



Steamfitter-Pipefitter

Guide to Course Content

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 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:

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.

TRAINING REQUIREMENTS FOR THE STEAMFITTER-PIPEFITTER TRADE

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
<p>❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).</p> <p>*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.</p> <p>For information about high school curriculum, including Math and Science course names, please see: http://www.curriculum.gov.sk.ca/</p> <p>Individuals not meeting the entrance requirements will be subject to an assessment and any required training</p>		

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.

* Sub-tasks with numbers in the boxes is where the content will be delivered in training.

A – Performs common occupational skills

12%

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

B – Performs layout, fabrication and piping installation

23%

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

C – Performs rigging, hoisting, lifting and positioning

13%

C-8 Performs common rigging, hoisting, lifting and positioning	8.01 Determines load 1, In Context in 2, 3	8.02 Prepares lift plans(s) 1, In Context in 2, 3	8.03 Selects rigging, hoisting, lifting and positioning equipment 1, In Context in 2, 3	8.04 Inspects rigging, hoisting, lifting and positioning equipment 1, In Context in 2, 3	8.05 Secures lift area 1, In Context in 2, 3
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<p>8.06 Sets up rigging, hoisting, lifting and positioning equipment</p> <p>1, In Context in 2, 3</p>	<p>8.07 Performs lift and positioning</p> <p>1, In Context in 2, 3</p>	<p>8.08 Maintains and stores rigging, hoisting, lifting and positioning equipment</p> <p>1, In Context in 2, 3</p>
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<p>C-9 Performs complex and critical rigging, hoisting, lifting and positioning</p>	<p>9.01 Prepares lift plan for complex and critical rigging, hoisting, lifting and positioning</p> <p>4</p>	<p>9.02 Performs calculations for complex and critical rigging, hoisting, lifting and positioning</p> <p>4</p>	<p>9.03 Selects rigging, hoisting, lifting and positioning equipment for complex and critical lifts</p> <p>4</p>	<p>9.04 Sets up rigging, hoisting, lifting and positioning equipment for complex and critical lifts</p> <p>4</p>	<p>9.05 Performs complex and critical lifts and positioning</p> <p>4</p>
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D – Installs, tests, maintains, troubleshoots and repairs low and high pressure steam and condensate systems

18%

<p>D-10 Installs, tests, maintains, troubleshoots and repairs low pressure steam and condensate systems</p>	<p>10.01 Installs equipment for low pressure steam and condensate systems</p> <p>3</p>	<p>10.02 Installs piping for low pressure steam and condensate systems</p> <p>3</p>	<p>10.03 Tests low pressure steam and condensate systems</p> <p>3</p>	<p>10.04 Maintains, troubleshoots and repairs low pressure steam and condensate systems</p> <p>3</p>
	<p>D-11 Installs, tests, maintains, troubleshoots and repairs high pressure steam and condensate systems</p>	<p>11.01 Installs equipment for high pressure steam and condensate systems</p> <p>4</p>	<p>11.02 Installs piping for high pressure steam and condensate systems</p> <p>4</p>	<p>11.03 Tests high pressure steam and condensate systems</p> <p>4</p>

E – Installs, tests, maintains, troubleshoots and repairs heating, cooling and process piping systems

20%

<p>E-12 Installs, tests, maintains, troubleshoots and repairs hydronic systems</p>	<p>12.01 Installs equipment for hydronic systems</p> <p>2, 3</p>	<p>12.02 Installs piping for hydronic systems</p> <p>2, 3</p>	<p>12.03 Tests hydronic systems</p> <p>2, 3</p>	<p>12.04 Maintains, troubleshoots and repairs hydronic systems</p> <p>2, 3</p>
<p>E-13 Installs, tests, maintains, troubleshoots and repairs process piping systems</p>	<p>13.01 Installs equipment for process piping systems</p> <p>4</p>	<p>13.02 Installs piping for process piping systems</p> <p>4</p>	<p>13.03 Tests process piping systems</p> <p>4</p>	<p>13.04 Maintains, troubleshoots and repairs process piping systems</p> <p>4</p>
<p>E-14 Installs, tests, maintains, troubleshoots and repairs industrial water and waste treatment systems</p>	<p>14.01 Installs equipment for industrial water and waste treatment systems</p> <p>3</p>	<p>14.02 Installs piping for industrial water and waste treatment systems</p> <p>3</p>	<p>14.03 Tests industrial water and waste treatment systems</p> <p>3</p>	<p>14.04 Maintains, troubleshoots and repairs industrial water and waste treatment systems</p> <p>3</p>
<p>E-15 Installs, tests, maintains, troubleshoots and repairs hydraulic systems</p>	<p>15.01 Installs equipment for hydraulic systems</p> <p>4</p>	<p>15.02 Installs piping, tubing and hoses for hydraulic systems</p> <p>4</p>	<p>15.03 Tests hydraulic systems</p> <p>4</p>	<p>15.04 Maintains, troubleshoots and repairs hydraulic systems</p> <p>4</p>
<p>E-16 Installs, tests, maintains, troubleshoots and repairs heating, ventilation, air conditioning and refrigeration (HVACR) systems</p>	<p>16.01 Installs equipment for HVACR systems</p> <p>4</p>	<p>16.02 Installs hydronic piping and refrigeration tubing for HVACR systems</p> <p>4</p>	<p>16.03 Tests associated components of HVACR systems</p> <p>4</p>	<p>16.04 Maintains, troubleshoots and repairs associated components of HVACR systems</p> <p>4</p>
<p>E-17 Installs, tests, maintains, troubleshoots and repairs fuel systems</p>	<p>17.01 Installs equipment for fuel systems</p> <p>3</p>	<p>17.02 Installs piping and tubing for fuel systems</p> <p>3</p>	<p>17.03 Tests fuel systems</p> <p>3</p>	<p>17.04 Maintains, troubleshoots and repairs fuel systems</p> <p>3</p>

E-18 Installs, tests, maintains, troubleshoots and repairs medical gas systems	18.01 Installs equipment for medical gas systems 3	18.02 Installs piping and tubing for medical gas systems 3	18.03 Tests medical gas systems 3	18.04 Maintains, troubleshoots and repairs medical gas systems 3
E-19 Installs, tests, maintains, troubleshoots and repairs compressed air and pneumatic systems	19.01 Installs equipment for compressed air and pneumatic systems 4	19.02 Installs piping and tubing for compressed air and pneumatic systems 4	19.03 Tests compressed air and pneumatic systems 4	19.04 Maintains, troubleshoots and repairs compressed air and pneumatic systems 4
E-20 Installs and tests fire protection Systems (NOT COMMON CORE)	20.01 Installs equipment for fire protection systems (NOT COMMONCORE)	20.02 Installs piping for fire protection systems (NOT COMMONCORE)	20.03 Tests fire protection systems (NOT COMMONCORE)	

F – Installs, tests, maintains, troubleshoots and repairs renewable energy systems

6%

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

G – Performs commissioning, start-up and turnover

8%

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

TRAINING PROFILE CHART

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

Level One	Transcript Code	Hours
Trade Related Safety	SAFE 130 - Theory	15
	SAFE 131 - Shop	15
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	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	Transcript Code	Hours
Electrical Systems (Exceed)	ELEC 386	14
Gasfitting (Exceed)	PIPE 382	28
Pipe Fabrication	PIPE 381	28
Specialty Piping	PIPE 383	28
Low Pressure Steam Systems	STEA 394	56
Blueprint Reading	PRNT 382	28
Hydronic Heating	HDRO 362	28
		210

Level Four	Transcript Code	Hours
Electrical Systems (Exceed)	ELEC 484	14
Critical Rigging	RIGG 401	28
Pipe Fabrication	PIPE 482	28
HVAC and Refrigeration Systems	RFRG 488	28
Renewable Energy	PIPE 483	15
Process Piping	STEAM 482	28
Blueprint Reading	PRNT 482	28
High Pressure Steam Systems	STEAM 400	41
		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.

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
<ul style="list-style-type: none">• discuss safe work practices• discuss WHMIS• discuss lockout and tag out procedures		
Trade Related Safety – Shop		15 hours
<ul style="list-style-type: none">• 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		
A-1.02 Uses personal protective equipment (PPE) and safety equipment		
A-1.03 Performs lock-out and tag-out procedures		
<hr/>		
Tool Basics and Equipment – Theory		15 hours
<ul style="list-style-type: none">• discuss the use and care of hand tools• discuss the use and care of power tools• discuss access equipment• explain soldering and brazing equipment		
Tool Basics and Equipment – Shop		15 hours
<ul style="list-style-type: none">• demonstrate the use and care of hand tools• demonstrate the use and care of power tools• demonstrate use of access 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		
A-2.02 Uses access equipment		
A-2.04 Uses soldering and brazing equipment		

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 Uses welding equipment
 - A-2.05 Uses oxy-fuel equipment
-

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
 - A-3.02 Generates drawings
 - A-3.03 Interprets drawings and specifications
 - A-3.04 Develops piping templates
 - A-3.05 Performs quality control functions
-

Pipe Fabrication – Theory**30 hours**

- discuss piping system layout
- discuss piping system measurements
- explain piping system offsets
- identify pipe system 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
- B-4.02 Fabricates 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

B-5.02 Lays out, identifies and installs plastic piping, tubing, fittings and related components

B-5.03 Lays out, identifies and installs carbon steel piping, tubing, fittings and related components

B-5.04 Lays out, identifies and installs stainless steel piping, tubing, fittings and related components

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

B-6.01 Installs valves

B-6.02 Maintains, troubleshoots, repairs and tests valves

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

C-8.02 Prepares lift plan(s)

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

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

C-8.05 Secures lift area

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

C-8.07 Performs lift and positioning

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

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:

A-3 Organizes Work

For details regarding the In Context Topic, see pages 26

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 projects

RSOS topics covered in this section of training:

B-4 Perform Fabrication

B-4.01 Fabricates piping system components

B-4.02 Fabricates 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

B-5.02 Lays out, identifies and installs plastic piping, tubing, fittings and related components

B-5.03 Lays out, identifies and installs carbon steel piping, tubing, fittings and related components

B-5.04 Lays out, identifies and installs stainless steel piping, tubing, fittings and related components

Hydronic Systems – Theory

47 hours

- explain the chemical and physical properties of water
- perform mathematical calculations
- describe boilers
- describe boiler components
- 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:

E-12 Installs, tests and services hydronic heating and cooling piping systems

E-12.01 Installs equipment for hydronic systems

E-12.02 Installs piping for hydronic systems

E-12.03 Tests hydronic systems

E-12.04 Maintains, troubleshoots and repairs 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

RSOS topics covered in this section of training:

A-3 Organizes Job

A3.02 Generates drawings

A3.03 Interprets drawings 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
- discuss steam traps
- Assemble 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

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

D-10.03 Tests low pressure steam and condensate systems

D-10.04 Maintains, troubleshoots and repairs 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

A-2.05 Uses oxy-fuel equipment

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 Steamfitter-Pipefitter RSOS.

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

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

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

A-3 Organizes Work

B-6 Installs, maintains, troubleshoots, repairs and tests valves

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

For details regarding the In Context Topic, see pages 26



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:

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

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

D-10.03 Tests low pressure steam and condensate systems

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

E-12 Installs, tests and services hydronic heating and cooling piping systems

E-12.01 Installs equipment for hydronic systems

E-12.02 Installs piping for hydronic systems

E-12.03 Tests hydronic systems

E-12.04 Maintains, troubleshoots and repairs hydronic systems

Pipe Fabrication

28 hours

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

RSOS topics covered in this section of training:

B-4 Perform Fabrication

B-4.01 Fabricates piping system components

B-4.02 Fabricates 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

B-5.02 Lays out, identifies and installs plastic piping, tubing, fittings and related components

B-5.03 Lays out, identifies and installs carbon steel piping, tubing, fittings and related components

B-5.04 Lays out, identifies and installs stainless steel piping, tubing, fittings and related components

B-7 Installs, tests, maintains, troubleshoots and repairs heat tracing systems

B-7.01 Installs steam tracing systems

H-22 Installs, tests and services specialized systems

H-22.01 Installs piping for specialized systems

H-22.02 Installs equipment and components for specialized systems

H-22.03 Tests specialized systems

H-22.04 Services specialized systems

Specialty Piping

28 hours

- discuss specialty piping systems
- identify specialty piping components and equipment
- describe installation procedures
- discuss codes pertaining to specialty piping systems (SATCC LO codes)
- describe testing procedures

RSOS topics covered in this section of training:

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

E-17.01 Installs equipment for fuel systems

E-17.02 Installs piping and tubing for fuel systems

E-17.03 Tests fuel systems

E-17.04 Maintains, troubleshoots and repairs fuel systems

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

E-18.01 Installs equipment for medical gas systems

E-18.02 Installs piping and tubing for medical gas systems

E-18.03 Tests medical gas systems

E-18.04 Maintains, troubleshoots and repairs medical gas systems

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 pneumatic systems

E-19.03 Tests compressed air and pneumatic systems

E-19.04 Maintains, troubleshoots and repairs compressed air and pneumatic systems

Gasfitting – Theory

28 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 gas appliances and equipment
- 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

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

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

Blueprint Reading

28 hours

- describe spool sheet drawings
- discuss specification books
- interpret isometric spool sheet drawings
- produce and isometric spool sheet drawing

RSOS topics covered in this section of training:

A-3 Organizes Job

A-3.02 Generates drawings

A-3.03 Interprets drawings and specifications

A-3.04 Develop piping templates

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

A-3 Organizes Work

A-4 Routine Trade Activates

B-6 Installs, maintains, troubleshoots, repairs and tests valves

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

For details regarding the In Context Topic, see pages 26



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

RSOS topics covered in this section of training:

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

Pipe Fabrication

28 hours

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

RSOS topics covered in this section of training:

A-3 Organizes Work

A-3.01 Plans work

A-3.02 Generates drawings

A-3.03 Interprets drawings and specifications

A-3.04 Develops piping templates

A-3.05 Performs quality control functions

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

B-5.02 Lays out, identifies and installs plastic piping, tubing, fittings and related components

B-5.03 Lays out, identifies and installs carbon steel piping, tubing, fittings and related components

B-5.04 Lays out, identifies and installs stainless steel piping, tubing, fittings and related components

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

RSOS topics covered in this section of training:

E-16 Installs, Tests, Maintains, Troubleshoots and Repairs Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) Systems

E-16.01 Installs HVACR systems

E-16.02 Installs hydronic piping and refrigeration tubing for HVACR systems

E-16 Installs, Tests, Maintains, Troubleshoots and Repairs Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) Systems

E-16.01 Installs 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

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

Blueprint Reading

28 hours

- isometric and orthographic drawings
- industrial equipment and materials
- gridlines and coordinates

RSOS topics covered in this section of training:

A-3 Organizes Job

A-3.02 Generates drawings
A-3.03 Interprets drawings and specifications
A-3.04 Develop piping templates

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

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
D-11.02 Installs piping for high pressure steam and condensate systems
D-11.03 Tests high pressure steam and condensate systems
D-11.04 Maintains, troubleshoots and repairs high pressure steam and condensate systems

Electrical Systems

14 hours

- troubleshoot flame safeguard controls
- interpret ladder diagrams and connection diagrams
- troubleshoot natural gas fired furnaces
- explain the electrical controls used with submersible pumps

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

Renewable Energy

15 hours

- describe equipment
- discuss piping configurations
- describe testing procedures

RSOS topics covered in this section of training:

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

F-22 Installs, Tests, Maintains, Troubleshoots and Repairs Solar Heating System

F-22.01 Installs equipment for solar heating systems

F-22.02 Installs piping for solar heating systems

F-22.03 Test solar heating systems

F-22.04 Maintains, troubleshoots and repairs solar heating systems

Critical Rigging

28 hours

- describe lift plan requirements
- explain load charts and weight calculations
- classify rigging equipment used in industry
- examine equipment usage
- compare details of different lift plans

RSOS topics covered in this section of training:

- 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
-

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

A-3 Organizes Work

A-4 Routine Trade Activates

B-6 Installs, maintains, troubleshoots, repairs and tests valves

B-7 Installs, tests, maintains, troubleshoots and repairs heat tracing systems

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

E-14 Installs, tests, maintains, troubleshoots and repairs industrial water and waste treatment systems

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

G-24 Prepares system for commissioning, start-up and turnover

G-25 Commissions systems

For details regarding the In Context Topic, see pages 26

In Context Topics

In In context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in context topics are accomplished in other topics in that level.

A-3 Organizes work

- A-3.01 Plans work
- A-3.02 Generates drawings
- A-3.03 Interprets drawings and specifications
- A-3.04 Develops piping templates
- A-3.05 Performs quality control functions

B-6 Installs, maintains, troubleshoots, repairs and tests valves

- B-6.01 Installs valves
- B-6.02 Maintains, troubleshoots, repairs and tests valves

B-7 Installs, tests, maintains, troubleshoots and repairs heat tracing systems

- B-7.01 Installs steam tracing systems
- B-7.02 Maintains, troubleshoots, repairs and tests steam tracing systems
- B-7.03 Installs liquid-filled tracing systems
- B-7.04 Maintains, troubleshoots, repairs and tests liquid-filled tracing systems

C-8 Performs common rigging, hoisting, lifting and positioning

- C-8.01 Determines load
- C-8.02 Prepares lift plan(s)
- C-8.03 Selects rigging, hoisting, lifting and positioning equipment
- C-8.04 Inspects rigging, hoisting, lifting and positioning equipment
- C-8.05 Secures lift area
- C-8.06 Sets up rigging, hoisting, lifting and positioning equipment
- C-8.07 Performs lift and positioning
- C-8.08 Maintains and stores rigging, hoisting, lifting and positioning equipment

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
- E-14.02 Installs piping for industrial water and waste treatment systems
- E-14.03 Tests industrial water and waste treatment systems
- E-14.04 Maintains, troubleshoots and repairs industrial water and waste treatment systems

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

- E-17.01 Installs equipment for fuel systems
- E-17.02 Installs piping and tubing for fuel systems
- E-17.03 Tests fuel systems
- E-17.04 Maintains, troubleshoots and repairs fuel systems

G-24 Prepares system for commissioning, start-up and turnover

- G-24.01 Flushes system
- G-24.02 Chemically treat systems
- G-24.03 Pre-checks system for commissioning
- G-24.04 Selects and connects commissioning equipment

G-25 Commissions systems

- G-25.01 Secures commissioning area
- G-25.02 Pressurizes system
- G-25.03 Inspects system
- G-25.04 Corrects faulty
- G-25.05 Participates in start-up and turnover procedures