



Saskatchewan
Apprenticeship and
Trade Certification
Commission



Steamfitter-Pipefitter Course Outline

2021



TRAINING PROFILE CHART

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

Level One (Harmonized)	Transcript Code	Hours
Trade Related Safety	SAFE 130 - Theory	15
	SAFE 131 - Shop	15
Tool Basics and Equipment	TOOL 147 – Theory	15
	TOOL 148 - Shop	15
Welding	WLDR 136	30
Pipe Fabrication	PIPE 146 - Theory	30
	PIPE 147 - Shop	30
Rigging, Hoisting and Lifting	RIGG 132	30
Pipe Graphics and Layout	PRNT 172	30
Gasfitting (Exceed)	PIPE 150	30
		240

Level Two (Harmonized)	Transcript Code	Hours
Pipe Fabrication	PIPE 281	27
Introduction to Steam Systems	STEA 294	27
Hydronic Systems	HDRO 260 – Theory	47
	HDRO 261 – Shop	7
Welding	WLDR 250	27
Blueprint Reading	PRNT 285	27
Gasfitting (Exceed)	PIPE 280 - Theory	42
	PIPE 283 - Shop	12
Basic Electrical (Exceed)	ELEC 287	24
		240

Level Three (Harmonized)	Transcript Code	Hours
Electrical Systems	ELEC386	14
Gasfitting	PIPE 382	28
Pipe Fabrication	PIPE 381	28
Specialty Piping	PIPE 383	28
Low Pressure Steam Systems	STEA 382	56
Blueprint Reading	PRNT 382	28
Hydronic Heating	HYDR 360	28
		210

Level Four	Transcript Code	Hours
Electrical Systems	ELEC 484	14
Critical Rigging	RIGG 401	28
Pipe Fabrication	PIPE 482	28
HVAC and Refrigeration Systems	RFRG 488	26
Renewable Energy	PIPE 483	15
Process Piping	STE A 482	28
Blueprint Reading	PLMB 482	28
High Pressure Steam Systems	STE A 400	41
		210

TECHNICAL TRAINING COURSE CONTENT

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing.

The Red Seal Steamfitter-Pipefitter 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 <ul style="list-style-type: none"> discuss safe work practices discuss WHMIS discuss lockout and tag out procedures 		15 hours
Trade Related Safety – Shop <ul style="list-style-type: none"> demonstrate safe work practices apply WHMIS perform lockout and tag out procedures 		15 hours
Tool Basics and Equipment – Theory <ul style="list-style-type: none"> discuss the use and care of hand discuss the use and care of power tools discuss access equipment explain soldering and brazing equipment 		15 hours
Tool Basics and Equipment – Shop <ul style="list-style-type: none"> demonstrate the safe use and care of hand tools demonstrate the safe use and care of power tools demonstrate access equipment use use hoisting and rigging equipment perform soldering and brazing 		15 hours

Welding**30 hours**

- describe the safe assembly, operations, shut down and equipment for oxy-fuel cutting (OFC)
- describe the safe assembly, operations, shut down and equipment for Gas Metal Arc Welding (GMAW)
- demonstrate the safe set up, operation and maintenance when performing OFC
- demonstrate the safe set up operation and maintenance when performing GMAW in multiple positions
- demonstrate the safe operation and maintenance when performing GMAW while bridge tacking pipe

Pipe Graphics and Layout**30 hours**

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

Pipe Fabrication – Theory**30 hours**

- discuss piping system layout
- discuss piping system measurements
- explain piping system offsets
- identify pipe support systems
- discuss common piping materials
- discuss fittings and valves
- define piping system commissioning

Pipe Fabrication – Shop**30 hours**

- assemble copper tube and tubing
- assemble plastic tube and tubing
- assemble steel pipe project
- fabricate brackets, supports, guides and anchors
- install a hybrid piping system

Rigging, Hoisting and Lifting**30 hours**

- explain hoisting, lifting and rigging equipment
- explain hoisting, lifting and rigging procedures
- discuss load weight calculations
- demonstrate hoisting, lifting and rigging techniques
- perform hoisting signals and knot tying
- explain inspection and maintenance procedures

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

Level Two

8 weeks

240 hours

Pipe Fabrication

27 hours

- identify materials used in fabrication
 - describe the fabrication process
 - examine support and hanger systems
 - explain pipe bending theory
 - construct piping project
-

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
-

Blueprint Reading

27 hours

- draw isometric objects
 - explain blueprints and specifications
 - discuss spool sheets
 - produce compass orientated isometric drawings
 - use blueprints and specifications
-

Introduction to Steam Systems

27 hours

- discuss the thermodynamic properties of steam
 - identify the American Society of Mechanical Engineers (ASME) code requirements for steam boilers and piping systems
 - identify steam equipment
 - identify steam traps
-

Welding

27 hours

- describe the safe assembly, operations, shut down and equipment for Shield Metal Arc Welding (SMAW)
 - describe the safe assembly, operations, shut down and equipment for Gas Tungsten Arc Welding (GTAW)
 - demonstrate the safe set up, operation and maintenance when performing SMAW
 - demonstrate the safe set up operation and maintenance when performing GTAW
 - demonstrate the safe operation and maintenance when performing SMAW while beveling, preparing a land and bridge tacking pipe
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Gasfitting – Theory**42 hours**

- discuss line sizing techniques for piping systems operating at two pounds per square inch 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

12 hours**Gasfitting – Shop**

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

Basic Electrical**24 hours**

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

Level Three**7 weeks****210 hours**

Low Pressure Steam Systems**56 hours**

- describe low pressure steam (LPS) boilers
- discuss LPS piping systems
- choose steam traps
- use the American Society of Mechanical Engineers (ASME) code
- use steam tables

Hydronic Heating**28 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

Pipe Fabrication**28 hours**

- describe quality control procedures
- discuss templates for fitting fabrication
- discuss piping offsets
- discuss serpentine piping
- discuss steam tracing
- fabricate piping spool project

Specialty Piping**28 hours**

- specialty piping systems
 - specialty piping components and equipment
 - installation procedures
 - specialty piping codes
 - testing procedures
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Gasfitting – Theory**28 hours**

- apply line sizing techniques for piping systems operating at two pounds per square inch 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
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Electrical Systems**14 hours**

- test the operation of electrical circuits
 - describe the operation of electrical switches
 - use electrical transformers
 - use relays in electrical circuits
 - compare the characteristics of different styles of alternating current (AC) motors
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Blueprint Reading**28 hours**

- spool sheet drawings and specification books
 - isometric spool sheet drawings
 - IPT Pipe Trades Manual
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Level Four**7 weeks****210 hours**

Process Piping**28 hours**

- process piping equipment
 - industrial water and waste water systems
 - installation procedures for process piping
 - process control functions
 - testing procedures
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Pipe Fabrication**28 hours**

- quality control procedures
 - accurately take field measurements
 - construct isometric spool drawing from field measurement
 - construct a rolling off set project
-

HVAC and refrigeration Systems**28 hours**

- Discuss system operation
- Discuss the installation of heating, ventilation and air conditioning (HVAC) Equipment
- Discuss the installation of refrigeration equipment
- Describe commissioning procedures
- Discuss maintenance and repair procedures

Blueprint Reading**28 hours**

- isometric and orthographic drawings
- identify industrial equipment and materials
- equipment placement with gridlines and coordinates
- industrial blueprints and specifications

High Pressure Steam Systems**41 hours**

- Examine high pressure steam properties
- Differentiate power boilers, process boilers, and high temperature hot water boilers
- Examine boiler trim for high pressure steam boiler
- Relate ASME code to high pressure steam boilers and trim
- Discuss the operation of high pressure steam systems
- Analyze the piping procedures for high pressure steam systems
- Discuss testing procedures for high pressure steam systems
- Explain maintenance, troubleshooting, and repair of high pressure steam systems
- Implement water treatment strategies

Electrical Systems**14 hours**

- Troubleshoot flame safe guard controls
- Interpret ladder diagrams and connection diagrams
- Troubleshoot natural gas fired furnaces
- Explain the electrical controls used with submersible pumps

Renewable Energy**15 hours**

- equipment
- piping configurations
- testing procedures

STEAMFITTER-PIPEFITTER TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the **2015 Steamfitter-Pipefitter Red Seal Occupational Standard**. Each sub-task details the corresponding essential skill and level of training

where the content is covered.

A - PERFORMS COMMON OCCUPATIONAL SKILLS

Task A-1 Performs safety-related functions.	A-1.01 Maintains safe work environment. 1	A-1.02 Selects, inspects and uses personal protective equipment (PPE) and safety equipment. 1	A-1.03 Follows lock-out procedures. 1
Task A-2 Uses and maintains tools and equipment.	A-2.01 Uses common tools and equipment. 1	A-2.02 Uses access equipment. 1	A-2.03 Uses welding equipment. 1,2
	A-2.04 Uses soldering and brazing equipment. 1	A-2.05 Uses oxy-fuel equipment. 1,2	
Task A-3 Organizes job.	A-3.01 Plans work. 1,2,3,4 In Context	A-3.02 Generates drawings. 1,2,3,4 In Context	A-3.03 Interprets drawings and specifications. 1,2,3,4 In Context
	A-3.04 Develops piping templates. 1,2,3,4 In Context	A-3.05 Performs preliminary quality control functions. 1,2,3,4 In Context	

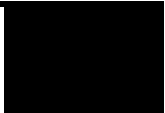
B – PERFORMS LAYOUT, FABRICATION AND PIPING INSTALLATION

<p>Task B-4 Performs fabrication.</p>	<p>B-4.01 Fabricates piping system components.</p> <p>1,2 3 In Context</p>	<p>B-4.02 Fabricates brackets, supports, hangers, guides and anchors.</p> <p>1,2 3 In Context</p>	
<p>Task B-5 Lays out, identifies and installs piping, tubing, fittings and related components.</p>	<p>B-5.01 Lays out, identifies and installs copper piping, tubing, fittings and related components.</p> <p>1 3 In Context</p>	<p>B-5.02 Lays out, identifies and installs plastic piping, tubing, fittings and related components.</p> <p>1 3 In Context</p>	<p>B-5.03 Lays out, identifies and installs carbon steel piping, tubing, fittings and related components.</p> <p>1 3 In Context</p>
	<p>B-5.04 Lays out, identifies and installs stainless steel piping, tubing, fittings and related components.</p> <p>1 3 In Context</p>	<p>B-5.05 Lays out, identifies and installs fibreglass piping, fittings and related components.</p> <p>2 3 In Context</p>	<p>B-5.06 Lays out, identifies and installs specialty piping, fittings and related components.</p> <p>2 3 In Context</p>
<p>Task B-6 Installs, maintains, troubleshoots, repairs and tests valves.</p>	<p>B-6.01 Installs valves.</p> <p>1 2,3 In Context</p>	<p>B-6.02 Maintains, troubleshoots, repairs and tests valves.</p> <p>1 2,3 In Context</p>	
<p>Task B-7 Installs, tests, maintains, troubleshoots and repairs heat tracing systems.</p>	<p>B-7.01 Installs steam tracing systems.</p> <p>3</p>	<p>B-7.02 Maintains, troubleshoots, repairs and tests steam tracing systems.</p> <p>3</p>	<p>B-7.03 Installs liquid-filled tracing systems.</p> <p>2</p>
	<p>B-7.04 Maintains, troubleshoots, repairs and tests liquid-filled tracing systems.</p> <p>2</p>		

C – PERFORMS RIGGING, HOISTING, LIFTING AND POSITIONING

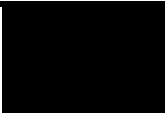
Task C-8 Performs common rigging, hoisting, lifting and positioning.	C-8.01 Determines load. 1 2,3 In Context	C-8.02. Prepares lift plan(s). 1 2,3 In Context	C-8.03 Selects rigging, hoisting, lifting and positioning equipment. 1 2,3 In Context
	C-8.04 Inspects rigging, hoisting, lifting and positioning equipment. 1 2,3 In Context	C-8.05 Secures lift area. 1 2,3 In Context	C-8.06 Sets up rigging, hoisting, lifting and positioning equipment. 1 2,3 In Context
	C-8.07 Performs lift and positioning. 1 2,3 In Context	C-8.08 Maintains and stores rigging, hoisting, lifting and positioning equipment. 1 2,3 In Context	
Task C-9 Performs complex and critical rigging, hoisting, lifting and positioning.	C-9.01 Prepares lift plan for complex and critical rigging, hoisting, lifting and positioning. 4	C-9.02 Performs calculations for complex and critical rigging, hoisting, lifting and positioning. 4	C-9.03 Selects rigging, hoisting, lifting and positioning equipment for complex and critical lifts. 4
	C-9.04 Sets up rigging, hoisting, lifting and positioning equipment for complex and critical lifts. 4	C-9.05 Performs complex and critical lifts and positioning. 4	

D – INSTALLS, TESTS, MAINTAINS, TROUBLESHOOTS AND REPAIRS LOW AND HIGH PRESSURE STEAM AND CONDENSATE SYSTEMS



<p>Task D-10 Installs, tests, maintains, troubleshoots and repairs low pressure steam and condensate systems.</p>	<p>D-10.01 Installs equipment for low pressure steam and condensate systems.</p> <p style="text-align: center;">3</p>	<p>D-10.02 Installs piping for low pressure steam and condensate systems.</p> <p style="text-align: center;">3</p>	<p>D-10.03 Tests low pressure steam and condensate systems.</p> <p style="text-align: center;">3</p>
	<p>D-10.04 Maintains, troubleshoots and repairs low pressure steam and condensate systems.</p> <p style="text-align: center;">3</p>		
<p>Task D-11 Installs, tests, maintains, troubleshoots and repairs high pressure steam and condensate systems.</p>	<p>D-11.01 Installs equipment for high pressure steam and condensate systems.</p> <p style="text-align: center;">4</p>	<p>D-11.02 Installs piping for high pressure steam and condensate systems.</p> <p style="text-align: center;">4</p>	<p>D-11.03 Tests high pressure steam and condensate systems.</p> <p style="text-align: center;">4</p>
	<p>D-11.04 Maintains, troubleshoots and repairs high pressure steam and condensate systems.</p> <p style="text-align: center;">4</p>		

E – INSTALLS, TESTS, MAINTAINS, TROUBLESHOOTS AND REPAIRS HEATING, COOLING AND PROCESS PIPING SYSTEMS

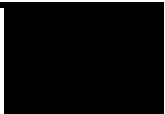


Task E-12 Installs, tests, maintains, troubleshoots and repairs hydronic systems.	E-12.01 Installs equipment for hydronic systems. 2,3	E-12.02 Installs piping for hydronic systems. 2,3	E-12.03 Tests hydronic systems. 2,3
	E-12.04 Maintains, troubleshoots and repairs hydronic systems. 2,3		
Task E-13 Installs, tests, maintains, troubleshoots and repairs process piping systems.	E-13.01 Installs equipment for process piping systems. 4	E-13.02 Installs piping for process piping systems. 4	E-13.03 Tests process piping systems. 4
	E-13.04 Maintains, troubleshoots and repairs process piping systems. 4		
Task E-14 Installs, tests, maintains, troubleshoots and repairs industrial water and waste treatment systems.	E-14.01 Installs equipment for industrial water and waste treatment systems. 3	E-14.02 Installs piping for industrial water and waste treatment systems. 3	E-14.03 Tests industrial water and waste treatment systems. 3
	E-14.04 Maintains, troubleshoots and repairs industrial water and waste treatment systems. 3		
Task E-15 Installs, tests, maintains, troubleshoots and repairs hydraulic systems.	E-15.01 Installs equipment for hydraulic systems. 4	E-15.02 Installs piping, tubing and hoses for hydraulic systems. 4	E-15.03 Tests hydraulic systems. 4
	E-15.04 Maintains, troubleshoots and repairs hydraulic systems. 4		
Task E-16 Installs, tests, maintains, troubleshoots and repairs heating, ventilation, air conditioning and refrigeration (HVACR) systems.	E-16.01 Installs equipment for HVACR systems. 4	E-16.02 Installs hydronic piping and refrigeration tubing for HVACR systems. 4	E-16.03 Tests associated components of HVACR systems. 4

	E-16.04 Maintains, troubleshoots and repairs associated components of HVACR systems. 4		
Task E-17 Installs, tests, maintains, troubleshoots and repairs fuel systems.	E-17.01 Installs equipment for fuel systems. 3	E-17.02 Installs piping and tubing for fuel systems. 3	E-17.03 Tests fuel systems. 3
	E-17.04 Maintains, troubleshoots and repairs fuel systems. 3		
Task E-18 Installs, tests, maintains, troubleshoots and repairs medical gas systems.	E-18.01 Installs equipment for medical gas systems. 3	E-18.02 Installs piping and tubing for medical gas systems. 3	E-18.03 Tests medical gas systems. 3
	E-18.04 Maintains, troubleshoots and repairs medical gas systems. 3		
Task E-19 Installs, tests, maintains, troubleshoots and repairs compressed air and pneumatic systems.	E-19.01 Installs equipment for compressed air and pneumatic systems. 4	E-19.02 Installs piping and tubing for compressed air and pneumatic systems. 4	E-19.03 Tests compressed air and pneumatic systems. 4
	E-19.04 Maintains, troubleshoots and repairs compressed air and pneumatic systems. 4		
Task E-20 Installs and tests fire protection systems. (NOT COMMON CORE) *	E-20.01 Installs equipment for fire protection systems. (NOT COMMON CORE)	E-20.02 Installs piping for fire protection systems. (NOT COMMON CORE)	E-20.03 Tests fire protection systems. (NOT COMMON CORE)

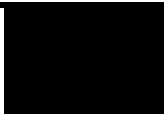
* This Task is not consistently performed by Steamfitter-Pipefitter across Canada, therefore this content is deemed not common core and will not be assessed on the Steamfitter-Pipefitter certification examination.

F – INSTALLS, TESTS, MAINTAINS, TROUBLESHOOTS AND REPAIRS RENEWABLE ENERGY SYSTEMS



Task F-21 Installs, tests, maintains, troubleshoots and repairs geo-exchange and geothermal systems.	F-21.01 Installs equipment for geo-exchange and geothermal systems. 4	F-21.02 Installs piping for geo-exchange and geothermal systems. 4	F-21.03 Tests geo-exchange and geothermal systems. 4
	F-21.04 Maintains, troubleshoots and repairs geo-exchange and geothermal systems. 4		
Task F-22 Installs, tests, maintains, troubleshoots and repairs solar heating systems.	F-22.01 Installs equipment for solar heating systems. 4	F-22.02 Installs piping for solar heating systems. 4	F-22.03 Tests solar heating systems. 4
	F-22.04 Maintains, troubleshoots and repairs solar heating systems. 4		
Task F-23 Installs, tests, maintains, troubleshoots and repairs heat recovery systems.	F-23.01 Installs equipment for heat recovery systems. 4	F-23.02 Installs piping for heat recovery systems. 4	F-23.03 Tests heat recovery systems. 4
	F-23.04 Maintains, troubleshoots and repairs heat recovery systems. 4		

G – PERFORMS COMMISSIONING, START-UP AND TURNOVER



Task G-24 Prepares system for commissioning, start-up and turnover.	G-24.01 Flushes system. 4	G-24.02 Chemically treats system. 4	G-24.03 Pre-checks system for commissioning. 4	
	G-24.04 Selects and connects commissioning equipment. 4			
	Task G-25 Commissions systems.	G-25.01 Secures commissioning area. 4	G-25.02 Pressurizes system. 4	G-25.03 Inspects system. 4
		G-25.04 Corrects faulty conditions. 4	G-25.05 Participates in start-up and turnover procedures. 4	

Online: www.saskapprenticeship.ca

Recognition:

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

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