1, 2 (3, 4 In-Context)	<b>4.08 Installs fire stopping devices and materials</b>  1, 2 (3, 4 In-Context)		

**A-5 Uses communication and mentoring techniques**

**5.01 Uses communication techniques**  
  
1

**5.02 Uses mentoring techniques**  
  
4

## B – PREPARES AND ASSEMBLES TUBE, TUBING AND PIPE

**10%**

**B-6 Prepares tube, tubing and pipe**

**6.01 Inspects tube, tubing, pipe and fittings before installation**  
  
1  
(2, 3, 4 In-Context)

**6.02 Cuts tube, tubing and pipe**  
  
1  
(2, 3, 4 In-Context)

**6.03 Bends tube, tubing and pipe**  
  
1  
(2, 3, 4 In-Context)

**6.04 Prepares tube, tubing and pipe connections**  
  
1  
(2, 3, 4 In-Context)

**B-7 Joins tube, tubing and pipe**

**7.01 Joins copper tube, tubing and pipe**  
  
1  
(2, 3, 4 In-Context)

**7.02 Joins plastic tube, tubing and pipe**  
  
1  
(2, 3, 4 In-Context)

**7.03 Joins steel tube, tubing and pipe**  
  
1  
(2, 3, 4 In-Context)

**7.04 Joins cast iron pipe**  
  
1  
(2, 3, 4 In-Context)

**7.05 Joins specialized tube, tubing and pipe**  
  
1  
(2, 3, 4 In-Context)

## C – INSTALLS, TESTS AND SERVICES SEWERS, SEWAGE TREATMENT SYSTEMS AND DRAINAGE, WASTE AND VENT (DWV) SYSTEMS

**26%**

**C-8 Installs, tests and services sewers**

**8.01 Plans layout and sizes piping for sewers**  
  
3  
(4 In-context)

**8.02 Installs maintenance holes and catch basins**  
  
3  
(4 In-Context)

**8.03 Installs piping for sewers**  
  
3  
(4 In-Context)

**8.04 Tests maintenance holes, catch basins and piping for sewers**  
  
3  
(4 In-Context)

**8.05 Services maintenance holes, catch basins and piping for sewers**  
  
3  
(4 In-Context)

**C-9 Installs, tests and services sewage treatment systems**

**9.01 Plans installation of sewage treatment systems**  
  
4

**9.02 Installs components for sewage treatment system**  
  
4

**9.03 Tests sewage treatment systems**  
  
4

**9.04 Services sewage treatment systems**  
  
4

**C-10 Installs, tests and services interior drainage, waste and vent (DWV) systems**

**10.01 Plans layout and sizes piping for interior drainage, waste, and vent (DWV) systems**  
  
1, 2, 3  
(4 In-context)

**10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems**  
  
1, 2, 3  
(4 In-context)

**10.03 Installs above-ground piping and components for interior drainage, waste and vent (DWV) systems**  
  
1, 2, 3  
(4 In-context)

**10.04 Tests interior drainage, waste and vent (DWV) systems**  
  
1, 2, 3  
(4 In-context)

**10.05 Services interior drainage, waste and vent (DWV) systems**  
  
1, 2, 3  
(4 In-context)

## D – INSTALLS, TESTS AND SERVICES WATER SERVICE AND DISTRIBUTION

19%

<b>D-11 Installs, tests and services water service</b>	<b>11.01 Plans layout and sizes piping and components for water service</b>  3 (4 In-Context)	<b>11.02 Installs piping for water services</b>  3 (4 In-Context)	<b>11.03 Installs components for water service</b>  3 (4 In-Context)	<b>11.04 Tests water service piping and components</b>  3 (4 In-Context)	<b>11.05 Services water service piping and components</b>  3 (4 In-Context)
<b>D-12 Installs, tests and services potable water distribution systems</b>	<b>12.01 Plans layout and sizes piping and components for potable water distribution systems</b>  3 (4 In-Context)	<b>12.02 Installs piping for potable water distribution systems</b>  3 (4 In-Context)	<b>12.03 Installs components for potable water distribution systems</b>  3 (4 In-Context)	<b>12.04 Installs cross-connection controls</b>  3 (4 In-Context)	<b>12.05 Tests potable water distribution systems</b>  3 (4 In-Context)
	<b>12.06 Services potable water distribution systems</b>  3 (4 In-Context)				
<b>D-13 Installs, tests and services private water pressure systems</b>	<b>13.01 Plans layout and sizes piping and components for private water pressure systems</b>  4	<b>13.02 Installs piping for private water pressure systems</b>  4	<b>13.03 Installs components for private water pressure systems</b>  4	<b>13.04 Tests private water pressure systems</b>  4	<b>13.05 Services private water pressure systems</b>  4

## E – INSTALLS, TESTS AND SERVICES FIXTURES, APPLIANCES AND WATER TREATMENT SYSTEMS

13%

<b>E-14 Installs, tests and services plumbing fixtures and appliances</b>	<b>14.01 Installs fixture supports</b>  2 (3, 4 In-Context)	<b>14.02 Installs plumbing fixtures and appliances</b>  2 (3, 4 In-Context)	<b>14.03 Tests plumbing fixtures and appliances</b>  2 (3, 4 In-Context)	<b>14.04 Services plumbing fixtures and appliances</b>  2 (3, 4 In-Context)
<b>E-15 Installs, tests and services water treatment systems</b>	<b>15.01 Sizes water treatment systems</b>  4	<b>15.02 Installs water treatment systems</b>  4	<b>15.03 Tests water treatment systems</b>  4	<b>15.04 Services water treatment systems</b>  4

## F – INSTALLS, TESTS AND SERVICES LOW PRESSURE STEAM AND HYDRONIC SYSTEMS

13%

Tasks within this Major Work Activity is not consistently performed by Plumbers across Canada, therefore content deemed not common core will **not** be assessed on the Plumber certification examination.

<b>F-16 Installs, tests and services low pressure steam systems (Not Common Core)</b>	<b>16.01 Plans layout and sizes piping and components for low pressure steam systems</b>  (Not Common Core)	<b>16.02 Installs piping and components for low pressure steam systems</b>  (Not Common Core)	<b>16.03 Tests low pressure steam systems</b>  (Not Common Core)	<b>16.04 Services low pressure steam systems</b>  (Not Common Core)
<b>F-17 Installs, tests and services piping and components for hydronic systems</b>	<b>17.01 Plans layout and sizes piping and components for hydronic systems</b>  2, 3 (4 In-Context)	<b>17.02 Installs piping and components for hydronic systems</b>  2, 3 (4 In-Context)	<b>17.03 Tests hydronic systems</b>  2, 3 (4 In-Context)	<b>17.04 Services hydronic systems</b>  2, 3 (4 In-Context)
<b>F-18 Installs, tests and services hydronic heating and cooling equipment</b>	<b>18.01 Installs hydronic heating equipment</b>  2, 3 (4 In-Context)	<b>18.02 Installs hydronic cooling equipment</b>  2, 3 (4 In-Context)	<b>18.03 Tests hydronic heating and cooling equipment</b>  2, 3 (4 In-Context)	<b>18.04 Services hydronic heating and cooling equipment</b>  2, 3 (4 In-Context)

## G – INSTALLS, TESTS AND SERVICES SPECIALIZED SYSTEMS

8%

Tasks within this Major Work Activity is not consistently performed by Plumbers across Canada, therefore content deemed not common core will **not** be assessed on the Plumber certification examination.

<b>G-19 Installs, tests and services specialized systems</b>	<b>19.01 Plans Layout and sizes piping and components for process piping systems</b>  4	<b>19.02 Installs piping for process piping systems</b>  4	<b>19.03 Installs components for process piping systems</b>  4	<b>19.04 Tests process piping systems</b>  4	<b>19.05 Services process piping systems</b>  4
<b>G-20 Installs, tests and services potable water fire protection systems (Not Common Core)</b>	<b>20.01 Plans layout and sizes piping for potable water fire protection systems</b>  (Not Common Core)	<b>20.02 Installs potable water fire protection systems</b>  (Not Common Core)	<b>20.03 Tests potable water fire protection systems</b>  (Not Common Core)	<b>20.04 Services potable water fire protection services</b>  (Not Common Core)	
<b>G-21 Installs, tests, and services other specialized systems</b>	<b>21.01 Plans layout and sizes piping, components and equipment for other specialized systems</b>  3, 4	<b>21.02 Installs piping and components for other specialized systems</b>  3, 4	<b>21.03 Installs equipment for other specialized systems</b>  3, 4	<b>21.04 Tests other specialized systems</b>  3, 4	<b>21.05 Services other specialized systems</b>  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
Trade Related Safety	SAFE 130 – Theory	15
	SAFE 131 – Shop	15
Basic Tools and Equipment	TOOL 137 – Theory	30
	TOOL 138 – Shop	30
Piping Fundamentals	PIPE 140 – Theory	30
	PIPE 141 – Shop	30
Introduction to Graphics	GRPH 132	30
Plumbing Codebook	CODE 170	30
Gasfitting (Exceed)	PIPE 150	30
		240

Level Two	Transcript Code	Hours
Plumbing Codebook	CODE 270 – Theory	27
	CODE 271 – Shop	27
Plumbing Systems	PIPE 240 – Theory	27
	PIPE 241 – Shop	27
Hydronic Systems	HDRO 260 – Theory	47
	HDRO 261 – Shop	7
Gasfitting (Exceed)	PIPE 280 – Theory	42
	PIPE 283 – Shop	12
Electric Controls (Exceed)	ELEC 281	24
		240

Level Three	Transcript Code	Hours
Plumbing Codebook	CODE 370 – Theory	27
	CODE 371 – Shop	27
Plumbing Systems	PIPE 340	54
Hydronic Systems	HDRO 360	27
Gasfitting (Exceed)	PIPE 350 – Theory	27
	PIPE 351 – Shop	27
Electric Controls (Exceed)	ELEC 370	24
Gas Appliance Service (Exceed)	HVAC 300	27
		240

Level Four	Transcript Code	Hours
Water Conditioning	WTER 421	27
Pump and Private Water Supply	WTER 420	27
Introduction to Low Pressure Steam	STEA 450	27
Special Piping Systems	PIPE 448	27
Process Piping	PIPE 449	27
Graphics	GRPH 432	27
Gasfitting (Exceed)	PIPE 450	27
Electric Controls (Exceed)	ELEC 470	24
Plumber Codebook	CODE 4XX*	27
*subject to change		240

### Exceed Topics

Throughout this guide to course content there are topics, which exceed the scope of work set out by the Plumber RSOS. Industry in Saskatchewan has deemed certain topics to fall within the scope of work of the Plumber 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.

The Red Seal Plumber 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>Trade Related Safety – Theory</b>		<b>15 hours</b>
<ul style="list-style-type: none"><li>• discuss safe work practices</li><li>• discuss WHMIS</li><li>• discuss lockout and tag out procedures</li></ul>		
<b>Trade Related Safety – Shop</b>		<b>15 hours</b>
<ul style="list-style-type: none"><li>• demonstrate safe work practices</li><li>• apply WHMIS</li><li>• perform lockout and tag out procedures</li></ul>		
<b>RSOS topics covered in this section of training:</b>		
<b>A-1 Safety-related functions</b>		
A-1.01 Maintains safe work environment		
<ul style="list-style-type: none"><li>• safe work practices</li><li>• regulatory requirements pertaining to workplace safety</li></ul>		
A-1.02 Uses personal protective equipment (PPE) and safety equipment		
<ul style="list-style-type: none"><li>• PPE and safety equipment, its applications, maintenance and procedures for use</li><li>• regulatory requirements pertaining to PPE and safety equipment</li></ul>		
A-1.03 Performs lock-out and tag-out procedures		
<ul style="list-style-type: none"><li>• regulations, applications and procedures for locking out equipment</li></ul>		
<b>Introduction to Graphics</b>		<b>30 hours</b>
<ul style="list-style-type: none"><li>• explain drafting tools</li><li>• use drafting tools</li><li>• discuss graphics language, measurements and standards</li><li>• explain graphical single line projections</li><li>• draw single line projections</li></ul>		
<b>RSOS topics covered in this section of training:</b>		
<b>A-3 Organizes work</b>		
A-3.01 Organizes project tasks and procedures		
<ul style="list-style-type: none"><li>• procedures to plan and organize work</li><li>• project costs and efficient trade practices</li><li>• job-specific technology</li></ul>		
A-3.02 Organizes materials and supplies		
<ul style="list-style-type: none"><li>• procedures to organize and maintain materials and supplies</li><li>• job-specific technology</li></ul>		
A-3.03 Uses documentation		
<ul style="list-style-type: none"><li>• documentation, its purpose, application and use</li><li>• technical documents and documentation, their characteristics and applications</li><li>• procedures to use and interpret technical documents and documentation</li></ul>		



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**Basic Tools and Equipment – Theory****30 hours**

- discuss the use and care of hand and power tools
- discuss access equipment
- explain hoisting and rigging equipment
- explain crane hand signals
- discuss knots and hitches describe welding equipment
- explain soldering and brazing equipment

**Basic Tools and Equipment – Shop****30 hours**

- demonstrate the safe use and care of hand and power tools
- demonstrate access equipment use
- use hoisting and rigging equipment
- use crane hand signals
- tie knots and hitches
- use welding equipment
- perform soldering and brazing

**RSOS topics covered in this section of training:****A-2 Tools and Equipment**

## A-2.01 Uses common tools and equipment

- tools and equipment, their applications, maintenance and procedures for use

## A-2.02 Uses access equipment

- ladders and aerial work platforms, their applications, limitations and procedures for use

## A-2.03 Uses rigging, hoisting, lifting and positioning equipment

- rigging, hoisting, lifting and positioning equipment, their application, limitations and procedures for use
- calculations required when performing hoisting and lifting and positioning operations
- inspection for rigging, hoisting, lifting and positioning equipment

## A-2.04 Rigs loads for cranes

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

## A-2.05 Uses welding equipment

- welding equipment, applications and procedures for not-pressure and non-structural welds

## A-2.06 Uses soldering and brazing equipment

- soldering and brazing equipment, application and procedures
- disarming the work area location within the fire monitoring system

**A-5 Communication Techniques**

## A-5.01 Uses communication techniques

- trade terminology
- effective communication practices

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**Piping Fundamentals – Theory****30 hours**

- discuss piping system layout
- discuss piping system measurements
- explain piping system offsets
- identify pipe support systems
- discuss pipe sleeves
- define piping system commissioning
- discuss piping system protection

## Piping Fundamentals – Shop

30 hours

- assemble copper tube and tubing
- assemble plastic tube and tubing
- assemble steel pipe project
- install a hybrid piping system

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

#### A-4 Routine Trade Activates

##### A-4.01 – Plans layout for piping systems

- various piping and equipment layouts and applications
- procedures to lay out piping systems
- training and certification requirements to lay out piping systems
- regulatory requirements to lay out piping systems
- emerging technologies and practices pertaining to laying out piping systems

##### A-4.02 Calculates tube, tubing and pipe lengths

- tube, tubing and pipe, their characteristics and applications
- procedures to calculate tube, tubing and pipe lengths
- regulatory requirements pertaining to tube, tubing, pipe and offsets length
- emerging technologies and practices pertaining to pipe, tube, tubing and offsets length

##### A-4.03 Installs piping supports

- piping supports and hangers, their characteristics and applications
- procedures to install piping supports and hangers
- training and certification requirements to install piping supports and hangers
- regulatory requirements to install piping supports and hangers
- emerging technologies and practices pertaining to installing piping supports and hangers

##### A-4.04 Installs piping sleeves

- piping sleeves, their characteristics and applications
- procedures to install piping sleeves
- training and certification requirements to install piping sleeves
- regulatory requirements to install piping sleeves
- emerging technologies and practices pertaining to installing piping sleeves

##### A-4.05 Commissions systems

- commissioning and its associated procedures
- training and certification requirements to commission systems
- regulatory requirements pertaining to commissioning systems

##### A-4.06 Protects piping systems, equipment and structure from damage

- methods used to protect piping systems, equipment and structure from damage
- procedures to protect piping systems, equipment and structure from damage
- training and certification requirements to protect piping systems, equipment and structure from damage
- regulatory requirements to protect piping systems, equipment and structure from damage

##### A-4.07 Coordinates excavation and backfilling of trenches

- excavating, backfilling and compacting trenches
- procedures to excavate, backfill and compact trenches
- training and certification requirements pertaining to excavating, backfilling and compacting trenches
- regulatory requirements pertaining to excavating, backfilling and compacting trenches
- emerging technologies and practices pertaining to excavating, backfilling and compacting trenches

##### A-4.08 Installs fire stopping devices and materials

- fire stopping devices and materials, their characteristics, applications and operation

- procedures to install fire stopping devices and materials
- training and certification requirements to install fire stopping devices and materials
- regulatory requirements to install fire stopping devices and materials
- emerging technologies and practices pertaining to the installation of fire stopping devices and materials

## **B-6 Prepares and Assembles Tube, Tubing and Pipe**

### **B-6.01 Inspects tube, tubing, pipe and fittings before installation**

- tube, tubing, pipe and fittings, their accessories, characteristics and applications
- procedures to measure tube, tubing, pipe and fittings
- procedures to inspect tube, tubing, pipe, fittings and accessories
- regulatory requirements pertaining to tube, tubing, pipe, fittings, and accessories

### **B-6.02 Cuts tube, tubing and pipe**

- tube, tubing, piping, fittings and accessories
- procedures used to measure and cut tube, tubing and pipe
- regulatory requirements pertaining to tube, tubing and pipe
- emerging technologies and practices pertaining to tube, tubing and pipe

### **B-6.03 Bends tube, tubing and pipe**

- tube, tubing, pipe and fittings, and their characteristics and applications
- procedures to bend tube, tubing and pipe
- regulatory requirements to bend tube, tubing and pipe
- emerging technologies and practices pertaining to bending tube, tubing and pipe

### **B-6.04 Prepares tube, tubing and pipe connections**

- tube, tubing, pipe and fittings, and their accessories, characteristics and applications
- procedures to prepare tube, tubing and pipe
- regulatory requirements pertaining to preparing tube, tubing and pipe connections
- emerging technologies and practices pertaining to preparing tube, tubing and pipe connections

## **B-7 Joins Tube, Tubing, and Pipe**

### **B-7.01 Joins copper tube, tubing and pipe**

- copper tube, tubing and pipe, and their fittings, accessories, characteristics and applications
- procedures to join copper tube, tubing and pipe
- training and certification requirements pertaining to copper tube, tubing and pipe
- regulatory requirements pertaining to copper tube, tubing and pipe

### **B-7.02 Joins plastic tube, tubing and pipe**

- plastic tube, tubing and pipe, and their fittings, accessories, characteristics and applications
- procedures to join plastic tube, tubing and pipe
- training and certification requirements pertaining to plastic tube, tubing and pipe
- regulatory requirements pertaining to joining plastic tube, tubing and pipe

### **B-7.03 Joins steel tube, tubing and pipe**

- steel tube, tubing and pipe and their fittings, accessories, characteristics and applications
- procedures to join steel tube, tubing and pipe
- training and certification requirements pertaining to steel tube, tubing and pipe
- regulatory requirements pertaining to steel tube, tubing and pipe

### **B-7.04 Joins cast iron pipe**

- cast iron piping, and their fittings, accessories, characteristics and applications
- procedures to join cast iron piping
- regulatory requirements pertaining to cast iron piping

### **B-7.05 Joins specialized tube, tubing and pipe**

- specialized tube, tubing, pipe and fittings, and their accessories, characteristics and applications
- procedures to join specialized tube, tubing and pipe, their fittings and accessories
- training and certification requirements pertaining to specialized tube, tubing and pipe
- regulatory requirements pertaining to specialized tube, tubing and pipe

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## Plumbing Codebook

30 hours

- explain drainage piping components
- explain dry venting
- explain wet venting
- size drainage, waste and venting (DWV) line drawings
- discuss rough-in requirements
- install bathroom rough-in

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

#### C-10 Installs, tests and services interior drainage, waste and vent (DWV) systems

- C-10.01 Plans layout and sizes piping for interior drainage, waste and vent (DWV) systems
- interior DWV systems, their piping arrangements, purposes, characteristics and applications
  - procedures to plan layout and size piping for interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems
- interior DWV systems, their components, purposes, characteristics, applications and operation
  - procedures to lay out and install underground piping and components for interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.03 Installs above-ground piping and components for interior drainage, waste and vent (DWV) systems
- interior DWV systems, their components, purposes, characteristics, applications and operation
  - procedures to lay out and install above-ground piping and components for interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.04 Tests interior drainage, waste and vent (DWV) systems
- interior DWV systems, their purposes, characteristics, applications and operation
  - procedures used for testing interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.05 Services interior drainage, waste and vent (DWV) systems
- interior DWV systems, their components, purposes, characteristics, applications and operation
  - procedures to service interior DWV systems
  - regulatory requirements pertaining to interior DWV systems

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## Gasfitting

30 hours

- explain the delivery system for natural and propane gases
- discuss the properties of natural, propane and butane gases
- explain gas codes
- install a natural gas piping system
- commission a natural gas piping system

**This section of training exceeds the minimum sequencing as set out by the Plumber RSOS.**

**Plumbing Systems – Theory****27 hours**

- describe potable water distribution systems
- distinguish different piping materials for drainage, waste and vent and potable water systems
- discuss piping system protection
- discuss fire stopping materials
- explain fixtures and trim

**Plumbing Systems – Shop****27 hours**

- plan piping system layout
- size piping system layout
- install rough-in plumbing
- install fixtures and trim
- test drainage, waste and venting (DWV) and potable water systems
- inspect DWV and potable water systems

**RSOS topics covered in this section of training:****A-4 Routine Trade Activates****A-4.01 Plans layout for piping systems**

- various piping and equipment layouts and applications
- procedures to lay out piping systems
- training and certification requirements to lay out piping systems
- regulatory requirements to lay out piping systems
- emerging technologies and practices pertaining to laying out piping systems

**A-4.02 Calculates tube, tubing and pipe lengths**

- tube, tubing and pipe, their characteristics and applications
- procedures to calculate tube, tubing and pipe lengths
- regulatory requirements pertaining to tube, tubing, pipe and offsets length
- emerging technologies and practices pertaining to pipe, tube, tubing and offsets length

**A-4.03 Installs piping supports**

- piping supports and hangers, their characteristics and applications
- procedures to install piping supports and hangers
- training and certification requirements to install piping supports and hangers
- regulatory requirements to install piping supports and hangers
- emerging technologies and practices pertaining to installing piping supports and hangers

**A-4.04 Installs piping sleeves**

- piping sleeves, their characteristics and applications
- procedures to install piping sleeves
- training and certification requirements to install piping sleeves
- regulatory requirements to install piping sleeves
- emerging technologies and practices pertaining to installing piping sleeves

**A-4.05 Commissions systems**

- commissioning and its associated procedures
- training and certification requirements to commission systems
- regulatory requirements pertaining to commissioning systems

**A-4.06 Protects piping systems, equipment and structure from damage**

- methods used to protect piping systems, equipment and structure from damage
- procedures to protect piping systems, equipment and structure from damage
- training and certification requirements to protect piping systems, equipment and structure from damage
- regulatory requirements to protect piping systems, equipment and structure from damage

A-4.07 Coordinates excavation and backfilling of trenches

- excavating, backfilling and compacting trenches
- procedures to excavate, backfill and compact trenches
- training and certification requirements pertaining to excavating, backfilling and compacting trenches
- regulatory requirements pertaining to excavating, backfilling and compacting trenches
- emerging technologies and practices pertaining to excavating, backfilling and compacting trenches

A-4.08 Installs fire stopping devices and materials

- fire stopping devices and materials, their characteristics, applications and operation
- procedures to install fire stopping devices and materials
- training and certification requirements to install fire stopping devices and materials
- regulatory requirements to install fire stopping devices and materials
- emerging technologies and practices pertaining to the installation of fire stopping devices and materials

**E-14 Installs, tests and services plumbing fixtures and appliances**

E-14.01 Installs fixture supports

- plumbing fixture supports, their characteristics and applications
- procedures to install plumbing fixture supports
- regulatory requirements pertaining to fixture supports

E-14.02 Installs plumbing fixtures and appliances

- plumbing fixtures and appliances, their characteristics, applications and operation
- procedures to install plumbing fixtures and appliances
- regulatory requirements to install plumbing fixtures and appliances
- emerging technologies and practices pertaining to installing plumbing fixtures and appliances

E-14.03 Tests plumbing fixtures and appliances

- plumbing fixtures and appliances, their characteristics, applications and operation
- procedures used for testing plumbing fixtures and appliances
- regulatory requirements pertaining to plumbing fixtures and appliances

E-14.04 Services plumbing fixtures and appliances

- plumbing fixtures and appliances, their characteristics, applications and operation
- procedures to service plumbing fixtures and appliances
- regulatory requirements pertaining to plumbing fixtures and appliances

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**Hydronic Systems - Theory**

**47 hours**

- explain the chemical and physical properties of water
- perform mathematical calculations
- describe boilers
- describe boiler trim
- explain circulating pump components
- describe zoning
- describe piping layouts
- discuss heat emitters

**Hydronic Systems - Shop**

**7 hours**

- identify boiler trim components
- interpret circulating pump curves
- operate hydronic systems

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

**F-17 Installs, tests and services piping and components for hydronic systems**

F-17.01 Plans layout and sizes piping and components for hydronic systems

- fluid fundamentals, and their characteristics and applications
- factors that impact design
- hydronic systems, piping and components, their characteristics, applications and operation
- procedures to size piping and components for hydronic systems
- training and certification requirements pertaining to hydronic systems
- regulatory requirements pertaining to hydronic systems
- emerging technologies and practices pertaining to hydronic systems

F-17.02 Installs piping and components for hydronic systems

- hydronic systems, piping and components, their characteristics, applications and operation
- procedures to install piping and components for hydronic systems
- training and certification requirements pertaining to hydronic systems
- regulatory requirements pertaining to hydronic systems
- emerging technologies and practices pertaining to hydronic systems

F-17.03 Tests hydronic systems

- hydronic systems, piping and components, their characteristics, applications and operation
- procedures used for testing piping and components for hydronic systems
- training and certification requirements to test piping and components for hydronic systems
- regulatory requirements pertaining to testing piping and components for hydronic systems
- emerging technologies and practices pertaining to hydronic systems

F-17.04 Services hydronic systems

- hydronic systems, piping and components, their characteristics, applications and operation
- procedures to service piping and components for hydronic systems
- documenting service for hydronic systems
- training and certification requirements to service piping and components for hydronic systems
- regulatory requirements pertaining to servicing piping and components for hydronic systems
- emerging technologies and practices pertaining to hydronic systems

**F-18 Installs, tests and services hydronic heating and cooling equipment**

F-18.01 Installs hydronic heating equipment

- hydronic heating equipment, their characteristics, applications and operation
- procedures to install hydronic heating equipment
- training and certification requirements pertaining to hydronic heating equipment
- regulatory requirements pertaining to hydronic heating equipment
- emerging technologies and practices pertaining to hydronic heating equipment

F-18.02 Installs hydronic cooling equipment

- hydronic cooling equipment, their characteristics, applications and operation
- procedures to install hydronic cooling equipment
- training and certification requirements pertaining to hydronic cooling equipment
- regulatory requirements pertaining to hydronic cooling equipment
- emerging technologies and practices pertaining to hydronic cooling equipment

F-18.03 Tests hydronic heating and cooling equipment

- hydronic heating and cooling equipment, their characteristics, applications and operation
- procedures to test hydronic heating and cooling equipment
- training and certification requirements pertaining to hydronic heating and cooling equipment
- regulatory requirements pertaining to hydronic heating and cooling equipment
- emerging technologies and practices pertaining to hydronic heating and cooling equipment

F-18.04 Services hydronic heating and cooling equipment

- hydronic heating and cooling equipment, their characteristics, applications and operation
- procedures to service hydronic heating and cooling equipment
- documenting service for hydronic heating and cooling equipment
- training and certification requirements pertaining to hydronic heating and cooling equipment

- regulatory requirements pertaining to hydronic heating and cooling equipment
- emerging technologies and practices pertaining to hydronic heating and cooling equipment

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### Plumbing Codebook – Theory

27 hours

- demonstrate orthographic projections
- demonstrate isometric projections
- apply codebook objectives for drainage, waste and venting (DWV) systems
- explain blueprints
- explain building specifications

### Plumbing Codebook – Shop

27 hours

- construct an orthographic drawing using an isometric template
- construct an isometric drawing using an orthographic template
- perform mathematical calculations
- demonstrate the relationship between the plumbing code, blueprints and specifications
- size drainage, waste and vent (DWV) systems
- draw DWV single line piping systems

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

#### C-10 Installs, tests and services interior drainage, waste and vent (DWV) systems

- C-10.01 Plans layout and sizes piping for interior drainage, waste and vent (DWV) systems
- interior DWV systems, their piping arrangements, purposes, characteristics and applications
  - procedures to plan layout and size piping for interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
  - emerging technologies and practices pertaining to interior DWV systems
- C-10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems
- interior DWV systems, their components, purposes, characteristics, applications and operation
  - procedures to lay out and install underground piping and components for interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.03 Installs above-ground piping and components for interior drainage, waste and vent (DWV) systems
- interior DWV systems, their components, purposes, characteristics, applications and operation
  - procedures to lay out and install above-ground piping and components for interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.04 Tests interior drainage, waste and vent (DWV) systems
- interior DWV systems, their purposes, characteristics, applications and operation
  - procedures used for testing interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.05 Services interior drainage, waste and vent (DWV) systems
- interior DWV systems, their components, purposes, characteristics, applications and operation
  - procedures to service interior DWV systems
  - regulatory requirements pertaining to interior DWV systems

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### Gasfitting – Theory

42 hours

- discuss line sizing techniques for piping systems operating at two psi and less
- discuss the combustion process pertaining to gas appliances
- perform mathematical calculations
- apply the B149.1 and B149.2 national and provincial codes
- describe gas burners
- explain domestic controls



## Gasfitting – Shop

12 hours

- layout gas distribution piping system
- layout the venting system
- apply manufacturers' guidelines for furnace positioning
- perform start up procedures

**This section of training exceeds the minimum sequencing as set out by the Plumber RSOS.**

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## Electric Controls

24 hours

- describe basic electrical concepts.
- measure voltage, current, resistance, and capacitance.
- interpret wiring diagrams.
- test standing pilot appliance controls.
- terminate wires.

**Exceeds RSOS scope of work.**

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

*A-2 Tools and Equipment*

*A-3 Organizes Work*

*B-6 Prepares Tube, Tubing and Pipe*

*B-7 Joins Tube, Tubing, and Pipe*

*For details regarding the In Context Topics, see pages 38-44*

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## Level Three

8 weeks

240 hours

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### Plumbing Codebook – Theory

27 hours

- demonstrate non-isometric lines
- identify procedures for establishing elevations with the builder's level
- identify procedures for establishing elevations with the laser level
- size storm drainage systems
- calculate grade and elevation
- solve sanitary drainage, waste and venting scenarios

### Plumbing Codebook – Shop

27 hours

- produce isometric drawings of drainage, waste and vent (DWV) systems
- demonstrate the use of a builder's level
- demonstrate the use of a laser level
- implement grid lines
- design a DWV system

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

#### C-10 Installs, tests and services interior drainage, waste and vent (DWV) systems

##### C-10.01 Plans layout and sizes piping for interior drainage, waste and vent (DWV) systems

- interior DWV systems, their piping arrangements, purposes, characteristics and applications
- procedures to plan layout and size piping for interior DWV systems
- regulatory requirements pertaining to interior DWV systems
- emerging technologies and practices pertaining to interior DWV systems

##### C-10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems

- interior DWV systems, their components, purposes, characteristics, applications and operation
- procedures to lay out and install underground piping and components for interior DWV systems
- regulatory requirements pertaining to interior DWV systems

##### C-10.03 Installs above-ground piping and components for interior drainage, waste and vent (DWV) systems

- interior DWV systems, their components, purposes, characteristics, applications and operation
- procedures to lay out and install above-ground piping and components for interior DWV systems
- regulatory requirements pertaining to interior DWV systems

##### C-10.04 Tests interior drainage, waste and vent (DWV) systems

- interior DWV systems, their purposes, characteristics, applications and operation
- procedures used for testing interior DWV systems
- regulatory requirements pertaining to interior DWV systems

##### C-10.05 Services interior drainage, waste and vent (DWV) systems

- interior DWV systems, their components, purposes, characteristics, applications and operation
- procedures to service interior DWV systems
- regulatory requirements pertaining to interior DWV systems

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### Hydronic Systems

27 hours

- discuss pump sciences
- calculate circulator requirements
- explain radiant heating concepts
- discuss piping strategy for multi temperature applications
- discuss design requirements for radiant panel heating systems
- recognize control systems
- discuss hydronic heating and cooling distribution piping

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

### **F-17 Installs, tests and services piping and components for hydronic systems**

- F-17.01 Plans layout and sizes piping and components for hydronic systems
- fluid fundamentals, and their characteristics and applications
  - factors that impact design
  - hydronic systems, piping and components, their characteristics, applications and operation
  - procedures to size piping and components for hydronic systems
  - training and certification requirements pertaining to hydronic systems
  - regulatory requirements pertaining to hydronic systems
  - emerging technologies and practices pertaining to hydronic systems
- F-17.02 Installs piping and components for hydronic systems
- hydronic systems, piping and components, their characteristics, applications and operation
  - procedures to install piping and components for hydronic systems
  - training and certification requirements pertaining to hydronic systems
  - regulatory requirements pertaining to hydronic systems
  - emerging technologies and practices pertaining to hydronic systems
- F-17.03 Tests hydronic systems
- hydronic systems, piping and components, their characteristics, applications and operation
  - procedures used for testing piping and components for hydronic systems
  - training and certification requirements to test piping and components for hydronic systems
  - regulatory requirements pertaining to testing piping and components for hydronic systems
  - emerging technologies and practices pertaining to hydronic systems
- F-17.04 Services hydronic systems
- hydronic systems, piping and components, their characteristics, applications and operation
  - procedures to service piping and components for hydronic systems
  - documenting service for hydronic systems
  - training and certification requirements to service piping and components for hydronic systems
  - regulatory requirements pertaining to servicing piping and components for hydronic systems
  - emerging technologies and practices pertaining to hydronic systems

### **F-18 Installs, tests and services hydronic heating and cooling equipment**

- F-18.01 Installs hydronic heating equipment
- hydronic heating equipment, their characteristics, applications and operation
  - procedures to install hydronic heating equipment
  - training and certification requirements pertaining to hydronic heating equipment
  - regulatory requirements pertaining to hydronic heating equipment
  - emerging technologies and practices pertaining to hydronic heating equipment
- F-18.02 Installs hydronic cooling equipment
- hydronic cooling equipment, their characteristics, applications and operation
  - procedures to install hydronic cooling equipment
  - training and certification requirements pertaining to hydronic cooling equipment
  - regulatory requirements pertaining to hydronic cooling equipment
  - emerging technologies and practices pertaining to hydronic cooling equipment
- F-18.03 Tests hydronic heating and cooling equipment
- hydronic heating and cooling equipment, their characteristics, applications and operation
  - procedures to test hydronic heating and cooling equipment
  - training and certification requirements pertaining to hydronic heating and cooling equipment
  - regulatory requirements pertaining to hydronic heating and cooling equipment
  - emerging technologies and practices pertaining to hydronic heating and cooling equipment
- F-18.04 Services hydronic heating and cooling equipment
- hydronic heating and cooling equipment, their characteristics, applications and operation
  - procedures to service hydronic heating and cooling equipment
  - documenting service for hydronic heating and cooling equipment
  - training and certification requirements pertaining to hydronic heating and cooling equipment

- regulatory requirements pertaining to hydronic heating and cooling equipment
- emerging technologies and practices pertaining to hydronic heating and cooling equipment

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## Plumbing Systems

54 hours

- describe commercial plumbing fixtures
- recognize cross connection control devices
- explain potable hot water distribution systems
- size potable water distribution systems
- discuss municipal infrastructures
- discuss medical gas systems
- explain radon gas prevention systems
- discuss compressed air systems
- discuss underground sprinkler systems
- discuss swimming pools
- describe special piping systems

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

#### C-8 Installs, tests and services sewers

##### C-8.01 Plans layout and sizes piping for sewers

- sanitary drainage systems, their components, characteristics and applications
- storm and combination drainage systems, their components, characteristics and applications
- procedures to plan layout and size piping for sewers
- regulatory requirements pertaining to sanitary drainage systems, and storm and combination drainage systems

##### C-8.02 Installs maintenance holes and catch basins

- maintenance holes and catch basins, their components, characteristics and applications
- procedures to lay out and install maintenance holes and catch basins
- regulatory requirements pertaining to maintenance holes and catch basins

##### C-8.03 Installs piping for sewers

- sewers, their components, characteristics and applications
- procedures to install piping for sewers
- regulatory requirements pertaining to sewers
- emerging technologies and practices pertaining to sewers

##### C-8.04 Tests maintenance holes, catch basins and piping for sewers

- maintenance holes, catch basins and piping for sewers, their characteristics and applications
- procedures to test maintenance holes, catch basins and piping for sewers
- regulatory requirements to test maintenance holes, catch basins and piping for sewers

C-8.05 Services maintenance holes, catch basins and piping for sewers

- maintenance holes, catch basins and piping for sewers, their components, characteristics and applications
- procedures to service maintenance holes, catch basins and piping for sewers
- regulatory requirements pertaining to maintenance holes, catch basins and piping for sewers
- emerging technologies and practices pertaining to maintenance holes, catch basins and piping for sewers

**D-11 Installs, tests and services water services**

D-11.01 Plans layout and sizes piping and components for water service

- water service piping, their components, characteristics and applications
- procedures to size pipe for water service
- regulatory requirements pertaining to sizing pipe for water service

D-11.02 Installs components for water service

- water service piping and components, their characteristics and applications
- procedures to install water service piping and components
- regulatory requirements pertaining to water services in residential and ICI applications
- emerging technologies and practices pertaining to water services

D-11.03 Installs water service equipment

- water service components, their characteristics, applications and operation
- procedures to install water service components
- training and certification requirements pertaining to installation of water service components
- regulatory requirements pertaining to installation of water service components
- emerging technologies and practices pertaining to installation of water service components

D-11.04 Tests water service piping and components

- water service piping and components, their characteristics and applications
- procedures used for testing water service piping and components
- training and certification requirements pertaining to water service piping and components
- regulatory requirements pertaining to water service piping and components

D-11.05 Services water service piping and components

- water services and components, their characteristics, applications and operation
- procedures to service water services
- training and certification requirements pertaining to servicing water services
- regulatory requirements pertaining to water services
- emerging technologies and practices pertaining to water services

**D-12 Installs, tests and services potable water distribution systems**

D-12.01 Plans layout and sizes piping and components for potable water distribution systems

- potable water distribution systems and components, their characteristics and applications
- procedures to size piping and components for potable water distribution systems
- regulatory requirements pertaining to sizing piping and components for potable water distribution systems

D-12.02 Installs piping for potable water distribution systems

- potable water distribution piping and components
- procedures to install potable water distribution piping and components for potable water distribution systems
- regulatory requirements pertaining to piping for potable water distribution

D-12.03 Installs components for potable water distribution systems

- potable water distribution equipment and components, their characteristics, applications and operation
- procedures to install potable water distribution components
- expansion calculations
- regulatory requirements to install potable water distribution components
- emerging technologies and practices pertaining to installing potable water distribution components

D-12.04 Installs cross-connection controls

- cross-connection controls, their characteristics, applications and operation
- procedures to install cross connection controls
- training and certification requirements pertaining to cross connection controls
- regulatory requirements pertaining to cross connection controls

D-12.05 Tests potable water distribution systems

- potable water distribution systems, their components, characteristics, applications and operation
- procedures to test potable water distribution systems
- training and certification requirements pertaining to testing potable water distribution systems
- regulatory requirements pertaining to testing potable water distribution systems

D-12.06 Services potable water distribution systems

- potable water distribution systems and components, their characteristics, applications and operation
- procedures to service potable water distribution systems
- procedures to service cross connection control devices
- training and certification requirements pertaining to servicing potable water distribution systems
- regulatory requirements pertaining to servicing potable water distribution system

**G-21 Installs, tests and services specialized systems**

G-21.01 Plans layout and sizes piping, components and equipment for other specialized systems

- specialized systems, their piping, components, equipment, properties, characteristics, applications and operation
- procedures to plan layout and size piping, components and equipment for specialized systems
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems
- emerging technologies and practices pertaining to specialized systems

G-21.02 Installs piping and components for other specialized systems

- specialized systems, their piping, components, properties, characteristics, applications and operation
- procedures to install piping and components for specialized systems
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems
- emerging technologies and practices pertaining to specialized systems

G-21.03 Installs equipment for other specialized systems

- specialized systems, their equipment, characteristics, applications and operation
- procedures to install equipment for specialized systems
- procedures to handle, store and transport equipment for specialized systems
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems
- emerging technologies and practices pertaining to specialized systems

G-21.04 Tests other specialized systems

- specialized systems, their piping, components, equipment, characteristics, applications and operation
- procedures to test specialized systems and their piping, components and equipment
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems

G-21.05 Services other specialized systems

- specialized systems, their piping, components, equipment, characteristics, applications and operation
- procedures to service specialized systems and their piping, equipment and components
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems
- emerging technologies and practices pertaining to specialized systems

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**Gasfitting – Theory****27 hours**

- apply line sizing techniques for piping systems operating at two psi and less
- analyze the air supply requirements for gas appliances
- categorize domestic gas fired equipment based on flue loss and draft characteristics
- interpret combustion air code requirements for appliances with inputs of 400 MBH or less
- interpret code requirements for flue gas removal from gas appliances
- examine category one vent system requirements

**Gasfitting – Shop****27 hours**

- size domestic gas line
- determine combustion air opening sizes for Category 1 appliances
- size vent, vent connectors and common vent connectors for Category 1 appliances
- interpret electrical control diagrams

**This section of training exceeds the minimum sequencing as set out by the Plumber RSOS.**

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**Gas Appliance Service****27 hours**

- perform investigative maintenance on a forced air, natural gas furnace system
- perform investigative maintenance on a self-contained heat/cool forced air unit with economizer
- perform investigative maintenance on a residential hydronic heating system
- troubleshoot the mechanical sub-systems of a residential hydronic heating system

**This section of training exceeds the minimum sequencing as set out by the Plumber RSOS.**

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**Electric Controls****24 hours**

- test the operation of electrical circuits
- describe the operation of electrical switches
- use electrical transformers
- use relays in electrical circuits
- compare the characteristics for alternating current (AC) motors

**This section of training exceeds the minimum sequencing as set out by the Plumber RSOS.**

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**Level Three topics from the RSOS that are taught in context:*****A-2 Tools and Equipment******A-3 Organizes Work******A-4 Routine Trade Activates******B-6 Prepares Tube, Tubing and Pipe******B-7 Joins Tube, Tubing, and Pipe******E-14 Installs, tests and services plumbing fixtures and appliances***

***For details regarding the In Context Topics, see pages 38-44***

**Pump and Private Water Supply****27 hours**

- compare the available water sources
- discuss potable water supply system components
- explain pump theory
- design a rural water supply system

**RSOS topics covered in this section of training:****C-9 Installs, tests and services sewage treatment systems****C-9.01 Plans installation of sewage treatment systems**

- private sewage treatment systems, their components, characteristics, applications and operation
- procedures to plan installation of private sewage treatment systems
- training and certification requirements pertaining to private sewage treatment systems
- regulatory requirements pertaining to private sewage treatment systems
- public sewage treatment systems, their components, characteristics and applications
- procedures to plan installation of public sewage treatment systems
- training and certification requirements pertaining to public sewage treatment systems
- regulatory requirements pertaining to public sewage treatment systems
- emerging technologies and practices pertaining to private and public sewage treatment systems

**C-9.02 Installs components for sewage treatment system**

- sewage treatment systems, their components, characteristics, applications and operation
- procedures to install sewage treatment system components
- training and certification requirements pertaining to sewage treatment systems
- regulatory requirements pertaining to sewage treatment systems

**C-9.03 Tests sewage treatment systems**

- sewage treatment systems, their characteristics, applications and operation
- procedures to test sewage treatment systems
- sewage treatment systems and their application
- testing equipment and procedures used for testing sewage treatment systems

**C-9.04 Services sewage treatment systems**

- sewage treatment systems, their components, characteristics, applications and operation
- procedures to service sewage treatment systems
- regulatory requirements pertaining to sewage treatment systems

**D-13 Installs, tests and services private water pressure systems****D-13.01 Plans layout and sizes piping and components for private water pressure systems**

- private water pressure systems and pressure system components, and their characteristics and applications
- procedures to size pressure system components
- regulatory requirements pertaining to private water pressure systems
- emerging technologies and practices pertaining to private water pressure systems

**D-13.02 Installs piping for private water pressure systems**

- private water pressure systems, their characteristics and applications
- procedures to install piping for private water pressure systems
- regulatory requirements pertaining to private water pressure systems

**D-13.03 Installs components for private water pressure systems**

- private water pressure systems, their characteristics and applications
- procedures to install private water pressure system components
- basic concepts of electricity
- procedures used to test electrical circuits



- training and certification requirements pertaining to installation of private water pressure system components
- regulatory requirements pertaining to installation of private water pressure system components
- emerging technologies and practices pertaining to installation of private water pressure system components

D-13.04 Tests private water pressure systems

- private water pressure systems, their characteristics and applications
- procedures to test private water pressure systems
- regulatory requirements pertaining to private water pressure systems

D-13.05 Services private water pressure systems

- private water pressure systems and components, their characteristics and applications
- procedures to service private water pressure systems
- training and certification requirements pertaining to servicing private water pressure systems
- regulatory requirements pertaining to private water pressure systems
- emerging technologies and practices pertaining to private water pressure systems

## Graphics

**27 hours**

- construct isometrics views from orthographic projections
- produce plumbing system design
- produce materials list

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

#### A-3 Organizes work

A-3.01 Organizes project tasks and procedures

- procedures to plan and organize work
- project costs and efficient trade practices
- job-specific technology

A-3.02 Organizes materials and supplies

- procedures to organize and maintain materials and supplies
- job-specific technology

A-3.03 Uses documentation

- documentation, its purpose, application and use
- technical documents and documentation, their characteristics and applications
- procedures to use and interpret technical documents and documentation

#### A-5 Uses communication and mentoring techniques

A-5.02 Uses mentoring techniques

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

## Water Conditioning

**27 hours**

- examine common constituents
- perform water tests
- identify water treatment equipment
- size water treatment equipment
- discuss equipment installation procedures

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

**E-15 Installs, tests and services water treatment systems**

E-15.01 Sizes water treatment systems

- water treatment systems, their characteristics, applications and operation
- procedures to plan layout and size piping and equipment for water treatment systems
- training and certification requirements for testing water quality
- emerging technologies and practices pertaining to water treatment systems

E-15.02 Installs water treatment systems

- water treatment systems, their characteristics, applications and operation
- procedures to install water treatment systems
- regulatory requirements to install water treatment systems
- emerging technologies and practices pertaining to water treatment systems

E-15.03 Tests water treatment systems

- water treatment systems, their characteristics, applications and operation
- testing water treatment systems
- regulatory requirements to test water treatment systems
- emerging technologies and practices pertaining to water treatment systems

E-15.04 Services water treatment systems

- water treatment systems, their characteristics, applications and operation
- procedures to service water treatment systems
- emerging technologies and practices pertaining to water treatment systems

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**Introduction to Low Pressure Steam**

**27 hours**

- use terms and definitions
- discuss steam boilers
- discuss system components
- discuss piping arrangements

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

**F-16 Installs, tests and services low pressure steam systems (Not Common Core)**

F-16.01 Plans layout and sizes piping and components for low pressure steam systems (Not Common Core)

- low-pressure steam systems, their components, characteristics, applications and operation
- procedures to size pipe and components for low-pressure steam systems
- training and certification requirements pertaining to low-pressure steam systems
- regulatory requirements pertaining to low-pressure steam systems
- emerging technologies and practices pertaining to low-pressure steam systems

F-16.02 Installs piping and components for low pressure steam systems (Not Common Core)

- low-pressure steam systems, their components, characteristics, applications and operation
- procedures to install pipe and components for low-pressure steam systems
- training requirements pertaining to low-pressure steam systems
- regulatory requirements pertaining to low-pressure steam systems
- emerging technologies and practices pertaining to low-pressure steam systems

F-16.03 Tests low-pressure steam systems (Not Common Core)

- piping and components for low-pressure steam systems, their characteristics, applications and operation
- procedures used for testing piping and components for low-pressure steam systems
- training requirements pertaining to low-pressure steam systems
- regulatory requirements pertaining to low-pressure steam systems
- emerging technologies and practices pertaining to low-pressure steam systems

#### F-16.04 Services low pressure steam systems (Not Common Core)

- Low-pressure steam systems, their characteristics, applications and operation
- procedures to service piping and components for low-pressure steam systems
- documenting service for low-pressure steam system
- training requirements pertaining to low-pressure steam systems
- regulatory requirements pertaining to low-pressure steam systems
- emerging technologies and practices pertaining to low-pressure steam systems

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### Special Piping Systems

**27 hours**

- explain geothermal heat transfer systems
- explain solar heat transfer systems
- discuss rainwater and greywater reuse
- discuss medical gas systems

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

##### G-21 Installs, tests and services specialized systems

###### G-21.01 Plans layout and sizes piping, components and equipment for other specialized systems

- specialized systems, their piping, components, equipment, properties, characteristics, applications and operation
- procedures to plan layout and size piping, components and equipment for specialized systems
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems
- emerging technologies and practices pertaining to specialized systems

###### G-21.02 Installs piping and components for other specialized systems

- specialized systems, their piping, components, properties, characteristics, applications and operation
- procedures to install piping and components for specialized systems
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems
- emerging technologies and practices pertaining to specialized systems

###### G-21.03 Installs equipment for other specialized systems

- specialized systems, their equipment, characteristics, applications and operation
- procedures to install equipment for specialized systems
- procedures to handle, store and transport equipment for specialized systems
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems
- emerging technologies and practices pertaining to specialized systems

###### G-21.04 Tests other specialized systems

- specialized systems, their piping, components, equipment, characteristics, applications and operation
- procedures to test specialized systems and their piping, components and equipment
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems

###### G-21.05 Services other specialized systems

- specialized systems, their piping, components, equipment, characteristics, applications and operation
- procedures to service specialized systems and their piping, equipment and components
- training and certification requirements pertaining to specialized systems
- regulatory requirements pertaining to specialized systems
- emerging technologies and practices pertaining to specialized systems

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## Process Piping

27 hours

- explain the Saskatchewan Onsite Waste Water guide
- explain piping materials used in water treatment systems
- explain piping materials used in food processing systems
- discuss water reclaim systems

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

#### G-19 Installs, tests and services process piping systems

##### G-19.01 Plans layout and sizes piping and components for process piping systems

- process piping systems, their components, characteristics, applications and operation
- procedures to plan layout and size piping for process piping systems
- training and certification requirements pertaining to process piping systems
- regulatory requirements pertaining to process piping systems
- emerging technologies and practices pertaining to process piping systems

##### G-19.02 Installs piping for process piping systems

- process piping systems, their components, characteristics, applications and operation
- procedures to install piping for process piping systems
- training and certification requirements pertaining to process piping systems
- regulatory requirements pertaining to process piping systems
- emerging technologies and practices pertaining to process piping systems

##### G-19.03 Installs components for process piping systems

- process piping systems, their components, characteristics, applications and operation
- procedures to install process piping components
- procedures to handle, store and transport process piping components
- training and certification requirements pertaining to process piping components
- regulatory requirements pertaining to process piping components
- emerging technologies and practices pertaining to process piping components

##### G-19.04 Tests process piping systems

- process piping systems, their characteristics, applications and operation
- procedures to test process piping systems
- training and certification requirements pertaining to process piping systems
- regulatory requirements pertaining to process piping systems

##### G-19.05 Services process piping systems

- process piping systems, their components, characteristics, applications and operation
- procedures to service process piping systems and their components
- training and certification requirements pertaining to process piping systems
- regulatory requirements pertaining to process piping systems
- emerging technologies and practices pertaining to process piping systems

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## Gasfitting

27 hours

- discuss liquefied petroleum containers
- discuss the gas appliance valve train
- explain sequence of operation from wiring diagrams
- interpret flue gas analysis

**This section of training exceeds the minimum scope of work as set out by the Plumber RSOS.**

- construct a drainage system
- construct a circuit-vented drainage system
- construct a potable water system
- install fixtures complete with fixture trim

**RSOS topics covered in this section of training:****C-8 Installs, tests and services sewers****C-8.01 Plans layout and sizes piping for sewers**

- sanitary drainage systems, their components, characteristics and applications
- storm and combination drainage systems, their components, characteristics and applications
- procedures to plan layout and size piping for sewers
- regulatory requirements pertaining to sanitary drainage systems, and storm and combination drainage systems

**C-8.02 Installs maintenance holes and catch basins**

- maintenance holes and catch basins, their components, characteristics and applications
- procedures to lay out and install maintenance holes and catch basins
- regulatory requirements pertaining to maintenance holes and catch basins

**C-8.03 Installs piping for sewers**

- sewers, their components, characteristics and applications
- procedures to install piping for sewers
- regulatory requirements pertaining to sewers
- emerging technologies and practices pertaining to sewers

**C-8.04 Tests maintenance holes, catch basins and piping for sewers**

- maintenance holes, catch basins and piping for sewers, their characteristics and applications
- procedures to test maintenance holes, catch basins and piping for sewers
- regulatory requirements to test maintenance holes, catch basins and piping for sewers

**C-8.05 Services maintenance holes, catch basins and piping for sewers**

- maintenance holes, catch basins and piping for sewers, their components, characteristics and applications
- procedures to service maintenance holes, catch basins and piping for sewers
- regulatory requirements pertaining to maintenance holes, catch basins and piping for sewers
- emerging technologies and practices pertaining to maintenance holes, catch basins and piping for sewers

**E-14 Installs, tests and services plumbing fixtures and appliances****E-14.01 Installs fixture supports**

- plumbing fixture supports, their characteristics and applications
- procedures to install plumbing fixture supports
- regulatory requirements pertaining to fixture supports

**E-14.02 Installs plumbing fixtures and appliances**

- plumbing fixtures and appliances, their characteristics, applications and operation
- procedures to install plumbing fixtures and appliances
- regulatory requirements to install plumbing fixtures and appliances
- emerging technologies and practices pertaining to installing plumbing fixtures and appliances

**E-14.03 Tests plumbing fixtures and appliances**

- plumbing fixtures and appliances, their characteristics, applications and operation
- procedures used for testing plumbing fixtures and appliances
- regulatory requirements pertaining to plumbing fixtures and appliances

**E-14.04 Services plumbing fixtures and appliances**

- plumbing fixtures and appliances, their characteristics, applications and operation
- procedures to service plumbing fixtures and appliances
- regulatory requirements pertaining to plumbing fixtures and appliances

## **E-15 Installs, tests and services water treatment systems**

### **E-15.01 Sizes water treatment systems**

- water treatment systems, their characteristics, applications and operation
- procedures to plan layout and size piping and equipment for water treatment systems
- training and certification requirements for testing water quality
- emerging technologies and practices pertaining to water treatment systems

### **E-15.02 Installs water treatment systems**

- water treatment systems, their characteristics, applications and operation
- procedures to install water treatment systems
- regulatory requirements to install water treatment systems
- emerging technologies and practices pertaining to water treatment systems

### **E-15.03 Tests water treatment systems**

- water treatment systems, their characteristics, applications and operation
- testing water treatment systems
- regulatory requirements to test water treatment systems
- emerging technologies and practices pertaining to water treatment systems

### **E-15.04 Services water treatment systems**

- water treatment systems, their characteristics, applications and operation
- procedures to service water treatment systems
- emerging technologies and practices pertaining to water treatment systems

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## **Electric Controls**

**24 hours**

- troubleshoot the electrical controls of a standing pilot appliance
- troubleshoot the electrical controls of direct spark or hot surface ignited appliances
- interpret ladder diagrams and connection diagrams
- explain electrical pump controls

**This section of training exceeds the minimum scope of work as set out by the Plumber RSOS.**

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

***A-2 Tools and Equipment***

***A-3 Organizes Work***

***A-4 Routine Trade Activates***

***B-6 Prepares Tube, Tubing and Pipe***

***B-7 Joins Tube, Tubing, and Pipe***

***C-8 Installs, tests and services sewers***

***C-10 Installs, tests and services interior drainage, waste and vent (DWV) systems***

***D-11 Installs, tests and services water services***

***D-12 Installs, tests and services potable water distribution systems***

***E-14 Installs, tests and services plumbing fixtures and appliances***

***F-17 Installs, tests and services hydronic heating and cooling piping systems***

***F-18 Installs, tests and services hydronic heating and cooling generating systems***

***For details regarding the In Context Topics, see pages 38-44***

# 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-2 Tools and Equipment

A-2.01 Uses common tools and equipment

- tools and equipment, their applications, maintenance and procedures for use

A-2.02 Uses access equipment

- ladders and aerial work platforms, their applications, limitations and procedures for use

A-2.03 Uses rigging, hoisting, lifting and positioning equipment

- rigging, hoisting, lifting and positioning equipment, their application, limitations and procedures for use
- calculations required when performing hoisting and lifting and positioning operations
- inspection for rigging, hoisting, lifting and positioning equipment

A-2.04 Rigs loads for cranes

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

A-2.05 Uses welding equipment

- welding equipment, applications and procedures for not-pressure and non-structural welds

A-2.06 Uses soldering and brazing equipment

- soldering and brazing equipment, application and procedures
- disarming the work area location within the fire monitoring system

## A-3 Organizes Work

A-3.01 Organizes project tasks and procedures

- procedures used to plan and organize work
- project costs and efficient trade practices
- job specific technology

A-3.02 Organizes materials and supplies

- procedures used to organize and maintain materials and supplies

A-3.03 Uses documentation

- documentation, its purpose, application and use
- technical documents and documentation, their characteristics and applications
- procedures to use and interpret technical documents and documentation

## A-4 Routine Trade Activates

A-4.01 Plans layout for piping systems

- various piping and equipment layouts and applications
- procedures to lay out piping systems
- training and certification requirements to lay out piping systems
- regulatory requirements to lay out piping systems
- emerging technologies and practices pertaining to laying out piping systems

A-4.02 Calculates tube, tubing and pipe lengths

- tube, tubing and pipe, their characteristics and applications
- procedures to calculate tube, tubing and pipe lengths
- regulatory requirements pertaining to tube, tubing, pipe and offsets length
- emerging technologies and practices pertaining to pipe, tube, tubing and offsets length

A-4.03 Installs piping supports

- piping supports and hangers, their characteristics and applications
- procedures to install piping supports and hangers
- training and certification requirements to install piping supports and hangers
- regulatory requirements to install piping supports and hangers
- emerging technologies and practices pertaining to installing piping supports and hangers

#### A-4.04 Installs piping sleeves

- piping sleeves, their characteristics and applications
- procedures to install piping sleeves
- training and certification requirements to install piping sleeves
- regulatory requirements to install piping sleeves
- emerging technologies and practices pertaining to installing piping sleeves

#### A-4.05 Commissions systems

- commissioning and its associated procedures
- training and certification requirements to commission systems
- regulatory requirements pertaining to commissioning systems

#### A-4.06 Protects piping systems, equipment and structure from damage

- methods used to protect piping systems, equipment and structure from damage
- procedures to protect piping systems, equipment and structure from damage
- training and certification requirements to protect piping systems, equipment and structure from damage
- regulatory requirements to protect piping systems, equipment and structure from damage

#### A-4.07 Coordinates excavation and backfilling of trenches

- excavating, backfilling and compacting trenches
- procedures to excavate, backfill and compact trenches
- training and certification requirements pertaining to excavating, backfilling and compacting trenches
- regulatory requirements pertaining to excavating, backfilling and compacting trenches
- emerging technologies and practices pertaining to excavating, backfilling and compacting trenches

#### A-4.08 Installs fire stopping devices and materials

- fire stopping devices and materials, their characteristics, applications and operation
- procedures to install fire stopping devices and materials
- training and certification requirements to install fire stopping devices and materials
- regulatory requirements to install fire stopping devices and materials
- emerging technologies and practices pertaining to the installation of fire stopping devices and materials

### **B-6 Prepares and Assembles Tube, Tubing and Pipe**

#### B-6.01 Inspects tube, tubing, pipe and fittings before installation

- tube, tubing, pipe and fittings, their accessories, characteristics and applications
- procedures to measure tube, tubing, pipe and fittings
- procedures to inspect tube, tubing, pipe, fittings and accessories
- regulatory requirements pertaining to tube, tubing, pipe, fittings, and accessories

#### B-6.02 Cuts tube, tubing and pipe

- tube, tubing, piping, fittings and accessories
- procedures used to measure and cut tube, tubing and pipe
- regulatory requirements pertaining to tube, tubing and pipe
- emerging technologies and practices pertaining to tube, tubing and pipe

#### B-6.03 Bends tube, tubing and pipe

- tube, tubing, pipe and fittings, and their characteristics and applications
- procedures to bend tube, tubing and pipe
- regulatory requirements to bend tube, tubing and pipe
- emerging technologies and practices pertaining to bending tube, tubing and pipe

#### B-6.04 Prepares tube, tubing and pipe connections

- tube, tubing, pipe and fittings, and their accessories, characteristics and applications
- procedures to prepare tube, tubing and pipe
- regulatory requirements pertaining to preparing tube, tubing and pipe connections
- emerging technologies and practices pertaining to preparing tube, tubing and pipe connections



## **B-7 Joins Tube, Tubing, and Pipe**

### **B-7.01 Joins copper tube, tubing and pipe**

- copper tube, tubing and pipe, and their fittings, accessories, characteristics and applications
- procedures to join copper tube, tubing and pipe
- training and certification requirements pertaining to copper tube, tubing and pipe
- regulatory requirements pertaining to copper tube, tubing and pipe

### **B-7.02 Joins plastic tube, tubing and pipe**

- plastic tube, tubing and pipe, and their fittings, accessories, characteristics and applications
- procedures to join plastic tube, tubing and pipe
- training and certification requirements pertaining to plastic tube, tubing and pipe
- regulatory requirements pertaining to joining plastic tube, tubing and pipe

### **B-7.03 Joins steel tube, tubing and pipe**

- steel tube, tubing and pipe and their fittings, accessories, characteristics and applications
- procedures to join steel tube, tubing and pipe
- training and certification requirements pertaining to steel tube, tubing and pipe
- regulatory requirements pertaining to steel tube, tubing and pipe

### **B-7.04 Joins cast iron pipe**

- cast iron piping, and their fittings, accessories, characteristics and applications
- procedures to join cast iron piping
- regulatory requirements pertaining to cast iron piping

### **B-7.05 Joins specialized tube, tubing and pipe**

- specialized tube, tubing, pipe and fittings, and their accessories, characteristics and applications
- procedures to join specialized tube, tubing and pipe, their fittings and accessories
- training and certification requirements pertaining to specialized tube, tubing and pipe
- regulatory requirements pertaining to specialized tube, tubing and pipe

## **C-8 Installs, tests and services sewers**

### **C-8.01 Plans layout and sizes piping for sewers**

- sanitary drainage systems, their components, characteristics and applications
- storm and combination drainage systems, their components, characteristics and applications
- procedures to plan layout and size piping for sewers
- regulatory requirements pertaining to sanitary drainage systems, and storm and combination drainage systems

### **C-8.02 Installs maintenance holes and catch basins**

- maintenance holes and catch basins, their components, characteristics and applications
- procedures to lay out and install maintenance holes and catch basins
- regulatory requirements pertaining to maintenance holes and catch basins

### **C-8.03 Installs piping for sewers**

- sewers, their components, characteristics and applications
- procedures to install piping for sewers
- regulatory requirements pertaining to sewers
- emerging technologies and practices pertaining to sewers

### **C-8.04 Tests maintenance holes, catch basins and piping for sewers**

- maintenance holes, catch basins and piping for sewers, their characteristics and applications
- procedures to test maintenance holes, catch basins and piping for sewers
- regulatory requirements to test maintenance holes, catch basins and piping for sewers

### **C-8.05 Services maintenance holes, catch basins and piping for sewers**

- maintenance holes, catch basins and piping for sewers, their components, characteristics and applications
- procedures to service maintenance holes, catch basins and piping for sewers
- regulatory requirements pertaining to maintenance holes, catch basins and piping for sewers
- emerging technologies and practices pertaining to maintenance holes, catch basins and piping for sewers

## **C-10 Installs, tests and services interior drainage, waste and vent (DWV) systems**

- C-10.01 Plans layout and sizes piping for interior drainage, waste and vent (DWV) systems
  - interior DWV systems, their piping arrangements, purposes, characteristics and applications
  - procedures to plan layout and size piping for interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
  - emerging technologies and practices pertaining to interior DWV systems
- C-10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems
  - interior DWV systems, their components, purposes, characteristics, applications and operation
  - procedures to lay out and install underground piping and components for interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.03 Installs above-ground piping and components for interior drainage, waste and vent (DWV) systems
  - interior DWV systems, their components, purposes, characteristics, applications and operation
  - procedures to lay out and install above-ground piping and components for interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.04 Tests interior drainage, waste and vent (DWV) systems
  - interior DWV systems, their purposes, characteristics, applications and operation
  - procedures used for testing interior DWV systems
  - regulatory requirements pertaining to interior DWV systems
- C-10.05 Services interior drainage, waste and vent (DWV) systems
  - interior DWV systems, their components, purposes, characteristics, applications and operation
  - procedures to service interior DWV systems
  - regulatory requirements pertaining to interior DWV systems

## **D-11 Installs, tests and services water services**

- D-11.01 Plans layout and sizes piping and components for water service
  - water service piping, their components, characteristics and applications
  - procedures to size pipe for water service
  - regulatory requirements pertaining to sizing pipe for water service
- D-11.02 Installs components for water service
  - water service piping and components, their characteristics and applications
  - procedures to install water service piping and components
  - regulatory requirements pertaining to water services in residential and ICI applications
  - emerging technologies and practices pertaining to water services
- D-11.03 Installs water service equipment
  - water service components, their characteristics, applications and operation
  - procedures to install water service components
  - training and certification requirements pertaining to installation of water service components
  - regulatory requirements pertaining to installation of water service components
  - emerging technologies and practices pertaining to installation of water service components
- D-11.04 Tests water service piping and components
  - water service piping and components, their characteristics and applications
  - procedures used for testing water service piping and components
  - training and certification requirements pertaining to water service piping and components
  - regulatory requirements pertaining to water service piping and components
- D-11.05 Services water service piping and components
  - water services and components, their characteristics, applications and operation
  - procedures to service water services
  - training and certification requirements pertaining to servicing water services
  - regulatory requirements pertaining to water services
  - emerging technologies and practices pertaining to water services

## **D-12 Installs, tests and services potable water distribution systems**

- D-12.01 Plans layout and sizes piping and components for potable water distribution systems
- potable water distribution systems and components, their characteristics and applications
  - procedures to size piping and components for potable water distribution systems
  - regulatory requirements pertaining to sizing piping and components for potable water distribution systems
- D-12.02 Installs piping for potable water distribution systems
- potable water distribution piping and components
  - procedures to install potable water distribution piping and components for potable water distribution systems
  - regulatory requirements pertaining to piping for potable water distribution
- D-12.03 Installs components for potable water distribution systems
- potable water distribution equipment and components, their characteristics, applications and operation
  - procedures to install potable water distribution components
  - expansion calculations
  - regulatory requirements to install potable water distribution components
  - emerging technologies and practices pertaining to installing potable water distribution components
- D-12.04 Installs cross-connection controls
- cross-connection controls, their characteristics, applications and operation
  - procedures to install cross connection controls
  - training and certification requirements pertaining to cross connection controls
  - regulatory requirements pertaining to cross connection controls
- D-12.05 Tests potable water distribution systems
- potable water distribution systems, their components, characteristics, applications and operation
  - procedures to test potable water distribution systems
  - training and certification requirements pertaining to testing potable water distribution systems
  - regulatory requirements pertaining to testing potable water distribution systems
- D-12.06 Services potable water distribution systems
- potable water distribution systems and components, their characteristics, applications and operation
  - procedures to service potable water distribution systems
  - procedures to service cross connection control devices
  - training and certification requirements pertaining to servicing potable water distribution systems
  - regulatory requirements pertaining to servicing potable water distribution system

## **E-14 Installs, tests and services plumbing fixtures and appliances**

- E-14.01 Installs fixture supports
- plumbing fixture supports, their characteristics and applications
  - procedures to install plumbing fixture supports
  - regulatory requirements pertaining to fixture supports
- E-14.02 Installs plumbing fixtures and appliances
- plumbing fixtures and appliances, their characteristics, applications and operation
  - procedures to install plumbing fixtures and appliances
  - regulatory requirements to install plumbing fixtures and appliances
  - emerging technologies and practices pertaining to installing plumbing fixtures and appliances
- E-14.03 Tests plumbing fixtures and appliances
- plumbing fixtures and appliances, their characteristics, applications and operation
  - procedures used for testing plumbing fixtures and appliances
  - regulatory requirements pertaining to plumbing fixtures and appliances
- E-14.04 Services plumbing fixtures and appliances
- plumbing fixtures and appliances, their characteristics, applications and operation
  - procedures to service plumbing fixtures and appliances

- regulatory requirements pertaining to plumbing fixtures and appliances

### **F-17 Installs, tests and services piping and components for hydronic systems**

#### F-17.01 Plans layout and sizes piping and components for hydronic systems

- fluid fundamentals, and their characteristics and applications
- factors that impact design
- hydronic systems, piping and components, their characteristics, applications and operation
- procedures to size piping and components for hydronic systems
- training and certification requirements pertaining to hydronic systems
- regulatory requirements pertaining to hydronic systems
- emerging technologies and practices pertaining to hydronic systems

#### F-17.02 Installs piping and components for hydronic systems

- hydronic systems, piping and components, their characteristics, applications and operation
- procedures to install piping and components for hydronic systems
- training and certification requirements pertaining to hydronic systems
- regulatory requirements pertaining to hydronic systems
- emerging technologies and practices pertaining to hydronic systems

#### F-17.03 Tests hydronic systems

- hydronic systems, piping and components, their characteristics, applications and operation
- procedures used for testing piping and components for hydronic systems
- training and certification requirements to test piping and components for hydronic systems
- regulatory requirements pertaining to testing piping and components for hydronic systems
- emerging technologies and practices pertaining to hydronic systems

#### F-17.04 Services hydronic systems

- hydronic systems, piping and components, their characteristics, applications and operation
- procedures to service piping and components for hydronic systems
- documenting service for hydronic systems
- training and certification requirements to service piping and components for hydronic systems
- regulatory requirements pertaining to servicing piping and components for hydronic systems

### **F-18 Installs, tests and services hydronic heating and cooling equipment**

#### F-18.01 Installs hydronic heating equipment

- hydronic heating equipment, their characteristics, applications and operation
- procedures to install hydronic heating equipment
- training and certification requirements pertaining to hydronic heating equipment
- regulatory requirements pertaining to hydronic heating equipment

#### F-18.02 Installs hydronic cooling equipment

- hydronic cooling equipment, their characteristics, applications and operation
- procedures to install hydronic cooling equipment
- training and certification requirements pertaining to hydronic cooling equipment
- regulatory requirements pertaining to hydronic cooling equipment
- emerging technologies and practices pertaining to hydronic cooling equipment

#### F-18.03 Tests hydronic heating and cooling equipment

- hydronic heating and cooling equipment, their characteristics, applications and operation
- procedures to test hydronic heating and cooling equipment
- training and certification requirements pertaining to hydronic heating and cooling equipment
- regulatory requirements pertaining to hydronic heating and cooling equipment
- emerging technologies and practices pertaining to hydronic heating and cooling equipment

#### F-18.04 Services hydronic heating and cooling equipment

- hydronic heating and cooling equipment, their characteristics, applications and operation
- procedures to service hydronic heating and cooling equipment
- documenting service for hydronic heating and cooling equipment
- training and certification requirements pertaining to hydronic heating and cooling equipment
- regulatory requirements pertaining to hydronic heating and cooling equipment
- emerging technologies and practices pertaining to hydronic heating and cooling equipment

# APPENDIX A: POST HARMONIZATION 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 2023 Plumber Red Seal Occupational Standard (RSOS).

SATCC Level One	Transcript Code	Hours	Pan-Canadian Harmonized Level One
Trade Related Safety	SAFE 130 - Theory	15	Safety-Related Functions
	SAFE 131 - Shop	15	
Basic Tools and Equipment	TOOL 137 - Theory	30	Organizes Work
	TOOL 138 - Shop	30	Tools and Equipment
Piping Fundamentals	PIPE 140 - Theory	30	Routine Trade Activities
	PIPE 141 - Shop	30	Prepare Tube, Tubing and Pipe
Introduction to Graphics	GRPH 132	30	Join Tube, Tubing and Pipe
Plumbing Codebook	CODE 170	30	Communication Techniques (Communication)
Gasfitting	PIPE 150	30	Interior DWV Systems
		240	<i>*Exceed</i>

SATCC Level Two	Transcript Code	Hours	Pan-Canadian Harmonized Level Two
<i>*In-Context learning</i>	--	--	Organizes Work
			Tools and Equipment
			Prepare Tube, Tubing and Pipe
			Join Tube, Tubing and Pipe
Plumbing Codebook	CODE 270 - Theory	27	Interior DWV Systems
	CODE 271 - Shop	27	
Plumbing Systems	PIPE 240 - Theory	27	Routine Trade Activities
	PIPE 241 - Shop	27	Plumbing Fixtures and Appliances
Hydronic Systems	HDRO 260 - Theory	47	Hydronic Systems
	HDRO 261 - Shop	7	
Gasfitting	PIPE 280 - Theory	42	<i>*Exceed</i>
	PIPE 283 - Shop	12	
Electric Controls	ELEC 281	24	
		240	

SATCC Level Three	Transcript Code	Hours	Pan-Canadian Harmonized Level Three	
<i>* In-Context Learning</i>	--	--	Organizes Work	
			Plumbing Fixtures and Appliances	
			Tools and Equipment	
			Routine Trade activities	
			Prepare Tube, Tubing and Pipe	
			Join Tube, Tubing and Pipe	
Plumbing Codebook	CODE 370 -Theory	27	Interior DWV Systems	
	CODE 371 - Shop	27		
Plumbing Systems	PIPE 340	54	Sewers	
			Water Services	
			Potable Water Distribution Systems	
			Specialized Systems	
Hydronic Systems	HDRO 360	27	Hydronic Systems	
Gasfitting	PIPE 350 - Theory	27	<i>*Exceed</i>	
	PIPE 351 - Shop	27		
Electric Controls	ELEC 370	24		
Gas Appliance Service	HVAC 3XX <sup>1</sup>	27		
<sup>1</sup> Subject to Change		240		

SATCC Level Four	Transcript Code	Hours	Pan-Canadian Harmonized Level Three
<i>*In-Context learning</i>	--	--	Organizes Work
			Tools and Equipment
			Prepare Tube, Tubing and Pipe
			Join Tube, Tubing and Pipe
			Routine Trade Activities
			Water Services
			Potable Water Distribution
			Hydronic Systems
Water Conditioning	WTER 421	27	Water Treatment Equipment
Pump and Private Water Supply	WTER 420	27	Sewage Treatment Systems
			Pressure systems
Introduction to Low Pressure Steam	STE A 450	27	Low Pressure Steam Systems
Special Piping Systems	PIPE 448	27	Specialized Systems
Process Piping	PIPE 449	27	Process Piping
Graphics	GRPH 432	27	Communication Techniques
Gasfitting	PIPE 450	27	<i>*Exceed</i>
Electric Controls	ELEC 470	24	
Plumber Codebook	CODE 4XX <sup>1</sup>	27	Plumbing Fixtures and Appliances
			Interior DWV Systems
		240	

<sup>1</sup> Subject to change

\* Exceed Topics

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