Plumber

Course Outline

2023-2024

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Saskatchewan Apprenticeship and Trade Certification Commission

Online: www.saskapprenticeship.ca

Recognition:
To promote transparency and consistency, this document has been adapted from the 2016 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

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

SATCC 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 3XX*	27
*subject to change		240

SATCC 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 OUTLINE

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

Level One	8 weeks	240 hours

Trade Related Safety – Theory — **15 hours**

- discuss safe work practices
- discuss WHMIS
- discuss lockout and tag out procedures

Trade Related Safety – Shop — **15 hours**

- demonstrate safe work practices
- apply WHMIS
- perform lockout and tag out procedures

Introduction to Graphics — **30 hours**

- explain drafting tools
- use drafting tools
- discuss graphics language, measurements and standards
- explain graphical single line projections
- draw single line projections

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

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

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

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.

Level Two — 8 weeks — 240 hours

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

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

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

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.

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.

Level Three — 8 weeks — 240 hours

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

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

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

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.

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.

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

Exceeds RSOS scope of work.

Level Four — 8 weeks — 240 hours

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

Graphics — **27 hours**

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

Water Conditioning — **27 hours**

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

Introduction to Low Pressure Steam — **27 hours**

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

Special Piping Systems — **27 hours**

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

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

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.

Plumber Codebook **27 hours**

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

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.

PLUMBER TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2016 Plumber Red Seal Occupational Standard. Each sub-task details the 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

A-1 Performs safety-related functions	**1.01 Maintains safe work environment** **1**	**1.02 Uses personal protective equipment (PPE) and safety equipment** **1**	**1.03 Performs lock-out and tag-out procedures** **1**		
A-2 Uses and maintains tools and equipment	**2.01 Uses common tools and equipment** **1** **(2, 3, 4 In Context)**	**2.02 Uses access equipment** **1** **(2, 3, 4 In Context)**	**2.03 Uses rigging, hoisting, lifting and positioning equipment** **1** **(2, 3, 4 In Context)**	**2.04 Rigs loads for cranes** **1** **(2, 3, 4 In Context)**	**2.05 Uses welding equipment** **1** **(2, 3, 4 In Context)**
	2.06 Uses soldering and brazing equipment **1** **(2, 3, 4 In Context)**	**2.07 Uses oxy-fuel equipment** **1** **(2, 3, 4 In Context)**			
A-3 Organizes work	**3.01 Organizes project tasks and procedures** **(1, 2, 3, 4 In Context)**	**3.02 Organizes materials and supplies** **(1, 2, 3, 4 In Context)**			
A-4 Performs routine trade activities	**4.01 Performs piping system layout** **1, 2** **(3, 4 In Context)**	**4.02 Calculates pipe, tube and tubing lengths** **1, 2** **(3, 4 In Context)**	**4.03 Calculates piping offsets** **1, 2** **(3, 4 In Context)**	**4.04 Installs piping supports** **1, 2** **(3, 4 In Context)**	**4.05 Installs sleeves** **1, 2** **(3, 4 In Context)**
	4.06 Commissions systems **1, 2** **(3, 4 In Context)**	**4.07 Protects piping systems, equipment and structure from damage** **1, 2** **(3, 4 In Context)**	**4.08 Coordinates excavation and backfilling of trenches** **1, 2** **(3, 4 In Context)**	**4.09 Installs fire stopping devices and materials** **1, 2** **(3, 4 In Context)**	

A-5 Uses communication and mentoring techniques	5.01 Uses communication techniques 1	5.02 Uses mentoring techniques 2

B – PREPARES AND ASSEMBLES PIPE

B-6 Prepares 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 pipe and tubing 1 (2, 3, 4 In Context)	7.03 Joins steel pipe 1 (2, 3, 4 In Context)	7.04 Joins cast iron pipe 1 (2, 3, 4 In Context)	7.05 Joins specialized pipe 1 (2, 3, 4 In Context)

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

C-8 Installs, tests and services sewers	8.01 Sizes pipe for sewers 3	8.02 Installs manholes and catch basins 3	8.03 Installs piping for sewers 3	8.04 Tests manholes, catch basins and piping for sewers 3	8.05 Services manholes, catch basins and piping for sewers 3
C-9 Installs, tests and services sewage treatment systems	9.01 Plans installation of sewage treatment systems 4	9.02 Installs sewage treatment system components 4	9.03 Tests sewage treatment systems and components 4	9.04 Services sewage treatment systems and components 4	
C-10 Installs, tests and services interior drainage, waste and vent (DWV) systems	10.01 Sizes pipe for interior drainage, waste and vent (DWV) systems 1, 2, 3, 4	10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems 1, 2, 3, 4	10.03 Installs piping and components for interior drainage, waste and vent (DWV) systems above-ground 1, 2, 3, 4	10.04 Tests interior drainage, waste and vent (DWV) systems 1, 2, 3, 4	10.05 Services piping and components for interior drainage, waste and vent (DWV) systems 1, 2, 3, 4

D – INSTALLS, TESTS AND SERVICES WATER SERVICE AND DISTRIBUTION

D-11 Installs, tests and services water services	11.01 Sizes pipe for water services 3	11.02 Installs piping for water services 3	11.03 Installs water service equipment 3	11.04 Tests water service piping and components 3	11.05 Services water services 3
D-12 Installs, tests and services potable water distribution systems	12.01 Sizes piping and equipment for potable water distribution systems 3 (4 In Context)	12.02 Installs piping for potable water distribution systems 3 (4 In Context)	12.03 Installs potable water distribution equipment 3 (4 In Context)	12.04 Installs and uses cross-connection control devices and methods 3 (4 In Context)	12.05 Tests potable water distribution systems 3 (4 In Context)
	12.06 Services potable water distribution systems 3 (4 In Context)				
D-13 Installs, tests and services pressure systems	13.01 Sizes pressure systems 4	13.02 Installs piping for pressure systems 4	13.03 Installs equipment and components for pressure systems 4	13.04 Tests pressure systems 4	13.05 Services pressure systems 4

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

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

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

F-16 Installs, tests and services low pressure steam systems	**16.01 Sizes piping and components for low pressure steam systems** **4**	**16.02 Installs piping and components for low pressure steam systems** **4**	**16.03 Tests piping and components for low pressure steam systems** **4**	**16.04 Services piping and components for low pressure steam systems** **4**
F-17 Installs, tests and services hydronic heating and cooling piping systems	**17.01 Sizes piping and components for hydronic systems** **2, 3 (4 In Context)**	**17.02 Installs piping and components for hydronic systems** **2, 3 (4 In Context)**	**17.03 Tests piping and components for hydronic systems** **2, 3 (4 In Context)**	**17.04 Services piping and components for hydronic systems** **2, 3 (4 In Context)**
F-18 Installs, tests and services hydronic heating and cooling generating systems	**18.01 Installs hydronic heating generating systems** **2, 3 (4 In Context)**	**18.02 Installs hydronic cooling generating systems** **2, 3 (4 In Context)**	**18.03 Tests hydronic heating and cooling generating systems** **2, 3 (4 In Context)**	**18.04 Services hydronic heating and cooling generating systems** **2, 3 (4 In Context)**
F-19 Installs, tests and services hydronic system controls and transfer units	**19.01 Installs hydronic system controls** **2, 3 (4 In Context)**	**19.02 Installs hydronic transfer units** **2, 3 (4 In Context)**	**19.03 Tests hydronic system controls and transfer units** **2, 3 (4 In Context)**	**19.04 Services hydronic system controls and transfer units** **2, 3 (4 In Context)**

G – INSTALLS, TESTS AND SERVICES FIRE PROTECTION SYSTEMS (NOT COMMON CORE)

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

G-20 Installs, tests and services flow-through fire protection systems (Not Common Core)	**20.01 Installs flow-through fire protection systems** **(Not Common Core)**	**20.02 Tests flow-through fire protection systems** **(Not Common Core)**	**20.03 Services flow-through fire protection systems** **(Not Common Core)**
G-21 Installs, tests and services standpipe systems (Not Common Core)	**21.01 Installs piping and equipment for standpipe systems** **(Not Common Core)**	**21.02. Tests standpipe systems** **(Not Common Core)**	**21.03. Services standpipe systems** **(Not Common Core)**

H – INSTALLS, TESTS AND SERVICES SPECIALIZED SYSTEMS

H-22 Installs, tests and services specialized systems	**22.01 Installs piping for specialized systems** **3, 4**	**22.02 Installs equipment and components for specialized systems** **3, 4**	**22.03 Tests specialized systems** **3, 4**	**22.04 Services specialized systems** **3, 4**
H-23 Installs, tests and services process piping systems	**23.01 Installs piping for process piping systems** **4**	**23.02 Installs equipment and components for process piping systems** **4**	**23.03 Tests process piping systems** **4**	**23.04 Services process piping systems** **4**

***The Plumber Red Seal Occupational Standard (RSOS), describing the "full scope" of the trade, can be found at** www.red-seal.ca.

***For more detailed information on course content, please refer to the Plumber Guide to Course Content at** www.saskapprenticeship.ca.