Saskatchewan Apprenticeship and Trade Certification Commission

Steamfitter-Pipefitter

Guide to Course Content

2019

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

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 Steamfitter-Pipefitter trade: an overview of the trade's duties and training requirements.

Essential Skills Summary: an overview of how each of the nine essential skills is applied in this trade.

Elements of harmonization of apprenticeship training: includes adoption of Red Seal trade name, number of levels of apprenticeship, total training hours (on-the-job and in-school) and consistent sequencing of technical training content.

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 Steamfitter-Pipefitter 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 Steamfitter-Pipefitter Curriculum Outline, which provides additional detail of the Harmonized technical training, can be found at www.red-seal.ca

DESCRIPTION OF THE STEAMFITTER-PIPEFITTER TRADE

Steamfitter/Pipefitters install and repair low and high pressure piping systems and their components, including heating and processing applications. They may also be licensed as gasfitters.

Steamfitters/Pipefitters lay out, assemble, fabricate, maintain, repair and service equipment and piping systems carrying water, steam, fluids, gases, chemicals and fuel in various systems such as heating, cooling, lubricating and process piping systems. They read and interpret drawings, specifications and codes to determine layout, type and size of pipe, and tools to use. They measure, cut, thread, groove, bend, solder, braze, assemble and install metal, plastic and fiberglass pipes, valves and fittings. As well, they must be able to join and secure pipe sections of related equipment. They check systems for leaks. Steamfitters/Pipefitters also do general maintenance work including replacement of worn components.

Steamfitters/Pipefitters must carry out quality control checks on work performed. The system must be tested and commissioned to verify the quality of work and to confirm that the system is functioning to design specifications. They use welding, cutting, shaping, soldering, threading and brazing equipment to join pipes and fabricate sections of piping systems.

Areas of specialization in this trade include maintenance, quality control, rigging, fabrication and installation of various types of systems and specialty piping.

Steamfitters/Pipefitters must have mechanical aptitude, manual dexterity, mathematical skills, an ability to read and understand complex instructions and an ability to do careful and exacting work. They sometimes work in uncomfortable or cramped positions. The work can also be physically demanding. In aspects of layout, work organization, project planning and supervisory tasks, steamfitters/pipefitters may also make use of many digital tools and applications.

With experience, steamfitters/pipefitters may advance to positions such as foreman, contractor, owner, superintendent and instructor.

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: 8 weeks
Level Two: 8 weeks
Level Three: 7 weeks
Level Four: 7 weeks

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	**Math Credit** at the Indicated Grade Level❶	**Science Credit** at Grade Level
Steamfitter-Pipefitter	Grade 10	Grade 10

❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).

*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.

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

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

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

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.

READING

Steamfitters/Pipefitters require strong reading skills to refer to and interpret manufacturers' manuals and instructions including diagrams, charts and graphs. They also need to consult multiple professional codes concerning industry standards and safety requirements.

DOCUMENT USE

Steamfitters/Pipefitters must be comfortable in document use to interpret work schedules. They consult reference manuals on measurement, materials and pipe sizing, pressures and mathematical formulas for calculations. They interpret information from mechanical drawings, schematic diagrams and architectural plans to ensure proper installation of piping. They also use quality control documentation which records information such as heat numbers, weld mapping and material identification.

WRITING

Writing skills are used by steamfitters/pipefitters to write lists of materials and fittings needed for a job, complete forms to request materials and keep daily logs to record measurements and reminders. When required, they must write incident or accident reports.

ORAL COMMUNICATION

Steamfitters/Pipefitters require good oral communication skills to interact with colleagues, supervisors and other tradespersons when co-ordinating work, resolving problems and ensuring safety. They interact with apprentices to provide mentorship and speak with vendors to order materials.

NUMERACY

Numeracy skills are very important in the everyday work of steamfitters/pipefitters. They frequently take or calculate measurements of temperature, pressure and volume. They verify conformity with manufacturers' recommendations and operating practices. The work requires a strong understanding of mathematical calculations and trigonometry. The ability to estimate the quantity of piping material required and to convert between imperial and metric systems of measurement is also important.

THINKING SKILLS

Steamfitters/Pipefitters identify the steps and develop a plan to accomplish a task and coordinate the work. They must decide how to configure and relocate pipes. The ability to problem solve during testing or when a pipe or system failure is encountered is important. Decision making is important when considering job safety and risk prevention. Steamfitters/Pipefitters must also be able to find information they need in multiple sources such as blueprints, code documents, reference manuals and product catalogues.

WORKING WITH OTHERS

Steamfitters/Pipefitters liaise with supervisors, colleagues and other trades to coordinate multiple tasks. They may work with trades such as welders, pipe insulators and electricians. They supervise others and mentor apprentices, offering both practical training and safety information. Additionally, the conduct, behaviour, appearance and attitude of a steamfitter/pipefitter are essential to the success of a job or project.

DIGITAL TECHNOLOGY

Steamfitters/Pipefitters may use communications software for e-mail or use the Internet to look up material and trade-related information, to order materials online or to access training. They may use a spreadsheet to keep track of the status of materials ordered. They may also use CAD software to input measurements taken on the job site, to generate drawings and for referencing purposes. The use of digital equipment for the trade such as smart phones, laser and digital layout equipment such as total station, building information modeling and GPS technology is increasingly important for trade activities.

CONTINUOUS LEARNING

Steamfitters/Pipefitters may pursue refresher courses or specialty certifications and attend supplier seminars. Continuous learning is essential as they must keep up-to-date with the regulatory requirements and the various codes that are periodically revised. Also, they must keep abreast of technological advances in their field to select the most appropriate equipment, tools and materials and be able to perform a proper installation.

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 Steamfitter-Pipefitter.

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for the Steamfitter-Pipefitter trade is 4.

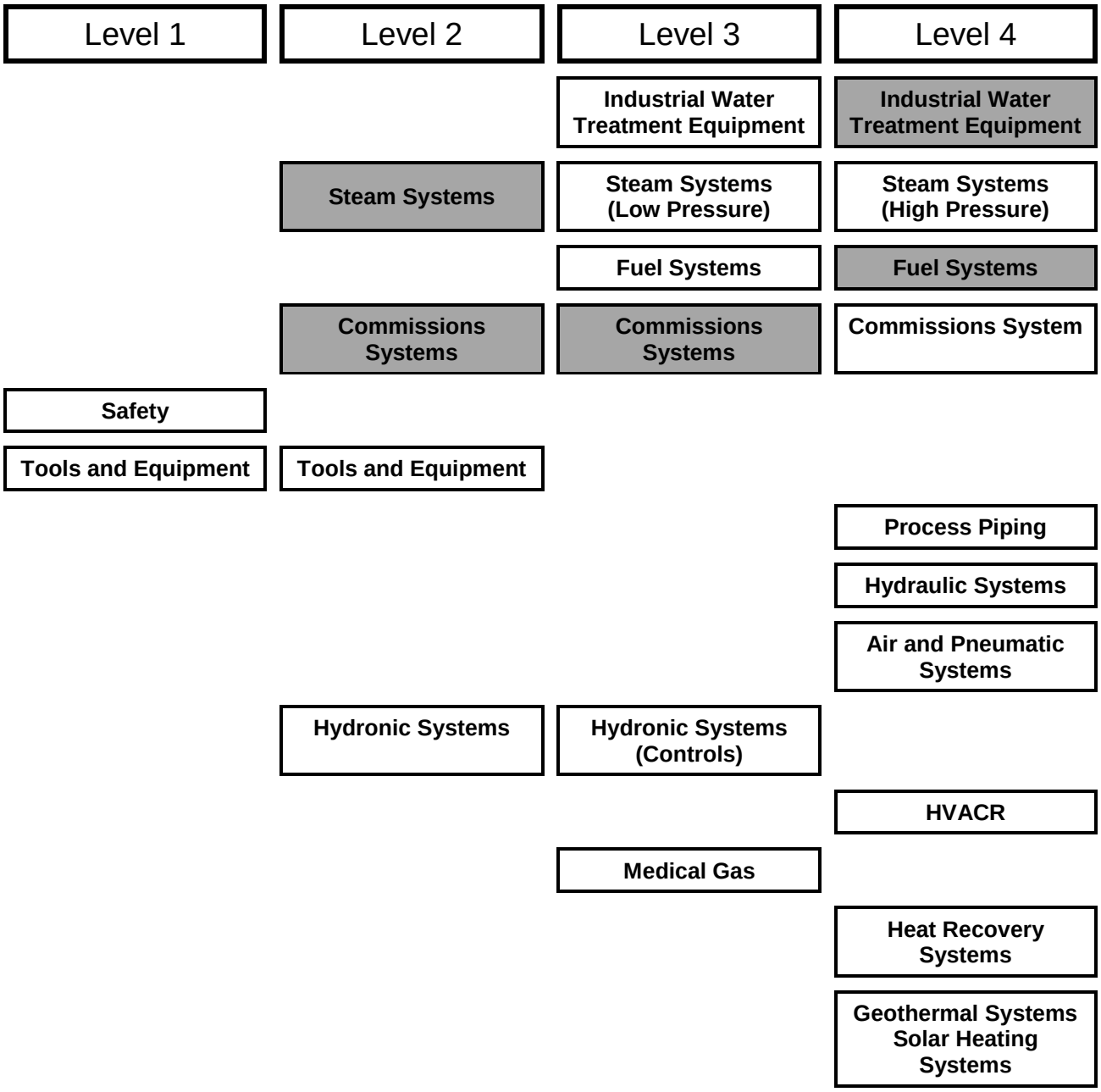
3. Total Training Hours during Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for the Steamfitter-Pipefitter 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
Organizes Job	**Organizes Job**	**Organizes Job**	**Organizes Job**
Rigging, Hoisting, Lifting	**Rigging, Hoisting, Lifting**	**Rigging, Hoisting, Lifting**	**Complex Rigging**
Fabrication	**Fabrication**	**Fabrication**	**Fabrication**
Layout	**Layout**	**Layout**	**Layout**
Valves	**Valves**	**Valves**	**Valves**
	Heat Tracing Systems (Liquid)	**Heat Tracing Systems (Steam)**	**Heat Tracing Systems**


Level 1
Level 2
Level 3
Level 4
Industrial Water Treatment Equipment
Industrial Water Treatment Equipment
Steam Systems
Steam Systems (Low Pressure)
Steam Systems (High Pressure)
Fuel Systems
Fuel Systems
Commissions Systems
Commissions Systems
Commissions System
Safety
Tools and Equipment
Tools and Equipment
Process Piping
Hydraulic Systems
Air and Pneumatic Systems
Hydronic Systems
Hydronic Systems (Controls)
HVACR
Medical Gas
Heat Recovery Systems
Geothermal Systems
Solar Heating Systems

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 In Context**	**A-3.02 Generates drawings.**  **1,2,3 In Context**	**A-3.03 Interprets drawings and specifications.**  **1,2,3 In Context**
	A-3.04 Develops piping templates.  **1,2,3 In Context**	**A-3.05 Performs preliminary quality control functions.**  **1,2,3 In Context**	

B – PERFORMS LAYOUT, FABRICATION AND PIPING INSTALLATION

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

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.** 	**C-9.02 Performs calculations for complex and critical rigging, hoisting, lifting and positioning.** 	**C-9.03 Selects rigging, hoisting, lifting and positioning equipment for complex and critical lifts.** 
	C-9.04 Sets up rigging, hoisting, lifting and positioning equipment for complex and critical lifts. 	**C-9.05 Performs complex and critical lifts and positioning.** 	

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

Task D-10 **Installs, tests, maintains, troubleshoots and repairs low pressure steam and condensate systems.**	**D-10.01 Installs equipment for low pressure steam and condensate systems.**  **3** **2 In Context**	**D-10.02 Installs piping for low pressure steam and condensate systems.**  **3** **2 In Context**	**D-10.03 Tests low pressure steam and condensate systems.**  **3** **2 In Context**
	D-10.04 Maintains, troubleshoots and repairs low pressure steam and condensate systems.  **3** **2 In Context**		
Task D-11 **Installs, tests, maintains, troubleshoots and repairs high pressure steam and condensate systems.**	**D-11.01 Installs equipment for high pressure steam and condensate systems.**  **2 In Context**	**D-11.02 Installs piping for high pressure steam and condensate systems.**  **2 In Context**	**D-11.03 Tests high pressure steam and condensate systems.**  **2 In Context**
	D-11.04 Maintains, troubleshoots and repairs high pressure steam and condensate systems.  **2 In Context**		

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.** 	**E-13.02 Installs piping for process piping systems.** 	**E-13.03 Tests process piping systems.** 
	E-13.04 Maintains, troubleshoots and repairs process piping systems. 		
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.** 	**E-15.02 Installs piping, tubing and hoses for hydraulic systems.** 	**E-15.03 Tests hydraulic systems.** 
	E-15.04 Maintains, troubleshoots and repairs hydraulic systems. 		

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.** 	**E-16.02 Installs hydronic piping and refrigeration tubing for HVACR systems.** 	**E-16.03 Tests associated components of HVACR systems.** 
	E-16.04 Maintains, troubleshoots and repairs associated components of HVACR systems. 		
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.** 	**E-19.02 Installs piping and tubing for compressed air and pneumatic systems.** 	**E-19.03 Tests compressed air and pneumatic systems.** 
	E-19.04 Maintains, troubleshoots and repairs compressed air and pneumatic systems. 		

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

G – PERFORMS COMMISSIONING, START-UP AND TURNOVER

Task G-24 **Prepares system for commissioning, start-up and turnover.**	**G-24.01 Flushes system.**  **1,2,3 In Context**	**G-24.02 Chemically treats system.**  **1,2,3 In Context**	**G-24.03 Pre-checks system for commissioning.**  **1,2,3 In Context**
	G-24.04 Selects and connects commissioning equipment.  **1,2,3 In Context**		
Task G-25 **Commissions systems.**	**G-25.01 Secures commissioning area.**  **1,2,3 In Context**	**G-25.02 Pressurizes system.**  **1,2,3 In Context**	**G-25.03 Inspects system.**  **1,2,3 In Context**
	G-25.04 Corrects faulty conditions.  **1,2,3 In Context**	**G-25.05 Participates in start-up and turnover procedures.**  **1,2,3 In Context**	

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	TBD	27
Introduction to Steam Systems	TBD	27 27
Hydronic Systems	TBD – Theory	47
	TBD – Shop	7
Welding	TBD	27
Blueprint Reading	TBD	27
Gasfitting (Exceed)	TBD - Theory	42
	TBD - Shop	12
Basic Electrical (Exceed)	TBD	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
Gasfitting	PIPE 481	26
Pipe Fabrication	PIPE 482	26
HVAC and Refrigeration Systems	RFRG 488	26
Renewable Energy	PIPE 483	26
Process Piping	STEA 482	52
Blueprint Reading	PLMB 482	26
Trade Mathematics	MATH 486	14
		210

TECHNICAL TRAINING COURSE CONTENT

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing. For the harmonized level of training, a cross reference to the Red Seal Occupational Standard (RSOS) apprenticeship technical training sequencing, at the learning outcome level, is provided.

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

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 — **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

RSOS topics covered in this section of training:

A-1 Safety-related functions

A-1.01 Maintains safe work environment

- safe work practices
- regulatory requirements pertaining to workplace safety

A-1.02 Uses personal protective equipment (PPE) and safety equipment

- PPE and safety equipment, its applications, maintenance and procedures for use
- regulatory requirements pertaining to PPE and safety equipment

A-1.03 Performs lock-out and tag-out procedures

- regulations, applications and procedures for locking out equipment

Tool Basics and Equipment – Theory — 15 hours

- discuss the use and care of hand
- discuss the use and care of power tools
- discuss access equipment
- explain soldering and brazing equipment

Tool Basics and Equipment – Shop — 15 hours

- 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

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, scaffolding and motorized work platforms, their applications, limitations and procedures for use

A-2.04 Uses soldering and brazing equipment

- soldering and brazing equipment, applications and procedures

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

RSOS topics covered in this section of training:

A-2 Tools and Equipment

A-2.03 Services

- welding equipment, applications and procedures

A-2.05

- oxy-fuel equipment, applications and procedures

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

RSOS topics covered in this section of training:

A-3 Organizes Work

A-3.01 Plans work

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

A-3.02 Generates drawings

- drawings and their applications
- basic drawing and sketching techniques

A-3.03 Interprets drawings and specifications
- interpret and extract information from types of drawings and specifications
- drawings and their applications
- digital tools and software for layout and design

A-3.04 Develops piping templates
- methods of template development and their associated procedures

A-3.05 Performs quality control functions
- quality control and its applications
- procedures used to complete quality control documentation

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

RSOS topics covered in this section of training:

B-4 Perform Fabrication

B-4.01 Fabricates piping system components
- procedures used to fabricate piping system components

B-4.02 Fabricates brackets, supports, hangers, guides and anchors
- procedures used to fabricate brackets, supports, hangers, guides and anchors

B-5 Lays Out, Identifies and Installs Piping, Tubing, Fittings And Related Components

B-5.01 Lays out, identifies and installs copper tube, tubing, fittings and related components
- copper tube and tubing, fittings and related components
- procedures used to measure and size copper tube and tubing and related components
- procedures used to cut, bend and join copper tube and tubing and related components

B-5.02 Lays out, identifies and installs plastic piping, tubing, fittings and related components
- plastic piping and tubing, fittings and related components
- procedures used to measure and size plastic piping, tubing and related components
- the procedures used to cut, bend and join plastic piping, tubing and related components

B-5.03 Lays out, identifies and installs carbon steel piping, tubing, fittings and related components
- carbon steel piping and tubing, fittings and related components
- procedures used to measure carbon steel piping and tubing
- the procedures used to cut and join carbon steel piping and tubing

B-5.04 Lays out, identifies and installs stainless steel piping, tubing, fittings and related components
- stainless steel piping and tubing, fittings and related components
- procedures used to measure stainless steel piping
- procedures used to measure tube, tubing and pipe
- procedures used to cut and join stainless steel piping

B-6 Installs, Maintains, Troubleshoots, Repairs and Tests Valves

B-6.01 Installs valves

- piping valves, their applications and operation
- procedures used to install valves

B-6.02 Maintains, troubleshoots, repairs and tests valves

- valves, their applications and operation

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

RSOS topics covered in this section of training:

C-8 Performs Common Rigging, Hoisting, Lifting and Positioning

C-8.01 Determines load

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

C-8.02 Prepares lift plan(s)

- rigging, hoisting, lifting and positioning equipment, their applications, limitations and procedures for use
- procedures used to select equipment for hoisting, lifting and positioning operations
- calculations required when performing hoisting and lifting operations

C-8.03 Selects rigging, hoisting, lifting and positioning equipment

- of rigging, hoisting, lifting and positioning equipment, their applications, limitations and procedures for use
- procedures used to perform hoisting, lifting and positioning operations
- calculations required when performing hoisting and lifting operations

C-8.04 Inspects rigging, hoisting, lifting and positioning equipment

- inspection for rigging, hoisting, lifting and positioning equipment

C-8.05 Secures lift area

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

C-8.06 Sets up rigging, hoisting, lifting and positioning equipment

- rigging, hoisting, lifting and positioning equipment, their applications, limitations and procedures for use
- procedures used to perform rigging, hoisting and lifting and positioning operations
- calculations required when performing hoisting and lifting operations

C-8.07 Performs lift and positioning

- rigging, hoisting, lifting and positioning equipment, their applications, limitations and procedures for use
- procedures used to perform rigging, hoisting and lifting and positioning operations
- calculations required when performing hoisting and lifting operations

C-8.08 Maintains and stores rigging, hoisting, lifting and positioning equipment

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

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 Steamfitter-Pipefitter RSOS.

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

G-25 Commissions Systems

For details regarding the In Context Topic, see page 35

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

RSOS topics covered in this section of training:

A-4 Routine Trade Activates

A-4.01 Performs piping system layout
- various piping and equipment layouts and applications
- layout tools and equipment

A-4.02 Calculates pipe, tube and tubing lengths
- procedures to calculate pipe, tube and tubing length

A-4.03 Calculates piping offsets
- mathematical calculations of piping offsets

A-4.04 Installs piping supports
- piping supports and hangers and their installation

A-4.05 Installs sleeves
- piping sleeves and their installation

A-4.06 Commissions systems
- commissioning and its associated procedures

A-4.07 Protects piping systems, equipment and structure from damage
- methods used to protect piping systems, equipment and structure from damage

A-4.08 Coordinates excavation and backfill of trenches
- procedures used and considerations to excavate and backfill, and compact trenches

A-4.09 Installs fire stopping devices and materials
- procedures to install fire stopping devices and materials

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

E-14.01 Installs fixture supports
- plumbing fixtures, supports and accessories, their applications and operation
- procedures used to install plumbing fixtures, supports and accessories

E-14.02 Installs plumbing fixtures and appliances
- plumbing fixtures, appliances and accessories, their applications and operation
- procedures used to install plumbing fixtures, appliances and accessories

E-14.03 Tests plumbing fixtures and appliances
- plumbing fixtures and appliances and their application
- procedures used for testing plumbing fixtures and appliances

E-14.04 Services plumbing fixtures and appliances
- plumbing fixtures and appliances, their applications and operation
- procedures used to maintain plumbing fixtures and appliances

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 hydronic heating and cooling piping systems

F-17.01 Sizes piping and components for hydronic systems
- fluid fundamentals
- factors that impact the design
- sizing pipe and components for hydronic systems

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

F-17.03 Tests piping and components for hydronic systems
- testing piping and components for hydronic systems
- principles of hydronic system operation

F-17.04 Services piping and components for hydronic systems
- principles of hydronic system operation
- servicing piping and components for hydronic systems

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

F-18.01 Installs hydronic heating generating systems
- hydronic heat sources and their operation

F-18.02 Installs hydronic cooling generating systems
- principles of heat transfer
- hydronic cooling sources and their operation

F-18.03 Tests hydronic heating and cooling generating systems
- testing hydronic heating and cooling sources and their operation
- interpreting manufacturers' data

F-18.04 Services hydronic heating and cooling generating systems
- the principles of hydronic heating and cooling generating systems operation
- servicing for hydronic heating and cooling generating systems
- documenting the service for hydronic heating and cooling generating systems and associated piping and components

F-19 Installs, tests and services hydronic system controls and transfer units

F-19.01 Installs hydronic system controls
- hydronic system control components and accessories, their applications and operation
- procedures used to install hydronic system controls

F-19.02 Installs hydronic transfer units
- hydronic transfer units, their applications and operation
- procedures used to install hydronic transfer units

F-19.03 Tests hydronic system controls and transfer units
- types of hydronic system controls and transfer units, related equipment and components, their applications and operation
- testing hydronic system controls and transfer units, their procedures and equipment

F-19.04 Services hydronic system controls and transfer units
- hydronic system controls and transfer unit equipment and components, their applications and operation
- the procedures used to service hydronic system controls and transfer units

Blueprint Reading 27 hours

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

RSOS topics covered in this section of training:

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

C-10.01 Sizes pipe for interior drainage, waste and vent (DWV) systems

- DWV systems, their components, applications and operation
- the procedures used to determine and transfer grade and elevation measurements for DWV systems

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

- DWV systems, applications and operation
- procedures used to determine and transfer grade and elevation measurements for DWV systems
- procedures used to layout and install DWV systems

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

- DWV systems, applications and operation
- procedures used to determine and transfer grade and elevation measurements for DWV systems
- procedures used to layout and install DWV systems

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

- interior DWV systems and their application
- testing equipment and procedures used for testing interior DWV systems

C-10.05 Services piping and components for interior drainage, waste and vent (DWV) systems

- interior DWV system equipment and components, their applications and operation
- procedures used to service interior DWV systems

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

RSOS topics covered in this section of training:

D-10 installs, tests, maintains, troubleshoots and repairs low pressure steam and condensate systems

D-10.01 Installs Equipment for low pressure steam and condensate systems

- knowledge of low pressure steam and condensate systems, their applications and operations
- knowledge of procedures used to install equipment for low pressure steam and condensate systems

D-10.02 Installs piping for low pressure steam and condensate systems

- knowledge of the properties of steam
- demonstrate low pressure steam and condensate piping configurations, their applications and operation and the process of installation of the piping system

D-10.03 Tests low pressure steam and condensate systems

- knowledge of testing equipment and components
- knowledge of system testing
- demonstrate the procedures used to test low pressure steam and condensate systems

D-10.04 Maintains, troubleshoots and repairs low pressure steam and condensate systems

- troubleshoot low pressure steam and condensate systems equipment and components
- demonstrate procedures used to troubleshoot low pressure steam and condensate systems

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

RSOS topics covered in this section of training:

A-2 Uses and maintains tools and equipment

A-2.03 Uses welding equipment

- demonstrate knowledge of welding equipment, applications and procedures

A-2.05 Uses oxy-fuel equipment

- demonstrate knowledge of oxy-fuel equipment, applications and procedures

Gasfitting – Theory (Exceed) — 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

Gasfitting – Shop (Exceed) — 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 Steamfitter-Pipefitter RSOS.

Basic Electrical (Exceed) **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

Exceeds RSOS scope of work.

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

RSOS topics covered in this section of training:

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

C-10.01 Sizes pipe for interior drainage, waste and vent (DWV) systems

- DWV systems, their components, applications and operation
- the procedures used to determine and transfer grade and elevation measurements for DWV systems

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

- DWV systems, applications and operation
- procedures used to determine and transfer grade and elevation measurements for DWV systems
- procedures used to layout and install DWV systems

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

- DWV systems, applications and operation
- procedures used to determine and transfer grade and elevation measurements for DWV systems
- procedures used to layout and install DWV systems

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

- interior DWV systems and their application
- testing equipment and procedures used for testing interior DWV systems

C-10.05 Services piping and components for interior drainage, waste and vent (DWV) systems

- interior DWV system equipment and components, their applications and operation
- procedures used to service interior DWV systems

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

RSOS topics covered in this section of training:

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

F-17.01 Sizes piping and components for hydronic systems
- fluid fundamentals
- factors that impact the design
- sizing pipe and components for hydronic systems

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

F-17.03 Tests piping and components for hydronic systems
- testing piping and components for hydronic systems
- principles of hydronic system operation

F-17.04 Services piping and components for hydronic systems
- principles of hydronic system operation
- servicing piping and components for hydronic systems

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

F-18.01 Installs hydronic heating generating systems
- hydronic heat sources and their operation

F-18.02 Installs hydronic cooling generating systems
- principles of heat transfer
- hydronic cooling sources and their operation

F-18.03 Tests hydronic heating and cooling generating systems
- testing hydronic heating and cooling sources and their operation
- interpreting manufacturers' data

F-18.04 Services hydronic heating and cooling generating systems
- the principles of hydronic heating and cooling generating systems operation
- servicing for hydronic heating and cooling generating systems
- documenting the service for hydronic heating and cooling generating systems and associated piping and components

F-19 Installs, tests and services hydronic system controls and transfer units

F-19.01 Installs hydronic system controls
- hydronic system control components and accessories, their applications and operation
- procedures used to install hydronic system controls

F-19.02 Installs hydronic transfer units
- hydronic transfer units, their applications and operation
- procedures used to install hydronic transfer units

F-19.03 Tests hydronic system controls and transfer units
- types of hydronic system controls and transfer units, related equipment and components, their applications and operation
- testing hydronic system controls and transfer units, their procedures and equipment

F-19.04 Services hydronic system controls and transfer units
- hydronic system controls and transfer unit equipment and components, their applications and operation
- the procedures used to service hydronic system controls and transfer units

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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

RSOS topics covered in this section of training:

C-8 Installs, tests and services sewers

C-8.01 Sizes pipe for sewers
- sanitary drainage, storm and combination drainage systems, their components, applications and operation
- procedures used to determine and transfer grade and elevation measurements for sanitary drainage systems

C-8.02 Installs manholes and catch basins
- manholes and catch basins, their components, applications and operation
- procedures used to determine and transfer grade and elevation measurements for manholes and catch basins
- procedures used to lay out and install manholes and catch basins

C-8.03 Installs piping for sewers
- sewers, their components, applications and operation
- procedures used to determine and transfer grade and elevation measurements for sewers
- procedures used to lay out and install piping for sewers

C-8.04 Tests manholes, catch basins and piping for sewers
- manholes, catch basins and piping for sewers and their application
- procedures used for testing manholes, catch basins and piping for sewers

C-8.05 Services manholes, catch basins and piping for sewers
- manholes, catch basins and piping for sewers, their components, applications and operation
- procedures used to repair and troubleshoot manholes, catch basins and piping for sewers

D-11 Installs, tests and services water services

D-11.01 Sizes pipe for water services
- water service piping, components, their applications and operation
- procedures used to determine elevation, friction loss, velocity and required pressure for water service

D-11.02 Installs piping for water services
- water service piping their applications and operation
- procedures used to install water service components
- procedures used to install water service

D-11.03 Installs water service equipment
- water service equipment, their applications and operation
- procedures used to install water service equipment

D-11.04 Tests water service piping and components
- water service piping and components and their application
- procedures used for testing water service piping and components

D-11.05 Services water services
- water service equipment and components, their applications and operation
- the procedures used to maintain water service

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

D-12.01 Sizes piping and equipment for potable water distribution systems
- potable water distribution equipment and components, their applications and operation
- procedures used to determine elevation, friction loss and required pressure for potable water distribution systems

D-12.02 Installs piping for potable water distribution systems
- potable water distribution system and components, their applications and operation
- procedures used to install piping and components for potable water distribution systems

D-12.03 Installs potable water distribution equipment
- potable water distribution equipment and components, their applications and operation
- procedures used to install potable water distribution equipment
- volumetric expansion calculations

D-12.04 Installs and uses cross-connection control devices and methods
- cross-connection control devices and methods, their applications and operation
- information pertaining to cross-connection control devices and methods
- procedures used to install cross-connection control devices

D-12.05 Tests potable water distribution systems

- procedures used to test potable water distribution systems

D-12.06 Services potable water distribution systems
- potable water distribution systems, components, their applications and operation
- procedures used to service potable water distribution systems
- procedures used to service cross-connection control devices

H-22 Installs, tests and services specialized systems

H-22.01 Installs piping for specialized systems
- piping for specialized systems, their applications and operation
- procedures used to install piping for specialized systems

H-22.02 Installs equipment and components for specialized systems
- equipment and components for specialized systems and their applications and operation
- procedures used to install equipment and components of specialized systems

H-22.03 Tests specialized systems
- procedures used to test specialized systems

H-22.04 Services specialized systems
- procedures used to service specialized systems

Specialty Piping — 28 hours

- specialty piping systems
- specialty piping components and equipment
- installation procedures
- specialty piping codes
- testing procedures

RSOS topics covered in this section of training:

E-17 Installs, tests, maintains, troubleshoots and repairs fuel systems

E17.01 Installs equipment for fuel systems
- determine installation method
- set and secure equipment in place

E17.02 Installs piping and tubing for fuel systems
- determine joining method
- calculate grade or pitch of piping
- assemble and install piping

E17.03 Tests fuel systems
- determine type of test, testing equipment and components and test parameters
- Install testing equipment and components

E17.04 Maintains, troubleshoots and repairs fuel systems
- Troubleshoot fuel systems to determine requirements for repair or replacement
- Disassemble system, repair or replace the faulty equipment or components and reassemble the system

E-18 Installs, tests, maintains, troubleshoots and repairs medical gas systems

E18.01 Installs equipment for medical gas systems
- Select and use tools and equipment required for installation of medical gas equipment
- Determine installation method

E18.02 Installs piping and tubing for medical gas systems
- Select piping and tubing
- Assemble and install piping

E18.03 Tests medical gas systems

- Determine method of purging and filling the medical gas system using test medium
- Install test equipment
- Conduct testing of the medical gas system

E18.04 Maintains, troubleshoots and repairs medical gas systems

- Trouble shoot medical gas systems to determine requirements for repair and replacement
- Repair system components
- Reinstate system to operating condition and verify repair

E-19 Installs, tests, maintains, troubleshoots and repairs compressed air and pneumatic systems

E19.01 Installs equipment for compressed air and pneumatic systems

- Select equipment and controls
- Determine installation method

E19.02 Installs piping and tubing for compressed air pneumatic systems

- Select and size piping
- Determine joining method
- Assemble and install piping

E19.03 Tests compressed air and pneumatic systems

- Perform test on system to verify the integrity of the system

E19.04 Maintains, troubleshoots and repairs compressed air and pneumatic Systems

- Troubleshoot compressed air and pneumatic systems to determine requirements for repair or replacement
- Follow a predetermined maintenance schedule and complete required documentation

Gasfitting – Theory (Exceed) — 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

This section of training exceeds the minimum sequencing as set out by the Steamfitter-Pipefitter RSOS.

Electrical Systems (Exceed) — 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

Exceeds RSOS scope of work.

Blueprint Reading — 28 hours

- spool sheet drawings and specification books
- isometric spool sheet drawings
- IPT Pipe Trades Manual

RSOS topics covered in this section of training:

A-3 Organizes Job

A3.02 Generates drawings
- Sketch types of drawings
- Apply trade-related symbols to sketches
- Create as-built drawings to illustrate final installation

A3.03 Interprets drawings and specifications
- Transfer information from specifications to drawings
- Gather information from multiple drawings
- Reference spool drawings to identify scope of work, fabricate piping and components, and install systems

A3.04 Develop piping templates
- Plan development of template to meet requirements
- Determine measurements for coordinates on pipe in order to create the template
- Measure pipe and lay out coordinates on the pipe

Level Four — 7 weeks — 210 hours

Process Piping — 52 hours

- process piping equipment
- industrial water and waste water systems
- installation procedures for process piping
- process control functions
- testing procedures

Pipe Fabrication — 26 hours

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

Gasfitting — 26 hours

- flue gas analysis
- electrical controls systems for domestic gas fired appliances
- liquefied petroleum containers
- domestic applications pertaining to the B149.3 Gas Code

Blueprint Reading — 26 hours

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

Trade Mathematics — 14 hours

- basic math skills
- offset calculations
- grade calculations
- heat calculations
- mechanical advantage trigonometry

Electrical Systems — 14 hours

- troubleshoot electrical controls for a direct spark or hot surface ignited appliance
- ladder and connection diagrams
- electrical pump controls

Renewable Energy — 26 hours

- equipment
- piping configurations
- testing procedures

HVAC and Refrigeration Systems — 26 hours

- system operation
- installation of HVAC equipment
- installation of refrigeration equipment
- commissioning procedures

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.

G-25 Commissions Systems

G-25.01 Secures commissioning area

- system commissioning and its associated procedures

G-25.02 Pressurizes system

- system commissioning and its associated procedures

G-25.03 Inspects system

- system inspection and its associated procedures

G-25.04 Corrects faulty conditions

- repair and replacement procedures

G-25.05 Participates in start-up and turnover procedures

- start-up procedures

APPENDIX A: POST HARMONIZATION TRAINING PROFILE CHART

This chart which outlines the finalized model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

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

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

SATCC Level Two	Transcript Code	Hours	Pan-Canadian Harmonized Level Two
			Rigging, Hoisting, Lifting (In Context)
			Valves (In Context)
			Commissions Systems (In Context)
Pipe Fabrication	TBD	27	Fabrication
			Layout
Introduction to Steam Systems	TBD	27 27	Steam Systems
Hydronic Systems	TBD – Theory	47	Hydronic Systems
	TBD – Shop	7	Heat Tracing (Liquid)
Welding	TBD	27	Tools and Equipment
Blueprint Reading	TBD	27	Organizes Job
Gasfitting (Exceed)	TBD - Theory	42	
	TBD - Shop	12	
Basic Electrical (Exceed)	TBD	24	
		240	

SATCC Level Three	Transcript Code	Hours	Pan-Canadian Harmonized Level Three
			Rigging, Hoisting, Lifting (In Context)
			Valves (In Context)
			Commissions Systems (In Context)
Pipe Fabrication	TBD	28	Fabrication
			Layout
			Heat Tracing Systems (Steam)
Specialty Piping	TBD	28	Fuel Systems
			Medical Gas
			Industrial Water and Waste Treatment Systems
Hydronic Heating	TBD	28	Hydronic Systems
Low Pressure Steam Systems	TBD	56	Steam Systems (Low Pressure)
Blueprint Reading	TBD	28	Organizes Job
Gasfitting (Exceed)	TBD	28	
Electric Systems (Exceed)	TBD	14	
		210	

SATCC Level Four	Transcript Code	Hours	Pan-Canadian Harmonized Level Three
			Rigging, Hoisting, Lifting (In Context)
			Valves (In Context)
			Fuel Systems (In Context)
			Industrial Water and Waste Treatment Systems (In Context)
High Pressure Steam Systems	TBD	41	Steam Systems (High Pressure)
Pipe Fabrication	TBD	28	Fabrication
			Layout
HVAC and Refrigeration Systems	TBD	28	Heat Recovery Systems
			Geothermal Systems and Solar Heating Systems
			Commissions Systems
Renewable Energy	TBD	15	Specialized Systems
Process Piping	TBD	28	Process Piping
			Hydraulic Systems
			Air and Pneumatic Systems
Critical Rigging	TBD	28	Complex Rigging
Blueprint Reading	TBD	28	Organizes Job
Electric Systems (Exceed)	TBD	14	
		210	

Exceed Topics

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