

# Trade Profile

## Steamfitter/Pipefitter



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# **RED SEAL**

# **TRADE PROFILE**

## **STEAMFITTER/PIPEFITTER**



# STRUCTURE OF THE TRADE PROFILE

This profile has two sections that provide a snapshot of the trade's description, and all trade activities as they are organized in the Red Seal Occupational Standard:

**Description of the Steamfitter/Pipefitter trade:** an overview of the trade's duties, work environment, job requirements, similar occupations and career progression

**Task Matrix:** a chart which outlines graphically the major work activities, tasks and sub-tasks of this trade

**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

A complete version of the occupational standard, which provides additional detail for the trade activities, skills and knowledge can be found at [www.red-seal.ca](http://www.red-seal.ca).

# DESCRIPTION OF THE STEAMFITTER/PIPEFITTER TRADE

“Steamfitter/Pipefitter” is this trade’s official Red Seal occupational title approved by the CCDA. This standard covers tasks performed by a Steamfitter/Pipefitter.

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, tack, assemble and install metallic, plastic and fiberglass pipes, valves, system components and fittings. As well, they must be able to join and secure pipe sections of related equipment using various methods. They check systems for leaks. Steamfitters/Pipefitters also do general maintenance work including repair or 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, mechanical and brazing equipment to join pipes and fabricate sections of piping systems.

Areas of specialization in this trade include maintenance, quality control, rigging, hoisting, fabrication and installation of various types of systems and specialty piping. Some steamfitters/pipefitters collaborate with consultants and owners in the design and planning stages.

Safety practices are of utmost importance in this trade. Steamfitters/Pipefitters work both indoors and outdoors at physically demanding tasks that often require working at heights. There is some risk of injury when working in and around trenches, on work platforms, and with power tools and heavy equipment. The piping systems may carry dangerous substances and contents at high pressures. Safety practices and training are emphasized in order to minimize risks.

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. In aspects of layout, work organization, project planning and supervisory tasks, steamfitters/pipefitters may also make use of many digital tools and applications.

Steamfitters/Pipefitters work in many sectors including pipelines, nuclear energy, mining, petrochemical, natural gas, sawmills, inland and offshore oil and gas, shipbuilding, automotive, pulp and paper, renewable energy, residential, commercial and institutional. With experience, steamfitters/pipefitters may advance to positions such as supervisor, contractor, owner, superintendent and instructor.

# TRENDS IN THE STEAMFITTER/PIPEFITTER TRADE

## Technology

There is an ongoing trend towards the use of computers for generating reports, schedules, requests for information (RFI), ordering material, completion of forms, rendering drawings (computer-aided design or CAD), system analysis and service, and control of heating/cooling systems.

Digital devices can be used to access piping apps and online sources to quickly access information such as pipe weights, bolt sizes and wall thickness. Laser and digital layout equipment such as total station and global positioning system (GPS) technology is increasingly important for trade activities.

3D software and equipment are gaining popularity for drawing production, model manipulation and measuring. 3D scanning is also being used, allowing contractors to scan entire mechanical rooms and pre-fabricate off of the digital dimensions. The use of virtual reality (VR) through VR headsets, allows the user to see a finished installation through Building Information Modelling (BIM).

Robotic layout stations are being used in new designs and installations. Laser levels and laser plumb bobs along with robotic stations facilitate layout in various installations such as boiler rooms, making it easier to locate interferences.

## Tools and Equipment

There is an increase in the use of hydraulic/pneumatic/electric cutting and bevelling tools for pipe-end preparation. Hydraulic/pneumatic/electric tensioning and torquing equipment are also becoming more common in the trade. There is an increase in the use of poly fusion methods which increase efficiency and safety.

Press fit joining techniques are being used more in the commercial heating sectors for heating and cooling applications. It is also becoming more popular in some industrial applications, shipbuilding and where intrinsically safe methods are required.

New access equipment such as rope access systems are being used in place of scaffolding in various work locations.

Battery-operated tools are becoming far more efficient, powerful, brushless, and less costly, as well as far lighter and safer to use in tight work areas.

## Health and Safety

Steamfitters/Pipefitters are expected to obtain and maintain a high level of safety knowledge and training.

Health and safety are the most important parts of a job. Safety certifications and records can be the difference between getting a job and not being able to bid for work.

New safety equipment is also available to protect workers and equipment. There is more stringent *Working at Heights* training. Improved fall restraint systems are being utilized.

## Environmental

Similar to Health and Safety, environmental concerns are at an all-time high. Leadership in Energy and

Environmental Design (LEED) design and construction is being used by owners and designers more often.

Contracts increasingly have built-in requirements for health, safety and environmental performance so attention needs to be given to proper waste disposal and management.

Renewable and sustainable energy systems such as geo-exchange, geothermal, solar, radiant, refrigeration, heat recovery, CO<sub>2</sub> capture and central cooling plants are becoming more prevalent. There is new technology for water-heating such as low-mass boilers, on-demand (flow-through) hot water systems, condensing boilers, biomass, high efficiency boilers and co-generation boilers. Heating and cooling systems are becoming increasingly hybridized, making it less clear where one system ends and the other begins.

### **Products/Materials**

New materials and products are becoming economically feasible, and driving changes in structural design, especially in industrial and institutional sectors. New materials and products such as high heat/corrosion resistant rubbers, gaskets, new low-pressure steam couplings and new steam traps are being used more frequently to replace components and perform repairs.

Plastic pipe is increasingly being used in residential, commercial and institutional sectors for certain applications. In industries such as pulp and paper, shipbuilding, mining and chemical, there is an increase in the use of specialized materials.

The movement to more specialized materials will require more training for steamfitters/pipefitters. This will also require a more in-depth knowledge of quality control procedures.

Modularization and pre-fabrication is becoming more common and installation of these materials requires fewer field runs.

### **Legislative and Regulatory**

Steamfitters/Pipefitters must keep current on a large number of regulations and codes. Governments continue to pass more stringent safety, health and environmental regulations. LEED standards are becoming more common in many jurisdictions. These promote increased energy efficiency and environmentally friendly building practices.

With regulations becoming more stringent, steamfitters/pipefitters may be held liable for their actions when performing rigging, hoisting, lifting and positioning activities. It is the responsibility of steamfitters/pipefitters to be aware of changes in regulations.

In some jurisdictions, steamfitters/pipefitters require specialty licenses such as gas, fuel and oil licences or other special endorsements for working with materials such as medical gas. Certification may also be required for performing welding, tacking processes and backflow prevention. Licensing and certifications for aerial work platforms, zoom booms, articulated forklifts and scissor lifts are becoming essential for operating these pieces of equipment. Hoisting and rigging certification is becoming increasingly necessary in some jurisdictions.

There is an increase in the enforcement in new and existing systems by jurisdictional regulators. Documentation on the quality and safety of a system has become paramount and it is often a requirement by most insurance companies. As such, steamfitters/pipefitters must keep updated and pay careful attention to these safety regulations and requirements.

# Steamfitter/Pipefitter

## Task Matrix and Weightings

### A - Performs common occupational skills

**13%**

<b>Task A-1</b> Performs safety-related functions <b>27%</b>	<b>A-1.01</b> Maintains safe work environment	<b>A-1.02</b> Uses personal protective equipment (PPE) and safety equipment	<b>A-1.03</b> Follows lock-out and tag-out (LOTO) procedures
<b>Task A-2</b> Uses and maintains tools and equipment <b>37%</b>	<b>A-2.01</b> Uses common tools and equipment	<b>A-2.02</b> Uses access equipment	<b>A-2.03</b> Uses welding equipment
	<b>A-2.04</b> Uses soldering and brazing equipment	<b>A-2.05</b> Uses oxy-fuel and plasma cutting equipment	
<b>Task A-3</b> Organizes job <b>23%</b>	<b>A-3.01</b> Plans work	<b>A-3.02</b> Generates drawings	<b>A-3.03</b> Interprets drawings and specifications
	<b>A-3.04</b> Develops piping templates	<b>A-3.05</b> Performs quality control functions	<b>A-3.06</b> Handles materials and components
<b>Task A-4</b> Uses communication and mentoring techniques <b>13%</b>	<b>A-4.01</b> Uses communication techniques	<b>A-4.02</b> Uses mentoring techniques	

## B – Performs layout, fabrication and piping installation

**22%**

**Task B-5**  
Performs fabrication  
**33%**

**Task B-6**  
Lays out and installs piping, tubing, fittings and related components  
**43%**

**Task B-7**  
Installs, maintains, troubleshoots, repairs and tests valves  
**14%**

**Task B-8**  
Installs, tests, maintains, troubleshoots and repairs heat tracing systems  
**10%**

**B-5.01 Fabricates piping system components**

**B-5.02 Fabricates brackets, supports, hangers, guides and anchors**

**B-6.01 Lays out and installs copper tube, tubing, fittings and related components**

**B-6.02 Lays out and installs plastic piping, fittings and related components**

**B-6.03 Lays out and installs carbon steel piping, fittings and related components**

**B-6.04 Lays out and installs stainless steel piping, tubing, fittings and related components**

**B-6.05 Lays out and installs fiberglass piping, fittings and related components**

**B-6.06 Lays out and installs specialty piping, fittings and related components**

**B-7.01 Installs valves**

**B-7.02 Maintains, troubleshoots, repairs and tests valves**

**B-8.01 Installs steam tracing systems**

**B-8.02 Maintains, troubleshoots, repairs and tests steam tracing systems**

**B-8.03 Installs liquid-filled tracing systems**

**B-8.04 Maintains, troubleshoots, repairs and tests liquid-filled tracing systems**

## C – Performs rigging, hoisting, lifting and positioning

**12%**

**Task C-9**  
Performs common rigging, hoisting, lifting and positioning

**66%**

**C-9.01 Determines load**

**C-9.02 Prepares lift plan(s) for common rigging, hoisting, lifting and positioning**

**C-9.03 Selects rigging, hoisting, lifting and positioning equipment for common lifts**

**C-9.04 Inspects rigging, hoisting, lifting and positioning equipment**

**C-9.05 Secures lift area**

**C-9.06 Sets up rigging, hoisting, lifting and positioning equipment for common lifts**

**C-9.07 Performs common lift and positioning**

**C-9.08 Maintains and stores rigging, hoisting, lifting and positioning equipment**

**Task C-10**  
Performs complex and critical rigging, hoisting, lifting and positioning

**34%**

**C-10.01 Prepares lift plan for complex and critical rigging, hoisting, lifting and positioning**

**C-10.02 Performs calculations for complex and critical rigging, hoisting, lifting and positioning**

**C-10.03 Selects rigging, hoisting, lifting and positioning equipment for complex and critical lifts**

**C-10.04 Sets up rigging, hoisting, lifting and positioning equipment for complex and critical lifts**

**C-10.05 Performs complex and critical lifts and positioning**

# D – Installs, tests, maintains, troubleshoots and repairs low and high pressure steam and condensate systems

**18%**

**Task D-11**  
 Installs, tests, maintains, troubleshoots and repairs low pressure steam and condensate systems  
**43%**

**D-11.01** Installs equipment for low pressure steam and condensate systems

**D-11.02** Installs piping for low pressure steam and condensate systems

**D-11.03** Tests low pressure steam and condensate systems

**D-11.04** Maintains, troubleshoots and repairs low pressure steam and condensate systems

**Task D-12**  
 Installs, tests, maintains, troubleshoots and repairs high pressure steam and condensate systems  
**57%**

**D-12.01** Installs equipment for high pressure steam and condensate systems

**D-12.02** Installs piping for high pressure steam and condensate systems

**D-12.03** Tests high pressure steam and condensate systems

**D-12.04** Maintains, troubleshoots and repairs high pressure steam and condensate systems

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

**21%**

**Task E-13**  
Installs, tests, maintains, troubleshoots and repairs hydronic systems  
**21%**

**E-13.01** Installs equipment for hydronic systems

**E-13.02** Installs piping for hydronic systems

**E-13.03** Tests hydronic systems

**E-13.04** Maintains, troubleshoots and repairs hydronic systems

**Task E-14**  
Installs, tests, maintains, troubleshoots and repairs process piping systems  
**13%**

**E-14.01** Installs equipment for process piping systems

**E-14.02** Installs piping for process piping systems

**E-14.03** Tests process piping systems

**E-14.04** Maintains, troubleshoots and repairs process piping systems

**Task E-15**  
Installs, tests, maintains, troubleshoots and repairs industrial water and waste treatment systems  
**12%**

**E-15.01** Installs equipment for industrial water and waste treatment systems

**E-15.02** Installs piping for industrial water and waste treatment systems

**E-15.03** Tests industrial water and waste treatment systems

**E-15.04** Maintains, troubleshoots and repairs industrial water and waste treatment systems

**Task E-16**  
Installs, tests, maintains, troubleshoots and repairs hydraulic systems  
**10%**

**E-16.01** Installs equipment for hydraulic systems

**E-16.02** Installs piping and hoses for hydraulic systems

**E-16.03** Tests hydraulic systems

**E-16.04** Maintains, troubleshoots and repairs hydraulic systems

**Task E-17**  
 Installs, tests, maintains, troubleshoots and repairs heating, ventilation, air conditioning and refrigeration (HVACR) systems  
**9%**

**E-17.01** Installs equipment for HVACR systems

**E-17.02** Installs piping for HVACR systems

**E-17.03** Tests HVACR systems

**E-17.04** Maintains, troubleshoots and repairs HVACR systems

**Task E-18**  
 Installs, tests, maintains, troubleshoots and repairs fuel systems  
**10%**

**E-18.01** Installs equipment for fuel systems

**E-18.02** Installs piping for fuel systems

**E-18.03** Tests fuel systems

**E-18.04** Maintains, troubleshoots and repairs fuel systems

**Task E-19**  
 Installs, tests, maintains, troubleshoots and repairs medical gas systems  
**9%**

**E-19.01** Installs equipment for medical gas systems

**E-19.02** Installs piping for medical gas systems

**E-19.03** Tests medical gas systems

**E-19.04** Maintains, troubleshoots and repairs medical gas systems

**Task E-20**  
 Installs, tests, maintains, troubleshoots and repairs compressed air and pneumatic systems  
**11%**

**E-20.01** Installs equipment for compressed air and pneumatic systems

**E-20.02** Installs piping for compressed air and pneumatic systems

**E-20.03** Tests compressed air and pneumatic systems

**E-20.04** Maintains, troubleshoots and repairs compressed air and pneumatic systems

**Task E-21**  
 Installs and tests fire protection systems  
**0% Not Common Core**

**E-21.01** Installs equipment for fire protection systems- Not Common Core

**E-21.02** Installs piping for fire protection systems- Not Common Core

**E-21.03** Tests fire protection systems- Not Common Core

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

**6%**

**Task F-22**  
 Installs, tests, maintains, troubleshoots and repairs geo-exchange and geothermal systems  
**27%**

**F-22.01** Installs equipment for geo-exchange and geothermal systems

**F-22.02** Installs piping for geo-exchange and geothermal systems

**F-22.03** Tests geo-exchange and geothermal systems

**F-22.04** Maintains, troubleshoots and repairs geo-exchange and geothermal systems

**Task F-23**  
 Installs, tests, maintains, troubleshoots and repairs solar heating systems  
**23%**

**F-23.01** Installs equipment for solar heating systems

**F-23.02** Installs piping for solar heating systems

**F-23.03** Tests solar heating systems

**F-23.04** Maintains, troubleshoots and repairs solar heating systems

**Task F-24**  
 Installs, tests, maintains, troubleshoots and repairs heat recovery systems  
**50%**

**F-24.01** Installs equipment for heat recovery systems

**F-24.02** Installs piping for heat recovery systems

**F-24.03** Tests heat recovery systems

**F-24.04** Maintains, troubleshoots and repairs heat recovery systems

## G – Performs commissioning, start-up and turnover

8%

**Task G-25**  
Prepares system for commissioning,  
start-up and turnover  
55%

G-25.01 Flushes system	G-25.02 Chemically treats system	G-25.03 Pre-checks system for commissioning
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G-25.04 Selects and connects commissioning equipment

**Task G-26**  
Commissions systems  
45%

G-26.01 Secures commissioning area	G-26.02 Pressurizes system	G-26.03 Inspects system
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G-26.04 Corrects faulty conditions

G-26.05 Participates in start-up and turnover procedures