Plumber

On-the-Job Training Guide

2025

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Recognition:
To promote transparency and consistency, portions of this document has been adapted from the 2023 Plumber Red Seal Occupational Standard (Employment and Social Development Canada).

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

STRUCTURE OF THE ON-THE-JOB TRAINING GUIDE

To facilitate understanding of the occupation, this on-the-job training guide 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.

On-the-Job and In-school Training Content for the Plumber Trade: a chart which outlines the topics of technical training with on-the-job examples for apprentice to achieve relevant experience at work

TRAINING REQUIREMENTS FOR THE PLUMBER 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.

Journeyperson to apprentice ratio for this trade is: 1:2

The information contained in this document serves as a guide for employers and apprentices. Apprenticeship training is mutually beneficial to both employer and apprentice. The employer's investment in training apprentices results in skilled and certified workers. The document summarizes the tasks to be covered by the apprentice during their on-the-job portion of apprenticeship training. An apprentice spends approximately 85% of their apprenticeship term training on-the-job.

It is the employer's or journeyperson's responsibility to supervise an apprentice's practical skills development until a satisfactory level of proficiency has been reached.

EMPLOYER TRAINING RESPONSIBILITY

- promote a safety-conscious workplace
- provide mentored, hands-on practice in the use of tools and equipment
- demonstrate procedures relevant to the installation of drainage, waste and vent systems; potable water distribution; fixtures and appliances; hydronic heating and cooling systems; specialty piping; pumps and private sewage disposal systems
- provide the opportunity for apprentices to service the above systems and products
- further the apprentice's ability to interpret technical drawings
- ensure that the apprentice can evaluate the end product.

Employers should make every effort to expose their apprentices to work experience in as many areas of the trade as possible.

In the On-the-Job Training Guide, in-school instruction is listed first; on-the-job suggestions to help employers assist the apprentice to prepare for in-school training are listed next.

The content of the training components is subject to change without notice.

PLUMBER TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2023 Plumber 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 — 11%

A-1 Performs safety-related functions	1.01 Maintains safe work environment 1	1.02 Uses personal protective equipment (PPE) and safety equipment 1	1.03 Performs lock-out and tag-out (LOTO) procedures 1		
A-2 Uses and maintains tools and equipment	2.01 Uses common tools and equipment 1 (2, 3, 4 In-Context)	2.02 Uses access equipment 1 (2, 3, 4 In-Context)	2.03 Uses rigging, hoisting, lifting and positioning equipment 1 (2, 3, 4 In-Context)	2.04 Rigs loads for cranes 1 (2, 3, 4 In-Context)	2.05 Uses welding equipment 1 (2, 3, 4 In-Context)
	2.06 Uses soldering and brazing equipment 1 (2, 3, 4 In-Context)				
A-3 Organizes work	3.01 Organizes project tasks and procedures 1 (2, 3, 4 In-Context)	3.02 Organizes materials and supplies 1 (2, 3, 4 In-Context)	3.03 Uses Documentation 1 (2, 3, 4 In-Context)		
A-4 Performs routine trade activities	4.01 Plans layout for piping system 1, 2 (3, 4 In-Context)	4.02 Calculates tube, tubing and pipe lengths 1, 2 (3, 4 In-Context)	4.03 Installs piping supports 1, 2 (3, 4 In-Context)	4.04 Installs piping sleeves 1, 2 (3, 4 In-Context)	4.05 Commissions systems 1, 2 (3, 4 In-Context)
	4.06 Protects piping systems, equipment and structure from damage 1, 2 (3, 4 In-Context)	4.07 Coordinates excavation and backfilling of trenches 1, 2 (3, 4 In-Context)	4.08 Installs fire stopping devices and materials 1, 2 (3, 4 In-Context)		

A-5 Uses communication and mentoring techniques	5.01 Uses communication techniques 1 (2, 3, 4 In Context)	5.02 Uses mentoring techniques 3, 4

B – Prepares and Assembles Tube, Tubing and Pipe — 10%

B-6 Prepares tube, tubing and pipe	6.01 Inspects tube, tubing, pipe and fittings before installation 1 (2, 3, 4 In-Context)	6.02 Cuts tube, tubing and pipe 1 (2, 3, 4 In-Context)	6.03 Bends tube, tubing and pipe 1 (2, 3, 4 In-Context)	6.04 Prepares tube, tubing and pipe connections 1 (2, 3, 4 In-Context)	
B-7 Joins tube, tubing and pipe	7.01 Joins copper tube, tubing and pipe 1 (2, 3, 4 In-Context)	7.02 Joins plastic tube, tubing and pipe 1 (2, 3, 4 In-Context)	7.03 Joins steel tube, tubing and pipe 1 (2, 3, 4 In-Context)	7.04 Joins cast iron pipe 1 (2, 3, 4 In-Context)	7.05 Joins specialized tube, tubing and pipe 1 (2, 3, 4 In-Context)

C – Installs, Tests and Services Sewers, Sewage Treatment Systems and Drainage, Waste and Vent (DWV) Systems — 26%

C-8 Installs, tests and services sewers	8.01 Plans layout and sizes piping for sewers 3 (4 In-context)	8.02 Installs maintenance holes and catch basins 3 (4 In-Context)	8.03 Installs piping for sewers 3 (4 In-Context)	8.04 Tests maintenance holes, catch basins and piping for sewers 3 (4 In-Context)	8.05 Services maintenance holes, catch basins and piping for sewers 3 (4 In-Context)
C-9 Installs, tests and services sewage treatment systems	9.01 Plans installation of sewage treatment systems 4	9.02 Installs components for sewage treatment system 4	9.03 Tests sewage treatment systems 4	9.04 Services sewage treatment systems 4	

C-10 Installs, tests and services interior drainage, waste and vent (DWV) systems	10.01 Plans layout and sizes piping for interior drainage, waste, and vent (DWV) systems 1, 2, 3 (4 In-context)	10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems 1, 2, 3 (4 In-context)	10.03 Installs above-ground piping and components for interior drainage, waste and vent (DWV) systems 1, 2, 3 (4 In-context)	10.04 Tests interior drainage, waste and vent (DWV) systems 1, 2, 3 (4 In-context)	10.05 Services interior drainage, waste and vent (DWV) systems 1, 2, 3 (4 In-context)

D – Installs, Tests and Services Water Service and Distribution

19%

D-11 Installs, tests and services water service	11.01 Plans layout and sizes piping and components for water service 3 (4 In-Context)	11.02 Installs piping for water services 3 (4 In-Context)	11.03 Installs components for water service 3 (4 In-Context)	11.04 Tests water service piping and components 3 (4 In-Context)	11.05 Services water service piping and components 3 (4 In-Context)
D-12 Installs, tests and services potable water distribution systems	12.01 Plans layout and sizes piping and components for potable water distribution systems 3 (4 In-Context)	12.02 Installs piping for potable water distribution systems 3 (4 In-Context)	12.03 Installs components for potable water distribution systems 3 (4 In-Context)	12.04 Installs cross-connection controls 3 (4 In-Context)	12.05 Tests potable water distribution systems 3 (4 In-Context)
	12.06 Services potable water distribution systems 3 (4 In-Context)				
D-13 Installs, tests and services private water pressure systems	13.01 Plans layout and sizes piping and components for private water pressure systems 4	13.02 Installs piping for private water pressure systems 4	13.03 Installs components for private water pressure systems 4	13.04 Tests private water pressure systems 4	13.05 Services private water pressure systems 4

E – Installs, Tests and Services Fixtures, Appliances and Water Treatment Systems

13%

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

F – Installs, Tests and Services Low Pressure Steam and Hydronic Systems

13%

Tasks within this Major Work Activity is not consistently performed by Plumbers across Canada, therefore content deemed not common core (MWA 16).will **not** be assessed on the Plumber certification examination.

F-16 Installs, tests and services low pressure steam systems (Not Common Core)	16.01 Plans layout and sizes piping and components for low pressure steam systems (Not Common Core)	16.02 Installs piping and components for low pressure steam systems (Not Common Core)	16.03 Tests low pressure steam systems (Not Common Core)	16.04 Services low pressure steam systems (Not Common Core)
F-17 Installs, tests and services piping and components for hydronic systems	17.01 Plans layout and sizes piping and components for hydronic systems 2, 3 (4 In-Context)	17.02 Installs piping and components for hydronic systems 2, 3 (4 In-Context)	17.03 Tests hydronic systems 2, 3 (4 In-Context)	17.04 Services hydronic systems 2, 3 (4 In-Context)
F-18 Installs, tests and services hydronic heating and cooling equipment	18.01 Installs hydronic heating equipment 2, 3 (4 In-Context)	18.02 Installs hydronic cooling equipment 2, 3 (4 In-Context)	18.03 Tests hydronic heating and cooling equipment 2, 3 (4 In-Context)	18.04 Services hydronic heating and cooling equipment 2, 3 (4 In-Context)

G – Installs, Tests and Services Specialized Systems

8%

Tasks within this Major Work Activity is not consistently performed by Plumbers across Canada, therefore content deemed not common core (MWA 20) will **not** be assessed on the Plumber certification examination.

G-19 Installs, tests and services specialized systems	**19.01 Plans layout and sizes piping and components for process piping systems** 4	**19.02 Installs piping for process piping systems** 4	**19.03 Installs components for process piping systems** 4	**19.04 Tests process piping systems** 4	**19.05 Services process piping systems** 4
G-20 Installs, tests and services potable water fire protection systems (Not Common Core)	**20.01 Plans layout and sizes piping for potable water fire protection systems** (Not Common Core)	**20.02 Installs potable water fire protection systems** (Not Common Core)	**20.03 Tests potable water fire protection systems** (Not Common Core)	**20.04 Services potable water fire protection services** (Not Common Core)	
G-21 Installs, tests, and services other specialized systems	**21.01 Plans layout and sizes piping, components and equipment for other specialized systems** 3, 4	**21.02 Instals piping and components for other specialized systems** 3, 4	**21.03 Installs equipment for other specialized systems** 3, 4	**21.04 Tests other specialized systems** 3, 4	**21.05 Services other specialized systems** 3, 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
Basic Tools and Equipment	TOOL 137 – Theory	30
	TOOL 138 – Shop	30
Piping Fundamentals	PIPE 140 – Theory	30
	PIPE 141 – Shop	30
Introduction to Graphics	GRPH 132	30
Plumbing Codebook	CODE 170	30
Gasfitting (Exceed)	PIPE 150	30
		240

Level Two	Transcript Code	Hours
Plumbing Codebook	CODE 270 – Theory	27
	CODE 271 – Shop	27
Plumbing Systems	PIPE 240 – Theory	27
	PIPE 241 – Shop	27
Hydronic Systems	HDRO 260 – Theory	47
	HDRO 261 – Shop	7
Gasfitting (Exceed)	PIPE 280 – Theory	42
	PIPE 283 – Shop	12
Electric Controls (Exceed)	ELEC 281	24
		240

Level Three	Transcript Code	Hours
Plumbing Codebook	CODE 370 – Theory	27
	CODE 371 – Shop	27
Plumbing Systems	PIPE 340	54
Hydronic Systems	HDRO 360	27
Gasfitting (Exceed)	PIPE 350 – Theory	27
	PIPE 351 – Shop	27
Electric Controls (Exceed)	ELEC 370	24
Gas Appliance Service (Exceed)	HVAC 300	27
		240

Level Four	Transcript Code	Hours
Water Conditioning	WTER 421	27
Pump and Private Water Supply	WTER 420	27
Introduction to Low Pressure Steam	STEA 450	27
Special Piping Systems	PIPE 448	27
Process Piping	PIPE 449	27
Graphics	GRPH 432	27
Gasfitting (Exceed)	PIPE 450	27
Electric Controls (Exceed)	ELEC 470	24
Plumber Codebook	CODE 4XX*	27
*subject to change		240

ON-THE JOB AND IN-SCHOOL TRAINING CONTENT FOR THE PLUMBER TRADE

This chart outlines on-the-job examples for apprentices to achieve relevant work experience to prepare for the topics of technical training. Topics of technical training are provided with the associated learning outcomes.

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *attending shop safety meetings*
- *insisting on appropriate work clothes and personal protective equipment*
- *having the apprentice attend training for WHMIS*
- *demonstrate how lock out and tag out procedures work and why*

Introduction to Graphics — 30 hours

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *reviewing and explaining on-site blueprints and shop drawings discussing what different symbols mean*
- *explaining and demonstrating how a scale ruler is used and interpreted*
- *demonstrating how on-site blueprints and hand-drawn isometric drawings are used for material take-off*

Basic Tools and Equipment – Theory — 30 hours

- discuss the use and care of hand and power tools
- discuss access equipment
- explain hoisting and rigging equipment
- explain crane hand signals
- discuss knots and hitches
- describe welding equipment
- explain soldering and brazing equipment

Basic Tools and Equipment – Shop **30 hours**

- demonstrate the safe use and care of hand and power tools
- demonstrate access equipment use
- use hoisting and rigging equipment
- use crane hand signals
- tie knots and hitches
- use welding equipment
- perform soldering and brazing

Mentors can assist the apprentice to prepare for this section of technical training by:

- *spending time explaining what each tool is used for and demonstrating the proper use*
- *making the apprentice perform a shop inventory to learn the proper names of materials and tools*
- *demonstrating safe work habits regarding trenching, confined spaces, ladders and scaffolds*
- *having the apprentice participate in lifting procedures, explaining how and when clevises, slings and other rigging equipment is used*
- *demonstrating, then supervising the apprentice during actual lifts of materials and equipment for crane hand signalling procedures*
- *demonstrating how knots are tied and when each should be used*

Piping Fundamentals – Theory **30 hours**

- discuss piping system layout
- discuss piping system measurements
- explain piping system offsets
- identify pipe support systems
- discuss pipe sleeves
- define piping system commissioning
- discuss piping system protection

Piping Fundamentals – Shop **30 hours**

- assemble copper tube and tubing
- assemble plastic tube and tubing
- assemble steel pipe project
- install a hybrid piping system

Mentors can assist the apprentice to prepare for this section of technical training by:

- *assisting the apprentice to identify the various fittings found in the shop and describing their use*
- *demonstrating the proper procedure for jointing of all piping materials and the bending and flaring of copper tube, then allowing time for the apprentice to practice these techniques on scrap materials*
- *having the apprentice repetitively perform tasks required to work with these materials*
- *describing the various types of piping supports and hangars and demonstrating their installation procedures*
- *demonstrating how piping support frequency is calculated using the code book*
- *demonstrating the proper procedure to join copper pipe using the appropriate solder and flux*
- *demonstrate the proper procedure to join plastic tube and tubing*
- *demonstrate the proper procedure to join steel*

Plumbing Codebook **30 hours**

- explain drainage piping components
- explain dry venting
- explain wet venting
- size drainage, waste and venting (DWV) line drawings

- discuss rough-in requirements
- install bathroom rough-in

Mentors can assist the apprentice to prepare for this section of technical training by:

- *performing the work referring to a code book, demonstrating how it is used and interpreted*
- *describe and show the apprentice different types of venting and their functions*
- *have the apprentice use the code book to size drainage, waste and venting lines*
- *have the apprentice involved in bathroom rough-ins on the job*

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *explaining the gasfitting basics regarding safety and terminology*
- *allowing the apprentice to clock a meter to determine gas consumption*
- *allowing the apprentice to check gas pressures*
- *demonstrating how a code book is used and interpreted by having the apprentice find relevant code references as an exercise*
- *having the apprentice assist in the installation, service, testing and repair of domestic natural gas piping systems*

Level Two — 8 weeks — 240 hours

Plumbing Systems – Theory — 27 hours

- describe potable water distribution systems
- distinguish different piping materials for drainage, waste and vent and potable water systems
- discuss piping system protection
- discuss fire stopping materials
- explain fixtures and trim

Plumbing Systems – Shop — 27 hours

- plan piping system layout
- size piping system layout
- install rough-in plumbing
- install fixtures and trim
- test drainage, waste and venting (DWV) and potable water systems
- Inspect DWV and potable water systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *explain the various piping materials used for domestic piping systems*
- *exposing the apprentice to various types of domestic plumbing fixtures*
- *explaining what the purpose of each system (DWV) is used for*
- *explaining why there are different size requirements*
- *demonstrating proper piping practices*
- *having the apprentice size and locate cleanouts*
- *having the apprentice fully participate in the rough and finished testing of systems*
- *assisting the apprentice to size a potable water system*
- *having the apprentice install water closets, sinks, basins, bathtubs and showers from rough-in trim*
- *allowing the apprentice to install all types of piping, not just making the holes or digging the trenches*
- *explaining the requirements and restrictions for system installations with respect to appropriate permits and drawings*
- *allowing the apprentice to work on residential, commercial and industrial installations, if possible*

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *explain the various components of a boiler and their functions*
- *have apprentice install and service boilers*
- *have apprentice install and service hydronic heating systems and components*
- *explain circulators and how they are chosen to meet different system demands*

- *explain calculations for finding the volume of glycol required for a particular system*

Plumbing Codebook – Theory **27 hours**

- demonstrate orthographic projections
- demonstrate isometric projections
- apply codebook objectives for drainage, waste and venting (DWV) systems
- explain blueprints
- explain building specifications

Plumbing Codebook – Shop **27 hours**

- construct an orthographic drawing using an isometric template
- construct an isometric drawing using an orthographic template
- perform mathematical calculations
- demonstrate the relationship between the plumbing code, blueprints and specifications
- size drainage, waste and vent (DWV) systems
- draw DWV single line piping systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *ensure the apprentice can identify, name and size the drains and vents that make up a residential or light commercial plumbing system*
- *encourage the apprentice to make isometric drawings to accompany any material lists*
- *assist the apprentice to understand how to establish grades and elevations from a drawing*
- *supervising the apprentice to calculate the requirements, according to code, for small jobs*
- *allowing the apprentice to make out the material lists for smaller projects*
- *explain the importance of grades and elevation calculations*
- *expose the apprentice to the different sections of a set of blueprints and the information that can be found in each section*

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *having the apprentice assist in the sizing of low and high pressure gas piping systems*
- *explaining the combustions process for natural and propane gases*
- *continuing to further the apprentices ability to interpret the gas codes for both natural and propane gases*
- *demonstrating the operation, adjustment and servicing of atmospheric burners*
- *explaining series and parallel circuits*
- *assisting the apprentice to understand meter use while testing domestic controls and electrical systems*
- *exposing the apprentice to various flame safeguard systems*

- *having the apprentice assist in the installation of domestic appliances*
- *having the apprentice assist in the start-up of domestic appliances*

Electric Controls (Exceed) **24 hours**

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *explaining wiring diagrams and assisting the apprentice to analyze series and parallel circuits*
- *discussing the applications for different meters and demonstrating how they are used*
- *explaining how equipment controls are serviced*
- *supervising hands-on experience in electrical troubleshooting*
- *allowing the apprentice to attend manufacturer's seminars*

Level Three — 8 weeks — 240 hours

Plumbing Codebook – Theory — 27 hours

- demonstrate non-isometric lines
- identify procedures for establishing elevations with the builder's level
- identify procedures for establishing elevations with the laser level
- size storm drainage systems
- calculate grade and elevation
- solve sanitary drainage, waste and venting scenarios

Plumbing Codebook – Shop — 27 hours

- produce isometric drawings of drainage, waste and vent (DWV) systems
- demonstrate the use of a builder's level
- demonstrate the use of a laser level
- implement grid lines
- design a DWV system

Mentors can assist the apprentice to prepare for this section of technical training by:

- *continually referring to the code book to identify the parts of plumbing systems*
- *allowing the apprentice time to fully read the manufacturer's installation procedures for all installations*
- *supervising the apprentice during various commercial potable water systems and describing the basic operation*
- *giving the apprentice exposure to the installation and service of commercial systems from start to finish*
- *assisting the apprentice to size a commercial water supply piping system according to code*
- *demonstrating the use of a builder's level and laser level to establish elevations*
- *assisting the apprentice in sizing DWV and storm drainage systems*

Hydronic Systems — 27 hours

- discuss pump sciences
- calculate circulator requirements
- explain radiant heating concepts
- discuss piping strategy for multi temperature applications
- discuss design requirements for radiant panel heating systems
- recognize control systems
- discuss hydronic heating and cooling distribution piping

Mentors can assist the apprentice to prepare for this section of technical training by:

- *discussing with the apprentice the operation of circulators and how to choose the correct model*
- *explaining radiant heating system layout and operation*
- *assisting the apprentice in the installation of a hydronic heating system*
- *discussing the common controls and components of a hydronic heating system*
- *assist the apprentice in the commissioning of a hydronic system*

Gasfitting – Theory (Exceed) — 27 hours

- apply line sizing techniques for piping systems operating at two psi and less
- analyze the air supply requirements for gas appliances
- categorize domestic gas fired equipment based on flue loss and draft characteristics
- interpret combustion air code requirements for appliances for gas appliances and equipment

- interpret code requirements for flue gas removal from gas appliances
- examine category one vent system requirements

Gasfitting – Shop (Exceed) — 27 hours

- size domestic gas line
- determine combustion air opening sizes for Category 1 appliances
- size vent, vent connectors and common vent connectors for Category 1 appliances
- interpret blueprints and specifications

Mentors can assist the apprentice to prepare for this section of technical training by:

- *allowing the apprentice to size low and high pressure gas systems*
- *having the apprentice calculate the combustion and ventilation requirements on various installations*
- *demonstrating a flue gas analysis*
- *continuing to further the apprentice's ability to interpret the gas codes for both natural and propane gases*
- *assisting the apprentice to size the ventilation and combustion air required for high input appliances*
- *allowing the apprentice to assist in the installation of category I appliance venting*
- *exposing the apprentice to various ignition systems*
- *demonstrating how ignition modules and ignition systems are tested*
- *ensuring the apprentice participates in the test firing of appliances to confirm the operation of all safety components*

Plumbing Systems — 54 hours

- describe commercial plumbing fixtures
- recognize cross connection control devices
- explain potable hot water distribution systems
- size potable water distribution systems
- discuss municipal infrastructures
- discuss medical gas systems
- explain radon gas prevention systems
- discuss compressed air systems
- discuss underground sprinkler systems
- discuss swimming pools
- describe special piping systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *providing the apprentice experience installing commercial plumbing fixtures*
- *discussing the different kinds of cross connection control devices and where they are to be installed*
- *explaining how a hot water distribution system works and how to design systems correctly*
- *assisting the apprentice in sizing potable water systems*
- *discussing the requirements of specialized piping systems*

Electric Controls — 24 hours

- test the operation of electrical circuits
- describe the operation of electrical switches
- use electrical transformers
- use relays in electrical circuits
- compare the characteristics for alternating current (AC) motors

Mentors can assist the apprentice to prepare for this section of technical training by:

- *continually asking the apprentice questions to ensure understanding of switches, alternating current, electromagnets, transformers, motors, relays and diagrams*
- *supervising hands-on work with meters on larger heating equipment*
- *supervising hands-on work with pump controls*
- *having the apprentice troubleshoot heating equipment and pump controls*

Gas Appliance Service — 27 hours

- perform investigative maintenance on a forced air, natural gas furnace system
- perform investigative maintenance on a self-contained heat/cool forced air unit with economizer
- perform investigative maintenance on a residential hydronic heating system
- troubleshoot the mechanical sub-systems of a residential hydronic heating system

Mentors can assist the apprentice to prepare for this section of technical training by:

- *explaining the sequence of operations on a forced air, natural gas system*
- *supervising hands-on work maintaining gas equipment*
- *supervising hands-on work with venting and venting requirements*
- *having the apprentice troubleshoot heating equipment*

Level Four — 8 weeks — 240 hours

Special Piping Systems — 27 hours

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *having the apprentice identify the components of a medical gas system using codes and regulations*
- *describing how a silfos piping system is purged*
- *exposing the apprentice to various specialty piping systems and their components*
- *discussing and if possible, assisting the apprentice in the installation of a residential sprinkler system*

Pumps and Private Water Supply — 27 hours

- compare the available water sources
- discuss potable water supply system components
- explain pump theory
- design a rural water supply system

Mentors can assist the apprentice to prepare for this section of technical training by:

- *ensuring the apprentice knows the differences and applications for different wells and sources of water such as sandpoints, aquifers, artesian, deep and shallow wells*
- *having the apprentice identify and install the basic types of pumps required in a residential water system*
- *ensuring the apprentice can identify all components and accessories used for a rural pump installation*
- *assisting the apprentice to size a rural water supply system*
- *having the apprentice size the pressure tank for a domestic pump installation using charts and Boyles Law*
- *describing the various ways to protect rural systems from frost damage and have the apprentice assist in the installation of these materials if possible*
- *providing supervised exposure to the installation and troubleshooting of rural pump systems*

Process Piping — 27 hours

- explain the Saskatchewan Onsite Waste Water guide
- explain piping materials used in water treatment systems
- explain piping materials used in food processing systems
- discuss water reclaim systems

Mentors can assist the apprentice to prepare for this section of technical training by:

- *discussing rural sewage systems*
- *giving the apprentice exposure to rural sewage systems*
- *discussing food processing piping requirements*
- *explaining water reclaim systems*
- *exposing the water treatment systems*

Water Conditioning — 27 hours

- constituents of water
- water tests
- water treatment devices

- water treatment equipment sizing
- component installation

Mentors can assist the apprentice to prepare for this section of technical training by:

- *discussing water chemistry terminology*
- *citing examples to assist the apprentice to identify useable water sources and discussing amounts of contamination*
- *having a basic water test kit, demonstrating its use and discussing the outcomes*
- *describe the sizing of and have the apprentice participate in the installation of a water softening system and an iron filtering system*
- *supervising the apprentice during the installation of components for water treatment devices*

Graphics — 27 hours

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *ensuring the apprentice can interpret construction documents for system installations with regard to blueprints, specifications and room schedules (room finishes and ceiling heights)*
- *having the apprentice draw isometric drawings to show all waste and vent pipes according to code, including sizing*
- *having the apprentice continually do material take-offs for various types of system installations*

Gasfitting — 27 hours

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *continuing to further the apprentice's ability to interpret the gas codes for both natural and propane gases*
- *monitoring the apprentice in test firing and service procedures on domestic equipment*
- *having the apprentice commission, start and troubleshoot domestic category I to IV appliances and equipment*
- *explaining the purpose and the use of the B149.3 Gas Code as it relates to domestic applications*

Electrical Controls — 24 hours

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *continuing to expose the apprentice to progressively more difficult installations*
- *insisting the apprentice read all installation manuals from start to finish*
- *assisting the apprentice to interpret detailed wiring diagrams*
- *ensuring the apprentice has an understanding of cable selection, furnace controls and components and submersible pumps*

Introduction to Low-Pressure Steam — 27 hours

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

Mentors can assist the apprentice to prepare for this section of technical training by:

- *ensure the apprentice is exposed to low-pressure steam systems*
- *explain design and troubleshooting of low-pressure steam systems*

Plumber Codebook — 27 hours

- Integrate training from previous levels to install a circuit-vented drainage system
- Integrate training from previous levels to install a circuit vent system
- Integrate training from previous levels to install a potable water system
- Install fixtures complete with fixture trim

Mentors can assist the apprentice to prepare for this section of technical training by:

- *assisting the apprentice in interpreting the rules and regulations regarding plumbing installations*
- *explaining the background regarding common code rules and trade practice*
- *insisting that an apprentice look up installation practices*
- *assisting the apprentice in determining when to apply Saskatchewan Codes of Practice*

Consider apprenticeship training as an investment in the future of your company and in the future of your workforce. Ultimately, skilled and certified workers increase your bottom line.

Get involved in the apprenticeship training system. Your commitment to training helps to maintain the integrity of the trade.

Do you have employees who have been working in the trade for a number of years but don't have trade certification? Contact your local apprenticeship office for details on how they might obtain the certification they need.

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